

Integral Personal Computer

HP-UX Technical BASIC Implementation Guide



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1

Introduction

About This Guide

This guide describes the machine-specific aspects of the implementation of HP-UX Technical BASIC on the Integral Personal Computer.

HP-UX Technical BASIC is a version of BASIC developed from Series 80 BASIC for the HP-UX series of computers. It includes most of the Series 80 keywords found in Series 80 BASIC, including the keywords found in the Advanced Programming ROM, Printer/Plotter ROM, I/O ROM and the Matrix ROM. Although the language is similar, the interpreter itself will not run on Series 80 computers. This guide also describes how to transfer Series 80 programs and data files to the Integral Personal Computer. In most cases, Series 80 programs will run with only slight modifications.

Because of the machine-specific differences among HP-UX computers, the implementation of HP-UX Technical BASIC on each machine is slightly different. These machine-specific differences include:

- Special keys (including cursor keys, editing keys and function keys)
- Graphics capability
- Multiple window environment
- Printer enhancements
- Display enhancements
- BASIC keyword differences
- Memory speed

This guide provides information on each of these features to allow you to get the most out of the advanced features of your Integral PC.

This guide is divided into three chapters. The information in the three chapters is summarized below.

Chapter 1: Introduction

Chapter one provides information about what's in this manual and where to find more information.

Chapter 2: Integral PC Specifics

This chapter summarizes the machine-specific capabilities of the Integral PC that may be used from HP-UX Technical BASIC programs.

Chapter 3: Uploading Series 80 BASIC Files

The last chapter describes how to transfer Series 80 files to the Integral PC using the upload program provided on the utilities disc.

Where to Find More Information

For more information on HP-UX Technical BASIC, refer to one of the following manuals:

- *HP-UX Technical BASIC Getting Started Guide*
- *HP-UX Technical BASIC Reference*
- *HP-UX Technical BASIC Implementation Guide*
- *HP-UX Technical BASIC I/O Programming Guide*

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Integral PC Specifics

The Keyboard

This section describes some of the machine-specific features of the keyboard. For a general discussion of how to use the keyboard, refer to the owner's documentation provided with your computer. For a discussion of how to use the keyboard specifically with HP-UX Technical BASIC, refer to one of the following sections:

- BASIC Function Keys
- Programming the Function Keys
- The `ON KYBD` Statement
- Keyboard Escape Sequences

BASIC Function Keys

On the Integral PC, BASIC makes the following typing aid assignments to the function keys. Immediate-execute keys include a terminating carriage return; pressing the key is equivalent to typing the command and pressing `(Return)`.

BASIC Function Keys

Key	Key Label	Typing Aid	Immediate Execute?
f1	LIST	LIST (without parameters)	Yes
f2	RUN	RUN (without parameter)	Yes
f3	STEP	SINGLESTEP	Yes
f4	CONT	CONT (without parameter)	Yes

BASIC Function Keys (continued)

Key	Key Label	Typing Aid	Immediate Execute?
(f5)	SCRATCH	SCRATCH	No
(f6)	PRT IS	PRINTER IS	No
(f7)	PLIST	PLIST	Yes
(f8)	KEY LAB	KEY LABEL	Yes
(f9)	MS IS	MASS STORAGE IS	No
(f10)	DELETE	DELETE	No
(f11)	LOAD	LOAD	No
(f12)	STORE	STORE	No
(f13)	TR ALL	TRACE ALL	Yes
(f14)	CRT IS	CRT IS	No
(f15)	INIT	INIT	Yes
(f16)	EXIT	Exits BASIC	Yes

Programming the Function Keys

The eight function keys (f1) through (f8) on the Integral PC keyboard may be used with the shift key to provide up to 16 function keys. The unshifted keys are (f1) through (f8); the shift key is used to access (f9) through (f16).

The function keys may be used both from the keyboard (as typing aids) or from a BASIC program. To program the function keys, use the ON KEY# statement to define the key labels and functions. For example:

```
10 ON KEY# 16,"Repeat" goto 100
```

This statement will display the key label **Repeat** for (f16). It will cause the program to branch to statement 100 when (Shift)(f8) is pressed.



To redefine the typing aids available from the keyboard, use the ON KEY# statement without a line number. For example, to assign the CLEAR statement to the (19) function key enter the following statement:

```
ON KEY# 9, "CLEAR", "CLEAR~13" [Return]
```

Pressing (19) is equivalent to typing the CLEAR statement and pressing return.

These function key assignments are lost when you exit BASIC.

ON KYBD Statement

The ON KYBD statement is used to initiate program branching when a specific key is pressed. The escape sequences returned by the special keys on the Integral PC keyboard have been remapped in BASIC from the standard *Term0* sequences to the escape sequences listed in the following section. The escape sequence consists of the escape character plus one alphabetic character. For example, the escape sequence for the (14) function key is CHR\$(27)&"n". To branch on this key, enter the following statement:

```
10 ON KYBD value, CHR$(27)&"n" GOTO 999
```

When the key specified by the string expression is pressed, the ON KYBD statement returns a value equal to the ASCII value of the alphabetic character plus 256. For example, when function key (14) is pressed the variable *value* is assigned the value 366 (the decimal ASCII value of the letter n plus 256). Testing the value of the numeric variable provides a method of identifying the key that caused the interrupt when the string expression enables branching on more than one key. For example:

```
ON KYBD Keys, "1234567890" GOSUB Numberkeys
```

This example will cause the program to branch to Numberkeys whenever a numeric key is pressed.

Keyboard Escape Sequences

The following table provides a list of escape sequences returned by the Integral PC keyboard. (Because these escape sequences have been remapped, these values are valid only while running HP-UX Technical BASIC.)

Keyboard Escape Sequences

Key Name	Numeric Key Code	BASIC Escape Sequence
[f1]	363	~027k
[f2]	364	~027l
[f3]	365	~027m
[f4]	366	~027n
[f5]	367	~027o
[f6]	368	~027p
[f7]	369	~027q
[f8]	360	~027r
[f9]	371	~027s
[f10]	372	~027t
[f11]	373	~027u
[f12]	374	~027v
[f13]	375	~027w
[f14]	376	~027x
[f15]	377	~027y
[f16]	378	~027z
[→]	360	~027h
[Shift] [→]	326	~027F
[Clear line]	331	~027K
[Clear display]	330	~027J
[Insert line]	332	~027L
[Delete line]	333	~027M

Keyboard Escape Sequences (continued)

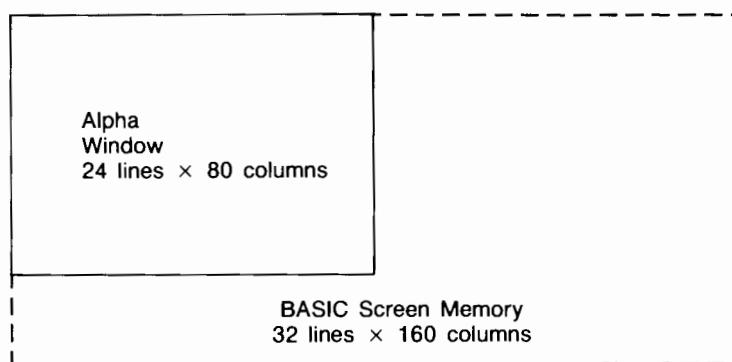
Key Name	Numeric Key Code	BASIC Escape Sequence
(Shift) Tab	361	~027i
Tab	329	~027I
Insert char (Mode On)	337	~0270
Insert char (Mode Off)	338	~027R
Delete char	336	~027P
Prev	342	~027V
Next	341	~027U
▲	321	~027A
◀	324	~027D
▼	322	~027B
▶	333	~027C
(Shift) ▲	339	~027S
(Shift) ▼	340	~027T

Alpha Display

The BASIC *alpha* window is created when the BASIC interpreter is invoked. The initial size of the window is 24 lines by 80 columns. The *alpha* window is a view into a 32 line by 160 column display buffer. Like other windows, the **Move** ((**11**)) and **Stretch** ((**12**)) function keys may be used to change the window. For information on how to control the alpha window, refer to the owner's documentation provide with your computer.

To change the position of the alpha window with respect to the display buffer, use the **Shift** key in combination with the arrow keys.

Figure 2-1.
Size of the Alpha Window



The normal mode for the alpha display is black characters on a white field. The window may be inverted by pressing the **Invert** ((f3)) function key on the system menu.

Other display modes may be obtained by sending the appropriate escape sequences to the display. The display modes are field-oriented. The escape sequences given below only affect the line from the current cursor position to the end of the line, or until the next escape sequence, whichever occurs first.

For example, to print one word in inverse mode, enter the following statement:

```
10 DISP "~27&dB INVERSE! ~27&d@"
```

2-6 Integral PC Specifics

Display Escape Sequences

The following table lists the escape sequences that can be used in BASIC to control the display. For more information, refer to the *Term0 Reference Manual* provided with the *Integral PC Programmer's Reference*.

Display Escape Sequences

Key Sequence	BASIC Escape Sequence	Effect
<code>(ESC) &dB</code>	<code>~27&dB</code>	Inverse mode.
<code>(ESC) &dD</code>	<code>~27&dD</code>	Underline mode.
<code>(ESC) &dF</code>	<code>~27&dF</code>	Inverse and underline mode.
<code>(ESC) &d@</code>	<code>~27&d@</code>	Turn off all display enhancements.
<code>(ESC) Y</code>	<code>~27Y</code>	Turn on display functions mode.
<code>(ESC) Z</code>	<code>~27Z</code>	Turn off display functions mode.

Display Line Length

Note that program lines listed in the BASIC window will normally extend to the edge of the window (or the currently defined line length) and then wrap around to the next line in the display. While this allows you to see the entire line, it can't be edited because it is now on two lines. If you want each line to be listed using the full width of the buffer, type in `CRT IS 1,160` to set the display line length to 160 characters before listing your program.

Screen Editing

HP-UX Technical BASIC on the Integral PC has limited screen editing capabilities. This means that any program line or statement on the 32 line screen buffer may be edited by simply moving the cursor to that line and using a combination of the **(Insert char)**, **(Delete char)**, **(Backspace)** and **(Clear line)** editing keys. The line can then be entered into program memory by pressing **(Return)**. Once a program statement has been entered into program memory it will not be lost until it is deleted, overwritten, or erased using the **SCRATCH**, **LOAD**, or **CHAIN** command.

For an example of screen editing, refer to chapter 3 of the getting started guide.

Multiple Windows

HP-UX Technical BASIC runs in a multi-tasking environment on the Integral PC. This means that users can have several processes running at the same time. For example, you may start a program in the **BASIC** window and then return to the **PAM** window. From the **PAM** window you can start other programs while your **BASIC** program is running. Multiple windows are also useful when you need to run a system utility while you are in **BASIC**. To format a disc, for example, simply return to **PAM** and run the **format_disc** utility, then return to **BASIC** and continue.

Both the **BASIC** interpreter and your **BASIC** programs run in the **BASIC alpha** window. If the **BASIC** program uses graphic statements the **BASIC** interpreter will create a **BASIC graphics** window.

BASIC Graphics

HP-UX Technical BASIC contains 47 BASIC keywords used to control the graphics window or plot. This section will discuss some of the machine specific aspects of graphics.

To enable you to use the BASIC graphics statements, the BASIC interpreter will automatically load the HP-GL (Hewlett-Packard Graphics Language) driver. And, unless the plotting device has been reassigned, it will also automatically create a BASIC *graphics* window when the first graphics statement is executed.

Graphics Window

The BASIC *graphics* window is a view into the graphics buffer. The graphics buffer is a 512 by 255 array of bits in memory. When plotted on the display, this corresponds to roughly 2.8 dots per millimeter over the entire 18 by 9 cm display. Like other windows, its size can be changed with the **Stretch** (f2) function key and moved with the **Move** (f1) function key (both on the graphic window's *system* menu).



Again, like other windows, the graphics window can be positioned by using the **Shift** key in combination with the cursor keys. The effect is as if the plotter buffer is “sliding” under the window.

Operation	Key	Description
Roll left.	Shift	Moves the display window left.
Roll right.	Shift	Moves the display window right.
Roll up.	Shift	Moves the display window up.
Roll down.	Shift	Moves the display window down.

Digitizing

The Integral PC has the capability to digitize from either the internal plotter or from a peripheral plotter. The syntax for the **DIGITIZE** statement is:

```
DIGITIZE XPosition, YPosition, Penstatus
```

To abort a digitizing operation, press **Break**.

Digitizing From the Internal Display. When DIGITIZE is executed in a program, it creates a graphics window and displays the pen icon.

To use the DIGITIZE statement directly from the keyboard (in the immediate execute mode), use the following procedure:

1. Enter the DIGITIZE statement followed by a **(Return)**.
For example: DIGITIZE X,Y
2. Select the graphics window using the display pointer.
3. Move the pen icon with a combination of **Select** and cursor keys. For example, to move the pen to the right press **Select****►** simultaneously.
4. Press **Enter** key to enter the pen coordinates. (The pen icon will disappear.)
5. Shuffle windows to return to the BASIC alpha window.

Digitizing From a Peripheral Plotter. Peripheral plotters using the HP-GL (Hewlett-Packard Graphics Language) instruction set may also be used to digitize. Use the arrow keys located on the plotter to move the pen. To enter the pen coordinates, press the **Enter** key on the peripheral plotter.

BPLOT Specifics

The maximum number of raster dots per row on the Integral PC is 512. This corresponds to 64 bytes per row.

VOLUME IS Statement

The volume labels on discs may be renamed using the VOLUME IS statement.* Peripheral disc drive device names on the Integral PC consist of the upper case letter D followed by three digits; volume number, HP-IB address, and disc drive number. For example, D020 is the device name of volume 0 of disc drive number 0 with HP-IB address 2. The one notable exception to this naming scheme is the internal disc drive which is named internal.

For more information on the naming conventions for disc drive devices, refer to the owner's documentation provided with your computer.

BEEP Statement

The BEEP statement on the Integral PC includes both the pitch and length parameters. The pitch parameter is interpreted as cycles per second, the length parameter in hundredths of a second.

Printer Enhancements

The built in inkjet printer may be controlled from BASIC by using escape sequences or control characters.

* You can't change the volume label of a disc that contains the current working directory.

To send an escape sequence to the printer, use "~27" or CHR\$(27) concatenated with the escape character. For example, to send the command to skip over the perforations, use one of the following BASIC statements:

```
10 PRINT "~27&11L"
```

or

```
10 PRINT CHR$(27)&"&11L"
```

The printer control codes can be sent by using the BASIC escape sequence listed below or by using the CHR\$ function. For example, to send a command to enable bold print, use one of the following statements:

```
10 PRINT "~14"
```

or

```
10 PRINT CHR$(14)
```

The following list summarizes both the control and escape sequences used to control the built-in inkjet printer. For more information on the printer enhancement escape sequences and control codes, refer to the owner's documentation provided with your computer. For information on escape sequences for peripheral printers, refer to the owner's manual for that printer.

Escape Sequences for the Built-in Printer

Key Sequence	BASIC Escape Sequence	Function
[ESC]=	~27=	Half Line Feed.
[ESC]&k {n}\$	~27&k {n}\$	Set print pitch {n}, where {n}=0,1,2,3.
[ESC]&dD	~27&dD	Enable underline mode.
[ESC]&d@	~27&d@	Disable underline mode.

Escape Sequences for the Built-in Printer (continued)

Key Sequence	BASIC Escape Sequence	Function
(ESC) &16D	~27&16D	Set line spacing to 6 lines per inch.
(ESC) &18D	~27&18D	Set line spacing to 8 lines per inch.
(ESC) &11L	~27&11L	Enable skip perforation mode.
(ESC) &1{n}P	~27&1{n}P	Specify total length of {n} lines per page.
(ESC) &1{n}F	~27&1{n}F	Set {n} lines of text per page.
(CTRL) H	~8	Backspace.
(CTRL) J	~10	Line Feed.
(CTRL) L	~12	Form Feed.
(CTRL) N	~14	Bold Print.
(CTRL) O	~15	Disable Bold Print.
(CTRL) M	~13	Carriage Return.
(ESC) &10L	~27&10L	Disable skip perforation mode.
(ESC) &s0C	~27&s0C	Enable Wrap-Around Mode.
(ESC) &s1C	~27&s1C	Disable Wrap-Around Mode.

Programming I/O Devices

The Integral PC provides a built in HP-IB interface and two I/O ports. A bus expander may be connected to each I/O port to provide space for additional interface or memory modules. At the time this guide was printed, the following interface modules were available for the Integral PC:

- HP 82919A Serial Interface
- HP 82920A Current Loop Interface
- HP 82921A 300/1200 BPS Modem
- HP 82923A GPIO Interface
- HP 82922A BCD Interface
- HP 82998A HP-IB Interface
- HP 82924A HP-IL Interface

For information on how to program either the built-in HP-IB interface or the plug-in interfaces, refer to the *HP-UX Technical BASIC I/O Programming Guide*.

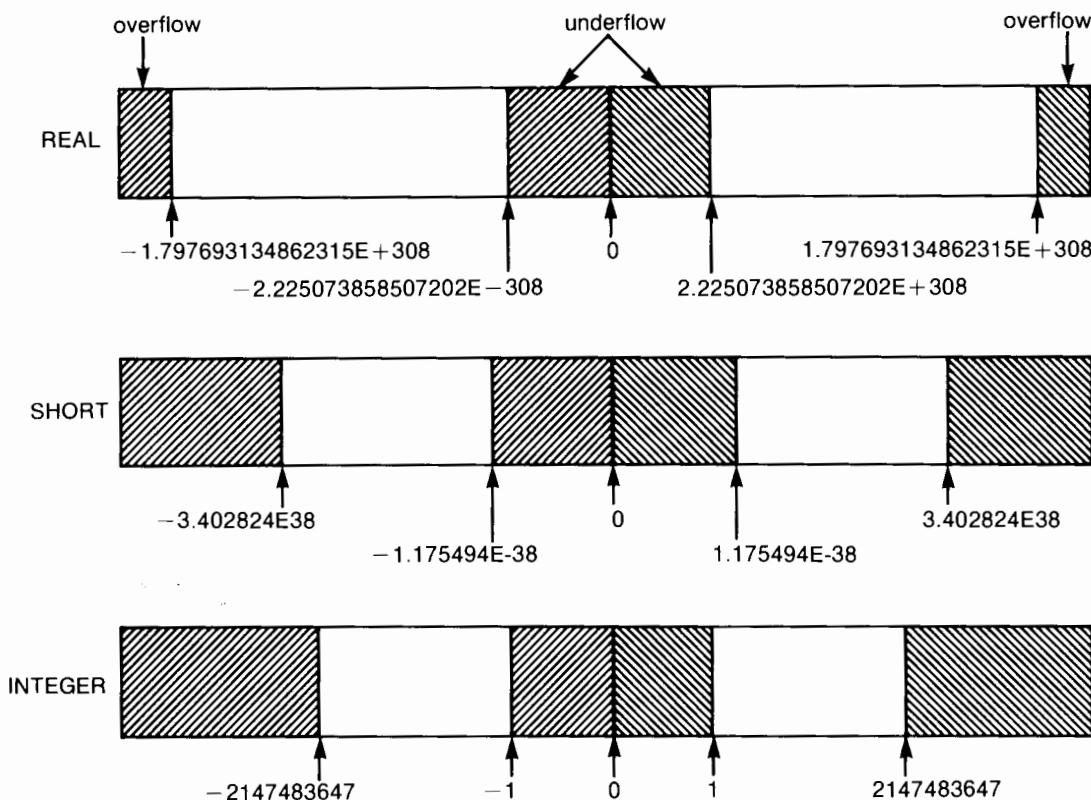
Program Performance

The use of plug-in memory modules in the bus expander will increase program execution times by as much as 30 percent. If program execution time is critical to your application, try configuring the system with all memory modules located in the built-in I/O ports.

Number Representation

Numbers are stored internally as binary numbers in HP-UX Technical BASIC. The following illustration shows the range of numbers that may be entered or stored in the Integral PC.

Figure 2-3.
Range of BASIC Variables



Storage Requirements

The following table gives the number of bytes required to store BASIC variables in the HP-UX disc file system.

Data Storage Requirements

Variable Type	Bytes in BASIC/DATA File
REAL	9 bytes.
SHORT	Individual variables or array elements: 9 bytes. Entire array: 5 bytes per element.
STRING	3 bytes + 1 byte per character + 3 bytes each time the string crosses a logical record boundary.

Copying BASIC

The README file on each disc contains a list of all the files in that disc, including a set of interface drivers provided for use with BASIC. Make sure you copy all the files relevant to your application. The interface driver must be present in the current working directory when you execute an ASSIGN statement that assigns an interface select code to that interface.



Autostarting the BASIC Interpreter

Autostarting the BASIC interpreter creates the PAM window and a BASIC window. The BASIC window is the active window.

To autostart BASIC, either the Autost file must be present in the same directory as the basic interpreter, or the basic interpreter must be in the search path designated by the variable PATH in your environment file. For more information on Autost files, refer to the owner's documentation provided with your Integral PC.

Autostarting BASIC Programs

To autostart both the BASIC interpreter and a BASIC program file, include the `bas_start` program in your `Autost` file. Use the following syntax:

```
bas_start program name & basic
```

If the program is located elsewhere than in the current directory, use an HP-UX pathname. The `bas_start` program is provided on the BASIC Utilities disc.

Loading Binaries

Binary files may be called from BASIC programs using the `CALLBIN` statement after the binaries have been loaded. Follow the procedure outlined in the dictionary section of the reference manual under `CALLBIN` to compile and load a binary program. Remember that the file must first be linked outside the BASIC interpreter before it is loaded. To link a binary module to libraries or other modules, use the link editor `ld` with the `-rd` options (the `ld` link editor is available with the HP-UX C Language compiler).

To call a binary program from BASIC, use the `CALLBIN` statement. For example, if the binary program has an entry point called "EntryPoint" use the following statement:

```
20 CALLBIN "EntryPoint"
```

Parameters may be passed either by address or by value. For example, in the following statement the address of the variable `addr` is passed as a parameter:

```
10 CALLBIN "EntryPoint" (addr)
```

In the following example, the value of the variable num is passed as a parameter:

```
10 CALLBIN "EntryPoint" ((num))
```

Both methods of passing parameters may be used in the same statement. For example:

```
10 CALLBIN "EntryPoint" (addr, (num), 15421)
```

For more information on the CALLBIN and LOADBIN statements, refer to the keyword dictionary section of the reference manual.

Disc Drive Naming Conventions

The special device files for disc drives are named using the following convention:

`D{volume-number}{HP-IB-address}{drive-number}`

For example, D020 is the special device file name for a disc drive with HP-IB address of 2, volume number 0, and drive number 0. Refer to the owner's documentation provided with your computer for more information on device naming conventions.

Specify the Default Direc- tory With MASS STORAGE IS

The parameter used in the MASS STORAGE IS statement can be in the form:

`" :D{volume-number} {HP-IB address} {drive-number}"`
special device file name

When the MASS STORAGE IS parameter uses the special device name, the disc in that drive is mounted, and the top-level directory of the disc becomes the current working directory. That disc should not be removed from the drive while it contains either the current working directory or an open file.

To swap discs:

1. Close any open files on the disc.
2. Execute MASS STORAGE IS, specifying a folder elsewhere than on the disc to be swapped.
3. Swap discs.
4. Execute MASS STORAGE IS, using the special device file name. This unmounts the old disc, mounts the new disc, and makes the top-level directory on that disc the current working directory.

The .bsc_config File

The `.bsc_config` (BASIC configuration) file is an optional file that is read by BASIC when the interpreter is invoked. If used, it must be in the current working directory at the time BASIC is invoked. The file consists of the following four lines:

aa
bb
cc
dd

where each entry is an integer and appears on a separate line. All four lines must be present. If you don't want to change a value, use the typical value given below.

The entries have the following meanings:

.bsc_config Entries

Entry	Typical Value	Meaning
<i>aa</i>	32	The number of lines in the BASIC window buffer.
<i>bb</i>	0	Reserves <i>bbK</i> -bytes of memory for your user program. Because the HP-UX operating system is a multi-tasking system, it can have several processes in memory at the same time. Because of this, the operating system may not be able to assign a large block of RAM to BASIC to run your BASIC application program without overrunning another program. To solve this problem, use a .bsc_config file with a <i>bb</i> entry large enough to accomodate your program.
<i>cc</i>	80	Line length of the display. This is equivalent to the following statement: <code>CRT IS 1,<i>cc</i></code>
<i>dd</i>	256	Driver block size in bytes, where $2 \leq dd \leq 1024$. This entry sets the block size for data transferred between the I/O device and the device driver. For more information on selecting the driver block size, refer to the <i>HP-UX Technical BASIC I/O Programming Guide</i> .

Using Interfaces in a Multi- Tasking Environment

The interface drivers used by BASIC are located either on the BASIC disc, the BASIC ROM, or the BASIC Utilities disc. BASIC I/O operations other than mass storage require use of these drivers, rather than the drivers included in the Integral operating system. Thus, a situation exists where there are two sets of drivers for each interface.

When an `ASSIGN` statement assigns an interface select code to an interface (for example, `ASSIGN 7 TO "hpiB"`), the BASIC driver becomes active. In a multi-tasking environment, it is necessary to prevent other applications from accessing that interface while the BASIC driver is using it. When assigning select codes to interface drivers located on the BASIC disc or BASIC Utility disc, the current directory must be the top level directory on the disc.

To prevent other applications from accessing a particular interface while BASIC is using it, a *lock file* is created by BASIC in `\tmp`. The lock file for the built-in HP-IB interface is `\tmp\hpiB.i.LCK`. Note that each interface has its own lock file. The lock file prevents the operating system and other processes from accessing the IB interface by suspending execution of the other programs until the lock file is removed by BASIC. Note that if BASIC is terminated abnormally, the user should delete the `.LCK` files in `\tmp` to allow the operating system and other processes to access the device files.

Once BASIC is through using the interface, you can restore access to the interface by other applications. To do this, execute:

```
ASSIGN file selector TO "*"
```

using the same *file selector* as before.

Note

For measurement and control systems using HP-IB instrumentation, we strongly suggest you use an HP 82998 HP-IB Interface to improve performance.

Unimplemented Series 80 Keywords

The following Series 80 BASIC keywords have not been implemented in HP-UX Technical BASIC:

BLINK, NOBLINK
CRT ON, CRT OFF
KEYLAG
INITIALIZE
PACK
PAGESIZE
RENUM
STOREBIN



Real Number Increments in FOR Loops

If real number increments are used in FOR loops, the actual number of iterations may differ by ± 1 count from what is expected. Either avoid using real values as parameters to FOR loops or test the loop alone to see if it behaves as expected.

3

Uploading Series 80 BASIC Files

Introduction

The upload utility program is provided to allow users to port Series 80 BASIC files to HP-UX Technical BASIC files on the Integral PC.

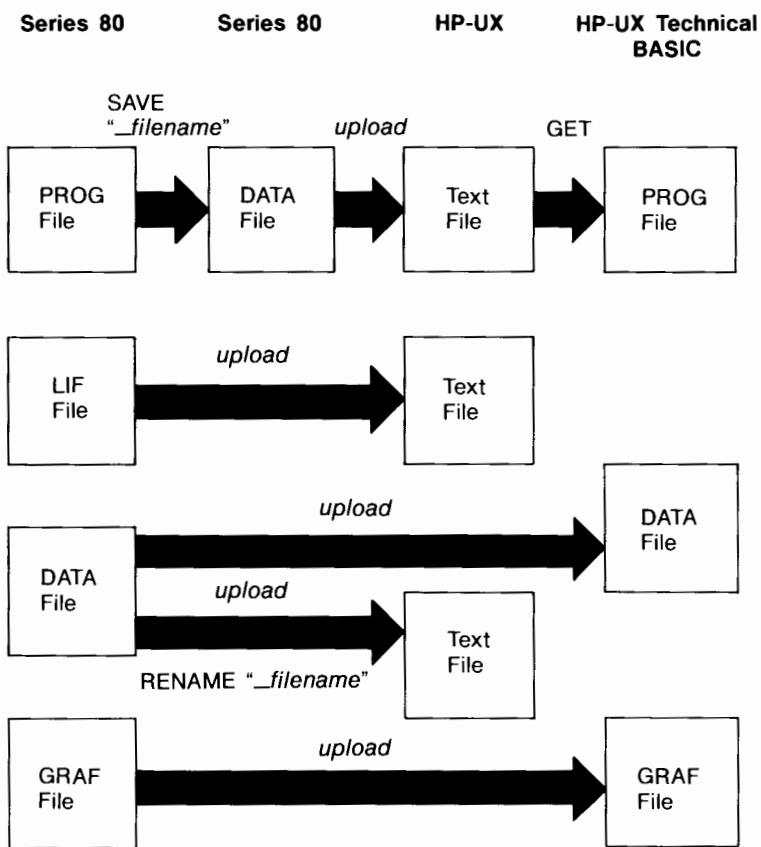
This utility will accept files from the HP-85, 86, and 87 computers.

The `UPLOAD` utility will transfer the following disc-based files:

- Series 80 BASIC Program Files (stored as ASCII DATA Files).
- Series 80 BASIC Logical Interchange Format (LIF) Files.
- Series 80 BASIC DATA Files.
- Series 80 BASIC GRAF Files.

The transfer process is illustrated below.

Figure 3-1.
Upload Process



Hardware Requirements

No additional hardware is required to run the upload program.

3-2 Uploading Series 80 BASIC Files

Limitations

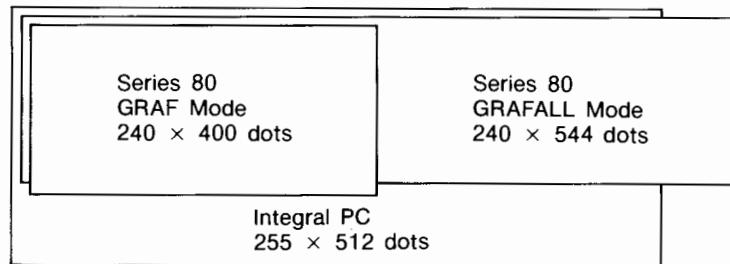
Number of Files. Up to 100 file names may be transferred in one batch from a single disc. If you need to transfer more than 100 files from any one disc, transfer the files in two or more batches. Files that have already been transferred in previous batches must be renamed on the source disc with an asterisk "*" as the first character in the file name before running subsequent batches.

Graphic Files. The sizes of the graphic screen on the HP-86/87 and the Integral PC are not identical. In the Series 80 GRAPH mode the screen size is 400×240 dots; in the GRAFALL mode the screen resolution is 544×240 dots. On the Integral PC the screen size is 512×255 dots. When a Series 80 file is transferred to the Integral PC, the GRAF files will either be padded out with zeros or truncated to fit. The result of the GRAF file transfer is given below.

Mode	Effect of Transfer on Series 80 GRAF File
GRAPH	Blank bytes are added in 112 bit positions on the right and 15 rows on the bottom.
GRAFALL	The rightmost 32 bit positions of each row are lost; blank bytes will be added in 15 rows on the bottom.

The relative size and position of the various screen sizes are illustrated below.

Figure 3-2.
Relative Size of Graphics Windows



Data Precision and Value Range. Another limitation is due to the differences in the internal representation of numbers. Transferring data files may result in numeric overflow or underflow conditions or in changes in precision.

In the overflow/underflow condition, the utility replaces all overflow or underflow values with the maximum or minimum values (INF and EPS) available on the Integral PC.

When the number to be transferred cannot be represented by a binary number, there will be a change in precision. Integer values will be transferred with no loss in precision.

Files Containing Non-displayable Characters. With the default character font on the Integral Personal Computer, characters with the ASCII decimal codes in the ranges 0 through 31 and 128 through 159 are non-displayable characters. When a program file is transferred to a HP-UX ASCII file, any non-displayable characters are escaped with a “~” followed by the character's three decimal digit ASCII code. (The “~” is represented on the screen as “~~”.)

Because this substitution expands lines of code in Series 80 BASIC, the resulting lines may be too long to use with the GET command. In this case the user will need to edit the ASCII text file. Once the parser has accepted the line containing the non-printing characters, the 4-character sequence is stored as a 1-byte ASCII character.

Preparation

Microflexible Disc Types

The upload program accepts both single- and double-sided microflexible discs. The internal disc drive in the Integral PC will not accept early versions of the single-sided 3½-inch disc that do not have the spring-loaded shutters (used with HP 9121 single-sided disc drive). If your source disc cannot be inserted into the internal drive, copy the disc on your Series 80 computer to a single-sided disc with a spring-loaded shutter.

Files on 5½-inch discs can be uploaded using the HP 82902M disc drive.

File Naming Conventions

It is recommended that Series 80 file names be restricted to upper and lower case alphabetic characters, numeric characters, the period, and the underscore character “_”.

Any files that you do not want to transfer can be masked with an asterisk “*” as the first character in the file name.

Series 80 Program Files

Converting Series 80 Program Files to ASCII Files.

Series 80 program files can *not* be directly transferred using this utility. Program files must first be converted into ASCII data files by the Advanced Programming ROM SAVE command or by the SAVE command available in the GETSAVE binary.

After using the SAVE command to convert the program into a data file, rename the file to start with an underscore character “_” (not a minus sign or a hyphen). This is to allow the utility to distinguish between the Series 80 DATA files that contain programs, and those that contain data. This is important since the GET command in HP-UX Technical BASIC cannot retrieve programs from DATA files.

Series 80 BASIC Programs Containing Binary

Programs. Any Series 80 program that contains binary program keywords may be transferred to an HP-UX text file. First use the Series 80 BASIC LOADBIN command to load the binary, then SAVE the file using a file name beginning with an underscore character. Use the upload program to convert the file, then in HP-UX Technical BASIC, use the GET command to retrieve the file. The parser will, however, flag all binary keywords as syntax errors or variable names.

To avoid syntax errors, try the following:

- 1.** Replace binary keywords with functionally equivalent ROM keywords, if possible.
- 2.** Replace binary keywords with user defined functions or subprograms.

3. Replace binary keywords with HP-UX Technical BASIC binary programs, for example, compiled C functions or subroutines.

If the program requires extensive editing, it may be more convenient to edit the program using an HP-UX editor such as *vi*. Note however that the HP-UX editors may only be used on ASCII text files, not on BASIC files.

Series 80 DATA, LIF and GRAF Files

No special preparation is needed to transfer regular Series 80 LIF, DATA or GRAF files to HP-UX text, DATA or GRAF files.

However, if the Series 80 DATA file is to be edited by an HP-UX system editor, it may be uploaded to an HP-UX ASCII text file by renaming the Series 80 source file to begin with the underscore (_) character.

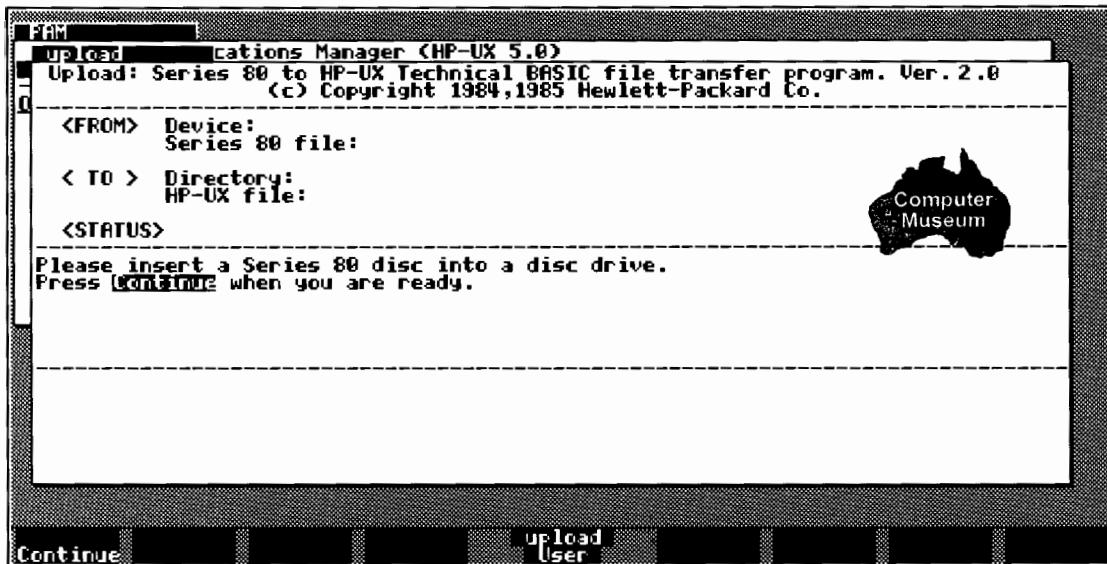
Running the Upload Program

Using the Single Internal Disc Drive

Use the following procedure to transfer Series 80 files if your Integral Personal Computer does not have a peripheral disc drive.

1. Insert the disc containing the *upload* utility program into the internal drive. Highlight and start the program or enter the program name in the PAM command line. The program window shown below will appear.

Upload Program Window



2. Remove the `upload` disc from the internal drive and insert the source disc containing Series 80 files. Press `Continue` (`f1`).
3. The program will prompt you for the name of the disc drive containing the Series 80 disc. Enter the *device name*.

Type in: `internal`

4. The program will prompt you to input the name of the destination folder. The `/tmp` folder should be present in the root folder, but it should not be used for the destination folder. If no suitable folder exists, shuffle the windows to get to the PAM window and use the `makefolder` utility to create a suitable folder. Return to the `upload` window and type in the name of the destination folder.

5. If you want to copy the entire disc, press: **Disc** ((f1)). If you only want to copy a portion of the disc, press the **Files** ((f8)) function key. Use the **Next** ((f3)) function key to move through the directory listing and the **Pick** ((f6)) function key to mark files that are to be transferred.

The program menu keys are summarized in the following table.

Upload Menu Keys

Menu Key	Function
Continue ((f1))	Continues to next step.
Disc ((f1))	Entire Series 80 disc is uploaded.
Larger ((f1))	HP-UX file will have larger logical record size than Series 80 source file.
Catalog ((f1))	Provides catalog of Series 80 source disc.
First ((f2))	Moves file selector to first file in directory.
Next ((f3))	Moves file selector to next file in directory.
Previous ((f4))	Moves file selector to previous file in directory.
Last ((f5))	Moves file selector to last file in directory.
Pick ((f6))	Picks file selected to be uploaded.
Quit ((f8))	Quits <i>upload</i> program.
Same ((f8))	HP-UX file will have same logical record size as Series 80 source file.
Files ((f8))	Enables user to select files.

Follow the directions in the window and use the menu keys provided.

6. The program will end with the following message:
**** End of the upload program ****

Using Multiple Disc Drives

When using multiple external microflexible disc or 5½-inch drives, do the following:

- 1.** Insert the utilities disc in the internal drive. Start the `mount_disc` utility.
- 2.** Insert the destination disc in an external drive. (If this is a new disc, it will need to be formatted first.)
- 3.** Follow the instructions in the `mount_disc` window and mount the destination disc.
- 4.** If you have another disc drive available, insert the Series 80 source disc in the drive. Do not mount this disc. Insert the disc containing the `upload` program in the internal drive, start the program.

Press **Continue** (f1).

When prompted, type in the device name of the disc drive containing the Series 80 files as the source.

When prompted for the destination disc, type in the volume label of the destination disc, starting with the root or “/” character.

- 5.** If you do not have another disc drive available, insert the disc containing the `upload` program in the internal drive. Start the `upload` program.

Insert the disc containing the Series 80 files in the internal disc drive. Press **Continue** (f1).

When prompted for the source disc, type in:

`internal` **Return**

When prompted for the destination disc, type in the volume label of the destination disc mounted in the external drive.

- 6.** Follow the instructions in the program window. After the program is finished, the destination disc will contain the uploaded Series 80 files in the HP-UX format.

Options

The full syntax for the `upload` program is:

```
upload -options source_device_name  
destination_folder_name
```

The options are summarized below. Options can be grouped in one string, for example, `-f gn`, or listed individually.

- `f` File by file transfer. The `upload` program will ask for the name of each file. Without this option, the program will copy all the files on the source disc when both the source and destination names are given in the argument string.
- `g` The `upload` utility allows transfer of HP-85 graphics data files with the `g` option. Note however that the HP-85 graphics data files will not show up as `GRAF` files, but rather as "****" when `CAT` is done on the disc.
- `n` Suppresses expansion of the logical record in the HP-UX Technical BASIC data file. Without this option, the program will create a `DATA` file that has logical record size 12.5 percent larger than that of the Series 80 file. For example, if the Series 80 file contains 24 byte logical records, the uploaded file will contain 24 byte logical records with the `n` option, or 27 byte logical records without the option. For applications requiring random access to each record, do not suppress expansion of logical record size.
- `s` All Series 80 `DATA` files will be uploaded as HP-UX text files. This option ignores the file name conventions to allow uploading of `DATA` files to HP-UX ASCII text files without renaming them.
- `e` Disables the non-printing character conversion routine. Without this option non-printing characters will be converted to a character string starting with the BASIC metacharacter (`\~`) when an HP-UX text file is created.

3-10 Uploading Series 80 BASIC Files

1, 2, 3 French, Spanish, HP-86B English language options (used with `-e` option). This option will cause the non-displayable characters to be mapped to the language character set specified. For example, in Series 80 BASIC, the Ä character is mapped to the ASCII "NAK" character. If it is uploaded to an HP-UX text file, using the `-e3` option, this nondisplayable character will be mapped to ASCII Ä (decimal 216), instead of being escaped with the string "`~21`".

Error Conditions

Destination Directory Full. If the destination directory becomes full and there are more files to be transferred, the program will stop and ask the user to specify another target folder name. Do the following:

If You Are Using Only the Internal Disc Drive:

- 1.** Remove the Series 80 disc.
- 2.** Insert a formatted disc.
- 3.** Move files from the target directory to the empty disc.
- 4.** Remove the disc and insert the Series 80 disc.
- 5.** Specify the target folder and continue transferring files.

If You Are Using an External Disc Drive:

- 1.** Remove the source disc. Select the PAM window.
- 2.** Insert the utilities disc and start the `unmount_disc` program. Unmount the destination disc.
- 3.** Remove the destination disc and insert another formatted destination disc.
- 4.** Run the `mount_disc` utility and mount the new destination disc.
- 5.** Remove the utilities disc and re-insert the source disc.
- 6.** Specify the name of the new destination disc and continue uploading programs.

Other Error Conditions. Several error conditions may stop or terminate program execution. These error conditions are summarized in the table on the following page.

Error Conditions

Condition	Program Response	Solution
Corrupt Series 80 Files	File will not be transferred. Program will go on to next file in the directory.	Check the file or disc on your Series 80 computer.
Source disc drive not found.	Asks for the correct disc drive name.	Check the <code>/dev</code> directory for the device name of the disc drive. Refer to the owner's documentation provided with your computer for device naming conventions.
Destination folder not found.	Asks for an alternate name.	Check the root directory in PAM for the destination folder. If the destination disc is in an external drive, check the <code>/dev</code> folder for the disc drive device file. If the device file is not found, run the <code>scan_discs</code> utility.
No valid file names or types found on source disc.	The program will issue a warning that the disc is empty, then stop.	Check the disc to be sure all program files have been saved as ASCII data files and stored with the correct file name. Check to be sure the asterisk character (*) is used only to mark files you do not want to copy.

