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Integral Personal Computer

HP-UX Technical BASIC Implementation Guide

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Guide to Documentation

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	Learn more about the machine-specific features of HP-UX Technical BASIC	*HP-UX Technical BASIC Implementation Guide* (82860-90004)
	Find out more about the syntax	*HP-UX Technical BASIC Reference Manual, Vol. 1* (82860-90002)
	Program I/O devices	*HP-UX Technical BASIC I/O Programming Guide* (82978-90001)
	Find description of error messages	*HP-UX Technical BASIC Reference Manual, Vol. 2* (82860-90003)
	Program using display or printer enhancements	*Integral PC Comprehensive Guide* (00095-90025)
	Upload Series 80 files to the Integral PC	*HP-UX Technical BASIC Implementation Guide* (82860-90004)
	Create binary subprograms using the HP-UX C language	*Getting Started With HP-UX C* (82857-90001)
	Create binary subprograms using the MC68000 assembly language	*Getting Started With HP-UX C* (82857-90001)
	Learn more about programming in HP-UX Technical BASIC	*HP-UX Technical BASIC Programming Guide* (98680-90035)

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 new 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

Summarizes what information is in this manual.

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

This chapter desribes how to transfer Series 80 files to the Integral PC using the upload program provided with the BASIC interpreter.

Where to Find More Information

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

1. *HP-UX Technical BASIC Getting Started Guide**
2. *HP-UX Technical BASIC Reference**
3. *HP-UX Technical BASIC Implementation Guide**
4. *HP-UX Technical BASIC I/O Programming Guide*† (82978-90001)
5. *HP-UX Technical BASIC Programming Guide*† (98680-90035)

* Provided with HP-UX Technical BASIC Interpreter.

† May be ordered separately.

2 Integral PC Specifics

The Keyboard

This section describes some of the machine-specific features of the Integral PC keyboard. For a general discussion of how to use the keyboard, refer to chapter 3 of the user's guide. 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 f9 function key enter the following statement:

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

Pressing f9 is equivalent to typing the `CLEAR` statement and pressing return.

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 f4 function key is `"~366"` or `CHR$(27)&"n"`. To branch on this key, enter one of the following statements:

```
10 ON KYBD value, "~366" GOTO 999
```

or

```
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 f4 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 causing the interupt when the string expression enables branching on more than one key.

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)

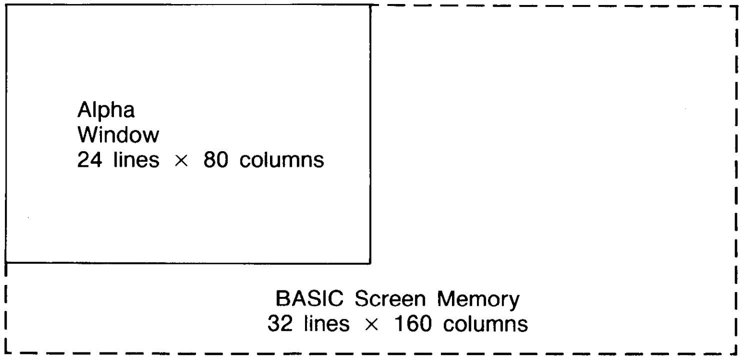
Key Name	Numeric Key Code	BASIC Escape Sequence
Shift Tab	361	~027i
Tab	329	~027I
Insert char (Mode On)	337	~027Q
Insert char (Mode Off)	338	~027R
Delete char	336	~027P
Prev	342	~027V
Next	341	~027U
▲	321	~027A
◀	324	~027D
▼	322	~027B
▶	333	~027C
Shift ▲	339	~027S
Shift ▼	340	~027T

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 on the Integral PC, the Move (f1) and Stretch (f2) function keys may be used to change the window. For information on how to control the alpha window, refer to chapter 2 of the comprehensive guide.

The size of both the alpha window and display buffer is shown below.

Figure 2-1. Size of the Alpha Window



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

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@"
```

Display Escape Sequences

Key Sequence	BASIC Escape Sequence	Effect
(ESC) **&dB**	`~27&dB`	Inverse mode.
(ESC) **&dD**	`~27&dD`	Underline mode.
(ESC) **&dF**	`~27&dF`	Inverse and underline mode.
(ESC) **&d@**	`~27&d@`	Turn off all display enhancements.

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. For more information about BASIC editing functions, refer to the *HP-UX Technical BASIC Programming Guide.*

Multiple Windows

HP-UX Technical BASIC runs in a multi-tasking environment on the Intergral 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

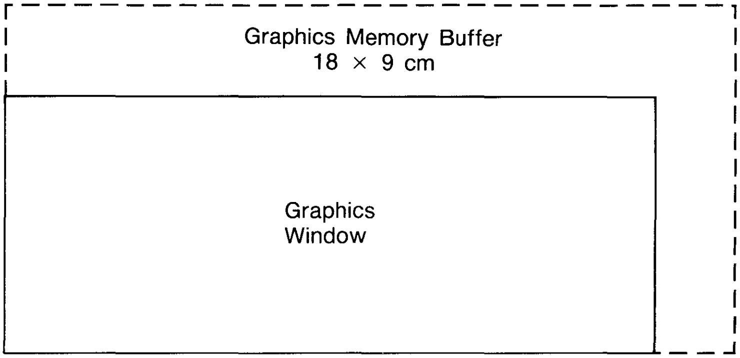
HP-UX Technical BASIC contains approximately 47 BASIC keywords used to control the graphics window or plot. This section will discuss some of the machine specific aspects of graphics. For more information on how to program using the graphics statements, refer to *HP-UX Technical BASIC Programming Guide.*

To enable you to use the BASIC graphics statements, the BASIC interpreter will automatically load the HP-GL (Hewlett-Packard Graphics Language) driver contained on the BASIC disc. 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. The size of the graphics window is initially 162 mm by 67 mm. But 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). The size of the graphics buffer and the initial position of the graphics window are illustrated below.

Figure 2.2
Size of the Graphics Window



Again, like other windows, the graphics window can be positioned over any portion of the plotter buffer 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 plotter buffer left.
Roll right.	(Shift)(▶)	Moves the plotter buffer right.
Roll up.	(Shift)(▲)	Moves the plotter buffer up.
Roll down.	(Shift)(▼)	Moves the plotter buffer 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
```

Digitizing From the Internal Display. When the `DIGITIZE` statement is executed from a program, it will create a graphics window and display the pen icon. Once the pen icon appears, use the cursor keys to position the pen on the plotter bed of the internal display. Press the (Enter) to enter the pen coordinates (the computer will beep to acknowledge the input). Press (Break) to pause the program and abort the digitizing.

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 left of the Integral PC keyboard or the (Enter) key provided on the peripheral plotter.

Keyword Specifics

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

PEN**.** The color of the dots plotted on the graphics display can be inverted using the **Invert** ((f3)) key on the BASIC graphics window system menu.

Graphics Menu

The **Graph** menu function keys can be used with the BASIC graphic window. To display the menu when the graphics window is active, press **Graphics** ((f5)) on the system menu. For more information on the **Graph** menu, refer to page 2-22 in the comprehensive guide.

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 full path name of the device file is **/dev/D020**. 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 on the Integral PC, refer to chapter 5 of the comprehensive guide.

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 in the Integral PC may be controlled from BASIC by using escape sequences or control characters.

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 (ESC l1L), use one of the following BASIC statements:

```
10 PRINT "~2711L"
```

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 appendix D of the comprehensive guide. For information on escape sequences for peripheral printers, refer to the owner's manual for that printer.

Printer Escape Sequences

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

Printer Escape Sequences

Key Sequence	BASIC Escape Sequence	Function
ESC **&l6D**	`~27&l6D`	Set line spacing to 6 lines per inch.
ESC **&l8D**	`~27&l8D`	Set line spacing to 8 lines per inch.
ESC **&l1L**	`~27&l1L`	Enable skip perforation mode.
ESC **&l**{*n*}**P**	`~27&l`{*n*}`P`	Specify total length of {*n*} lines per page.
ESC **&l**{*n*}**F**	`~27&l`{*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 **&l0L**	`~27&l0L`	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 and memory 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 82925A 256K Memory Module
- HP 82927A 512K Memory Module

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

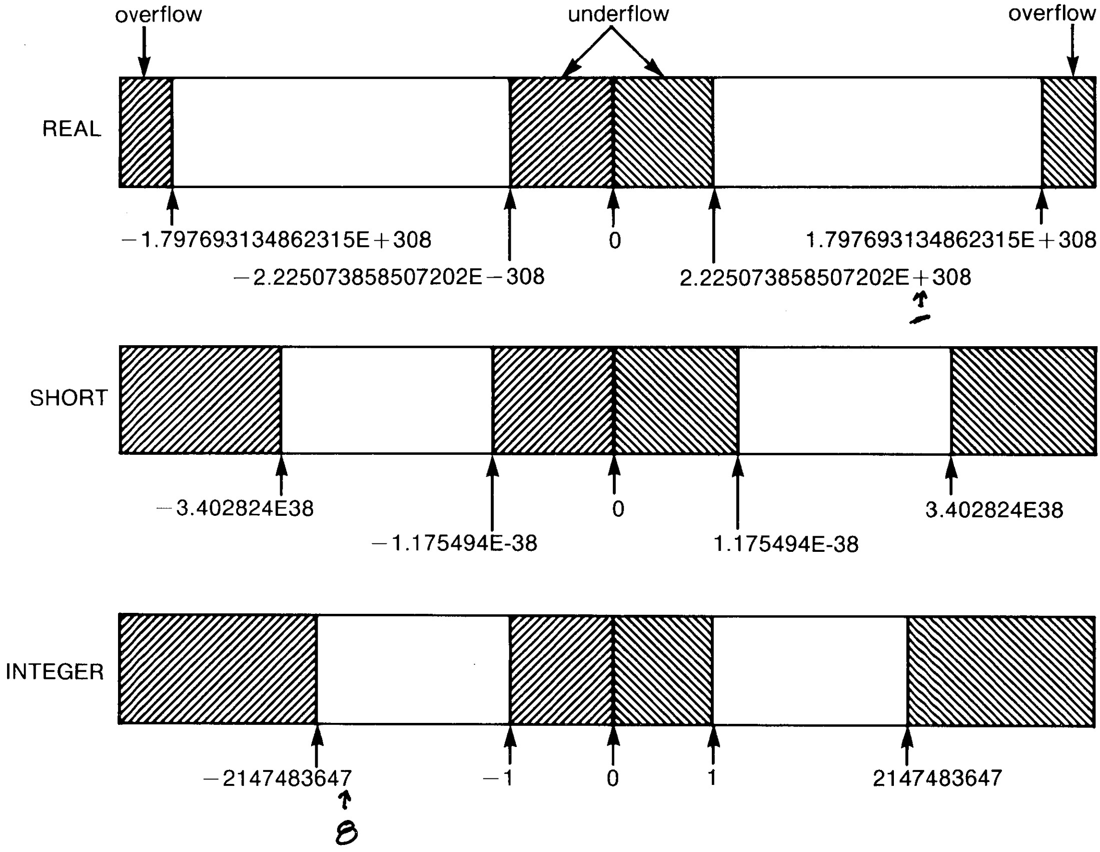
Program Performance

The use of external 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 mainframe 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.

Autostarting the BASIC Interpreter

The BASIC interpreter may be started automatically when the mainframe power is first turned on by using an **Autost** file. For example, to create an **Autost** file that will also start the PAM window, use the following procedure.

1. Create a working copy of the BASIC disc. (Refer to the getting started guide or to the user's guide for more information on how to copy discs.)
2. Create a file named **Autost** under the top-level directory on the disc and enter the following two line shell script:

```
echo "Now starting BASIC. Please wait."
BASIC #BASIC &
```

3. Save the file as an HP-UX text file.
4. Use the *chmod* command to add execute permission to the file. Type in `chmod +x Autost` (Return).

The disc is now ready to use. To automatically start BASIC when the power is turned on, simply insert the disc into the internal disc drive and turn the power on. The **PAM** window will first echo the message "Now starting BASIC. Please wait." When the BASIC window appears, it is ready to use.

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 information and examples on how to use binary programs in BASIC, refer to the *HP-UX Technical BASIC Programming Guide*. For more information on the CALLBIN and LOADBIN statements, refer to the keyword dictionary section of the reference manual.

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.

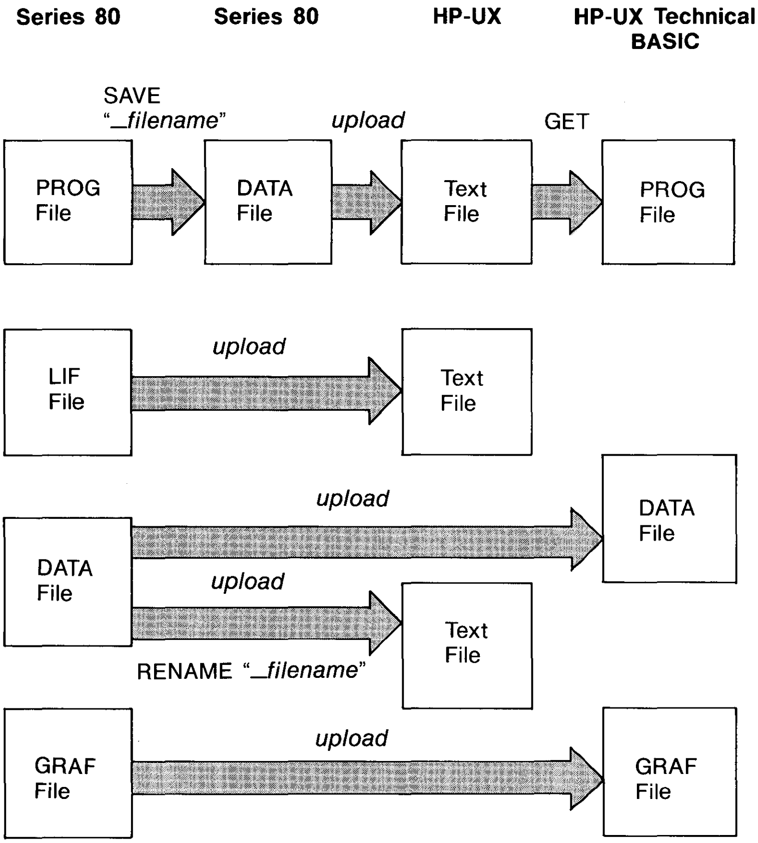
This utility will accept files from the HP-85, 86 and 87 computers.

The 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.

Limitations

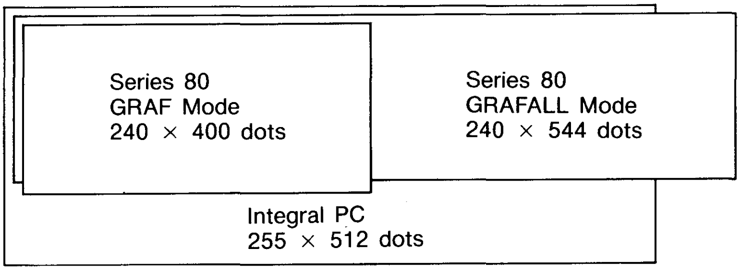
Number of Files. Up to 100 file names may be transferred in one batch from a single disc. If you need to transfer more than 100 files from any one disc, transfer the files in two or more batches. Files that have already been transferred in previous batches must be renamed on the source disc with an asterisk "*" 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 GRAPHALL 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.
GRAPHALL	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 Intergral 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 disc that do not have the spring-loaded shutters (used with HP 9121 single-sided disc drive). If your souce 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.

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 distinquish 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.

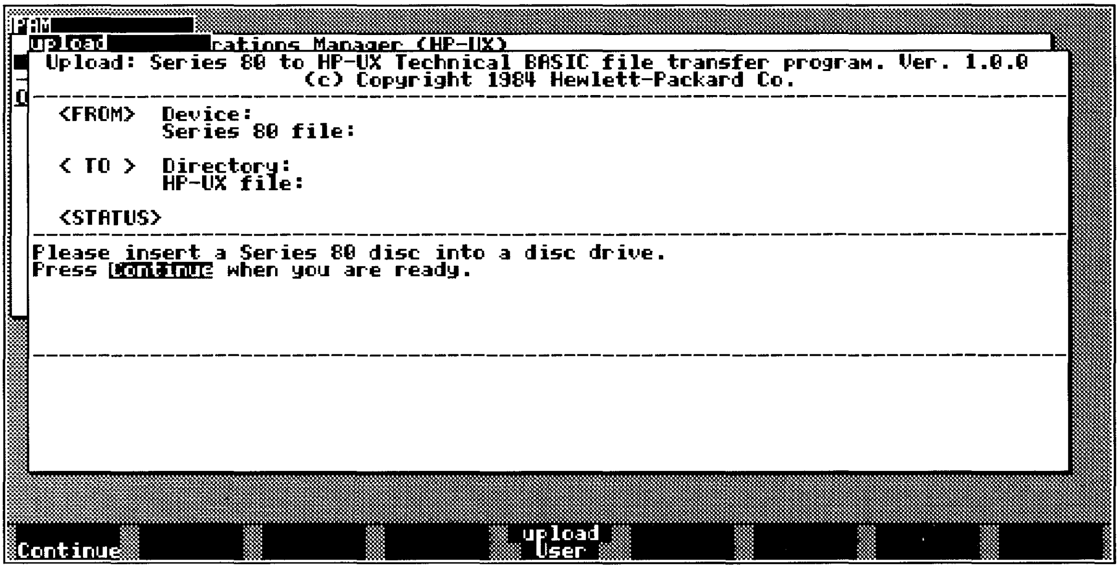
Running the Upload Program

Using the Single Internal Disc Drive

Use the following procedure to transfer Series 80 files if your Integral Personal Computer does not have an external 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



```
Upload: Series 80 to HP-UX Technical BASIC file transfer program. Ver. 1.0.0
                    (c) Copyright 1984 Hewlett-Packard Co.
------------------------------------------------------------------------------
 <FROM>  Device:
         Series 80 file:

 < TO >  Directory:
         HP-UX file:

 <STATUS>
------------------------------------------------------------------------------
Please insert a Series 80 disc into a disc drive.
Press Continue when you are ready.
```

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.
Files ((f8))	Enables user to select files.
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 *upload* program.
Larger ((f1))	HP-UX file will have larger logical record size than Series 80 source file.
Same ((f8))	HP-UX file will have same logical record size as Series 80 source file.

   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 5¼-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.

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.

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.

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.	Program terminates.	Check the **/dev** directory for the device name of the disc drive. Refer to the *Integral PC Comprehensive Guide* for device naming conventions.
Destination folder not found.	Program terminates.	Check the root directory in PAM for the destination folder. If the destination disc is in an external drive, check the **/dev** folder for the disc drive device file. If the device file is not found, run the *scan_discs* 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.

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 *Integral PC Comprehensive Guide* for more information on device naming conventions.