

Porting Considerations

Porting HP BASIC/9000 Programs to HTBasic for Windows

One of the hallmarks of RMB (Rocky Mountain Basic) has been the ability to develop applications, which will run on a variety of computer platforms. HTBasic for Windows adds the PC platform to the RMB family. This product note describes differences between HP BASIC/9000 (Including Series 200, 300, 400, and 700 computers) and HTBasic for Windows. Differences in hardware, file system, and keywords are discussed to help you move programs to HTBasic for Windows from other HP BASIC platforms.

The CONFIGURE command allows you to customize HTBasic for Windows to more nearly match the configuration of an HP 9000 computer. This command is described completely in the documentation supplied with the product.

Hardware Differences

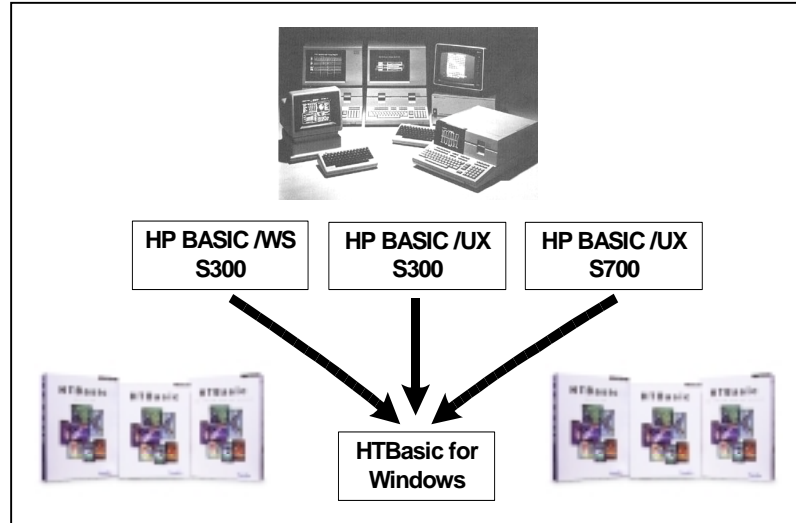
HTBasic for Windows compensates automatically for many of the hardware differences that exist between an HP BASIC/9000 and other hardware platforms. The following sections outline many of the differences and explain what limitations still apply.

Disk Drives

GPIB disk drives are not directly supported. HP LIF disks are not compatible with DOS disk formats and cannot be read or written directly by HTBasic for Windows. However, there are LIF utilities provided with HTBasic for Windows for transferring files from LIF disks. These utilities work with most PC floppy drive mechanisms. There are also third party utilities available for direct GPIB disk access.

Softkey Layout

Different keyboard layouts are used by HP BASIC/9000 and PCs. Some PC keyboards have the softkeys down the



left side of the keyboard, and some have them across the top of the keyboard. To make up for these differences and the lack of spatial coherence between the physical keys and the softkey menu, HTBasic for Windows menu labels have been numbered to provide numerical coherence. The label numbered "1" always corresponds to the softkey with the 1 printed on it. The number is not meant to be the softkey number.

To provide compatibility with programs written for the 9836 Nimitz keyboard (which starts with softkey K0), the command KBD CMODE can be used to turn on or off compatibility mode.

A New Backspace

Under HTBasic, the BACKSPACE key was assigned to CHR\$(255)&"B". This function does the same thing that the LEFT arrow key does. HP BASIC is unique in this treatment of the BACKSPACE key. For compatibility with the remainder of the computing community, HTBasic for Windows assigns a new function to the BACKSPACE key. Pushing BACKSPACE deletes the character to the left of the cursor. This function is named DEL LEFT and is equivalent to the function LEFT followed by DEL CHR. If you do not like this definition, you may redefine the key using the CONFIGURE KEY statement.

Series 300 Bit-Mapped (CRTB) Displays

With an HP 9816, 9836, or other HP computer with separate alpha and graphics hardware, some of the differences you find in HTBasic for Windows will be the same differences you would find moving to an HP 310 or another HP computer with a fully bit-mapped alpha/graphics display. On bit-mapped displays, the ALPHA image is written into one or more of the graphic planes. On HP BASIC/9000 workstations, one plane can be separated from the others for use solely for the ALPHA image. Or, all the planes can be merged for shared use between ALPHA and GRAPHICS. HTBasic for Windows supports both separated and merged mode.

When ALPHA and GRAPHICS are merged, ALPHA text is converted to graphic bits and written into the graphic planes, overwriting any graphics data that might be present. Therefore, ALPHA and GRAPHICS cannot be dumped separately. And when the ALPHA text is scrolled, any graphic data present will also be scrolled. CRTB Mode is the default for Windows system drivers. This mode gives the best HP 9000 emulation.

9836C (CRTA) Displays

The HP 9836C display is driven by CRTA Mode drivers. A CRTA display has distinct ALPHA and GRAPHICS images. Either the ALPHA or GRAPHICS images can be displayed, or both can be displayed at once overlapping each other. The hardware for the two images is independent. HTBasic for Windows emulates CRTA Mode drivers.

Processor

The instruction sets for the Intel x86 family of processors, Motorola 680x0 processors, and HP Precision Architecture processors are all different. Since a CSUB contains processor code, a CSUB cannot be moved from HP BASIC/9000 or HTBasic for Windows on one processor and executed under another. The same holds true for assembly routines called with WRITEIO 9827.

Timing Resolution

HTBasic only offers a minimum timer resolution of 55ms or more under Windows 95/98/ME; under Windows NT (3.51 and above) it is 10ms.

GPIB/IEEE-488

The GPIB bus is also known by the name IEEE-488 or HP-IB bus. Most computers are not sold with an integral IEEE-488 interface. Contact TransEra for information on supported interfaces for the PC and other platforms running HTBasic for Windows.

Character Set

The default character set used by the IBM PC is different from the HP Roman-8 character set used by HP BASIC/9000. The differences exist in characters CHR\$(128) and above. In HTBasic for Windows, all characters from CHR\$(128) through CHR\$(254) are allowed in variable names. If running a program with HP BASIC/9000 and HTBasic for Windows, you should restrict variable names to characters from CHR\$(161) to CHR\$(254) and the legal characters less than CHR\$(128).

Shared Resource Manager (SRM)

HTBasic for Windows can be a classical SRM client on an SRM server. Also, with SRM/UX servers, the PC can access the files on the server using NFS. HTBasic for Windows is also compatible with most industry standard networks

such as NetWare, LAN Manager, and Windows NT.

Miscellaneous Differences

The serial interface is enhanced with XON/XOFF flow control, and is enabled by default. If you are porting existing programs that transfer binary data or ^S and ^Q characters as part of the data, you should turn off XON/XOFF flow control and turn on hardware handshaking with the statements:

```
CONTROL 9,100; 0
CONTROL 9,5; 0
CONTROL 9,12; 0
```

The maximum line number in HTBasic for Windows is 4,194,304. If you plan to also run a program on an HP BASIC/9000 series 200/300 computer, you should not use line numbers over 32,766.

ASCII Files

When entering data from files, data should be entered into variables of the same type as those used to output it. This general rule applies to HTBasic for Windows as well, and if violated can produce unexpected results. Consider this program:

```
10 CREATE "TEMP", 1
20 ASSI GN @I TO
   "TEMP"; FORMAT ON
30 OUTPUT @I; " 1, 2"
40 OUTPUT @I; " 3, 4"
50 RESET @I
60 ENTER @I; A, B
70 PRINT A, B
80 ASSI GN @I TO *
90 PURGE "TEMP"
100 END
```

The program violates the matching-type rule by outputting strings and then entering numerics. Intuitively, you expect line 70 to print 1 and 2, which it does. When line 10 is changed to CREATE "BDAT", the same result is produced. However, if line 10 is changed to CREATE "ASCII", then HP BASIC/9000 prints 1 and 3. This discrepancy has been corrected in HTBasic for Windows. If you have written programs that use ASCII files and violate the matching-type rule, you should correct them before running them with HTBasic for Windows. If your program must run with both HP BASIC/9000 and HTBasic for Windows, you must either adhere to the matching-type rule, or use another file type.

File Systems

A primary difference between HP BASIC/9000 and HTBasic for Windows is that HP BASIC/9000 does its own file I/O, while HTBasic for Windows has the operating system do all file I/O. This has advantages and disadvantages. Any hard disk, diskette, network, or device accessible through the file system is accessible from HTBasic for Windows. HP LIF capabilities are not available so you cannot use HP LIF diskettes, GPIB disks, or tape drives, from HTBasic for Windows.

A couple of warnings are in order about the way most operating systems work. If a file is currently ASSIGNed, the operating system buffers some data in memory to make I/O faster. This buffering can produce unexpected results if the same file has multiple I/O paths ASSIGNed to it concurrently. Also, you should not remove a diskette while a file is ASSIGNed.

HP BASIC/9000 and HTBasic for Windows maintain compatibility with LIF file types by keeping a special file header for typed files (BDAT, LIF ASCII, and PROG files). The extra information that must be stored for these file types is kept in the header. The header is kept totally hidden from BASIC programs. However, to programs outside HTBasic for Windows, the header will be accessible as the first bytes of the file. Any files without the special header are known as "ordinary files". In a CAT listing, the file type is blank for ordinary files or reports the operating system.

In addition to HTBasic for Windows file headers, HTBasic for Windows can recognize and use HP LIF headers. This allows networked computers to directly interchange data between HP computer systems running HP BASIC/9000 and systems running HTBasic for Windows. The CONFIGURE CREATE {"HP" | "HTB"} statement allows the program to specify the type of file header to use when creating a new BDAT or LIF ASCII file.

LIF ASCII vs. Ordinary ASCII

Early versions of HP BASIC/9000 did not have a file type that matched DOS ASCII or UNIX ASCII files. Starting with BASIC 5.0, it does have an ordinary file type that can hold DOS

ASCII or UNIX ASCII data. With HP BASIC/WS or HP BASIC/UX, ordinary files are called "HP-UX" files. With the Measurement Coprocessor Card, ordinary files are called "DOS" files. No special header or other embedded information is placed in ordinary files. An ordinary file written with FORMAT ON is a DOS ASCII file. An ordinary file written with FORMAT ON, EOL CHR\$(10) is a UNIX ASCII file. Use the CREATE statement to create an ordinary file. In a CAT listing, an ordinary file is listed with the file type blank, or it gives the name of the operating system.

PC File System

The following sections describe some of the differences between the DOS (FAT) file system and the HP BASIC/9000 Logical Interchange Format (LIF) file system. This discussion is not meant to be a substitute for your DOS manual. You should read it for complete information on the topics presented here.

The FAT file system, like the Shared Resource Manager (SRM) file system, is a Hierarchical File System (HFS). An understanding of HFS, UNIX, or SRM file systems may aid you in understanding the FAT file system.

PC File Specifier

Under DOS, a file specifier has the form:

[d:] [directory path] filename[. ext]

Where:

d: is the drive letter. Usually this is A: and B: for the two diskette drives, and C: for the hard disk. Higher drive letters, D:, E:, and so on, usually refer to CD-ROMs, or network drives. This part of the file specifier corresponds to the msus of the HP file system, but is included on the front, not the end of the file specifier. It is optional, and if omitted, the current (or default) drive is used.

directory path is optional. It is explained later in this section.

filename is the main part of the file specifier. It may be one to 256 characters long. These characters are not allowed to be in a filename: . " / \ [] : | < > + = ; , and control characters whose ASCII value is less than the space character. All other characters are legal. The PC is not

case sensitive. Thus, you cannot have a file named "AbC" and another file named "aBC". DOS will consider both names to be "ABC". Be aware that a DOS file specifier is often referred to simply as a filename.

ext is the filename extension. The same characters that may be used in a filename may also be used in an extension. Certain conventions are used for filename extensions. Most of them are arbitrary, with a few exceptions noted below. Some conventional extensions are:

Extension	Conventional Use
.BAS	BASIC program
.PRG	BASIC program stored in prog type using STORE
.BDT	BDAT file
.AS	ASCII file
.DAT	BDAT or DOS data files
.TXT	Text file
.LIS	Text files or compiler listings
.LST	Another common listing file extension
.BAT	DOS batch files MUST have this extension
.COM	An executable DOS command or program
.EXE	An executable DOS command or program. DOS commands and programs MUST have one of these two extensions

While DOS does not have direct support for passwords on files, HTBasic allows the STOREing of files with password protection, and DOS has some access capabilities (similar to SRM access capabilities). These are discussed below. If passwords are present, they generate Error 462 -Invalid Password. If an HP style msus is present, it can be translated to a DOS path if specified by the CONFIGURE MSI statement. If no matching translation can be found, an error is returned. The CONFIGURE MSI statement has been added to HTBasic for Windows to allow HP style file specifiers to be used with a DOS file system. If DOS style file specifiers are used, then the CONFIGURE MSI statement is not needed.

DOS Directory Path

The DOS file system is "tree" structured, almost exactly like the HFS and SRM

file systems. The "/" character of the HFS file system is replaced with "\" in the DOS file system.

The file system is organized as a tree. Actually, it is usually thought of as an upside-down tree. The top of the tree is, thus, the root. The tree is composed of directories and files. Each directory may contain files and additional directories that act like branches down the tree. Directory names follow the same rules as filenames with extensions.

A directory path is the path you climb through in the tree to get from the root of the tree to a certain directory. It consists of the names of each directory that must be climbed through in order to get to that certain directory. The directory names are separated with the backslash "\" character

File Types and Access Capabilities

The DOS file system stores certain information about a file in addition to storing information in the file. This information consists of:

- file name
- number of bytes in the file
- modification date and time
- access capabilities
- location of the file on the disk

DOS does not store a record length or a file type. It does have access capabilities, although they are different from the SRM access capabilities. The access capabilities are called "attributes" by DOS and may be changed by the DOS ATTRIB command. They may also be changed by the HTBasic for Windows PROTECT command. The meanings of the attributes are:

Attribute	Meaning
hidden	The filename is not shown in a disk catalog although the file is there
read-only	The file may be read but not written to or deleted
system	The file is a system file

DOS Devices

HP BASIC/9000 accesses devices through interface and device select codes. The same is true of HTBasic for Windows. However, DOS also allows access to devices as if they were files.

Special names are given to devices by DOS, and when used in the place of a filename, access a device instead of a file. These names are called DOS Device Names and are typically: CON, AUX, COM1, COM2, PRN, LPT1, LPT2, and NUL.

DOS Wildcards

The question mark "?" and the asterisk "*" have special meaning to DOS. They are called wildcards and are used in DOS commands like DIR and the HTBasic for Windows CAT command in order to select more than one file. A filename with wildcard characters in it will be compared with existing filenames using special rules and all filenames that "match" will be selected. These are the rules used to match an actual filename with wildcards:

The "?" character will match any one character in the same position of an actual filename. For example, the string "? AT" will match the strings "CAT", "BAT", "MAT", or any other string three letters long that has an "A" as the second letter, and "T" as the third letter.

The "*" character will match zero or more characters starting at that position. For example, "*.BAS" will match all filenames that have the ".BAS" extension.

Keyword Differences

The following sections present, by keyword, various implementation differences between HTBasic for Windows and HP BASIC/9000. Most differences are the result of hardware differences, file system differences, or extensions in HTBasic for Windows. In some cases, DOS or UNIX commands that relate to BASIC commands are given. Some differences exist because of enhancements HTBasic for Windows. Many enhancements can be included in programs that run under both HP BASIC/9000 and HTBasic for Windows. One approach is to hide statements that will not parse under HP BASIC/9000 in OUTPUT KBD statements:

```
OUTPUT KBD; "CONFIGURE PRT  
TO 701" & CHR$(255) & "E";
```

Another approach is to set up a section of code that is executed only by HTBasic for Windows. When you GET the program under HP BASIC/9000, the lines with HTBasic for Windows syntax

enhancements will be commented out and ignored by HP BASIC/9000:

```
10 INTEGER Version  
20 Version = SYSTEM$  
  ("VERSION: HTB") <> "0"  
30 IF Version THEN 40  
  CONFIGURE PRT TO 701  
50 END IF  
60 END
```

When porting programs between HP BASIC/9000 and HTBasic for Windows, note the differences for the following keywords.

ALLOCATE

Under HTBasic for Windows, GOSUB and ALLOCATE use the same stack. Intermixing these statements can cause changes in available memory that are different from HP BASIC/9000.

ASSIGN

When an ASSIGN fails, the previous state of the I/O path is not preserved. Also, the CONVERT and PARITY options are not implemented.

Under Windows, if changes are made to an ASSIGNED file, the directory entry is not updated until the file is closed. Windows buffers read and write to disk. You should not remove a diskette while a file is ASSIGNED. Two I/O paths ASSIGNED simultaneously to the same file can produce slightly different results than HP BASIC/9000, depending on the buffering Windows does.

Under HTBasic for Windows ASSIGN includes two new options, FORMAT LSB FIRST and FORMAT MSB FIRST, to specify byte ordering of binary numeric data transfers. This provides the ability to do binary transfers with any device or computer, regardless of the byte ordering that device uses.

ATN2

ATN2 is an HTBasic for Windows function that returns the angle to a point.

BEEP

The BEEP statement generates a tone with the PC speaker. Both the frequency and the duration are adjustable.

BINEQV/BINIMP

These commands are HTBasic for Windows functions that perform a bit by bit equivalence operation.

BLOAD/BSTORE

The functionality of the HP BLOAD, BSTORE compiled subroutines is an integral part of the HTBasic for Windows language and does not require CSUBs. (See the GLOAD and GSTORE section.)

BUFFER

In HTBasic for Windows, it is usually incorrect to access numeric data in a buffer through the array name. ENTER and OUTPUT should be used instead.

CAT

HP BASIC/9000 uses wildcards as a primary filter and the SELECT option as a secondary filter in choosing filenames to display. HTBasic for Windows is designed to be used with one or the other. Use wildcards or the SELECT option, but not both.

CDIAL

CDIAL is not supported.

CHECKREAD

CHECKREAD is not supported

CINT

CINT is an HTBasic for Windows function that converts a value to INTEGER.

COMMAND\$

COMMAND\$ is an HTBasic for Windows function that returns a copy of the command line.

CONFIGURE

The CONFIGURE statement is an enhancement to HTBasic for Windows that allows the environment to be customized to a user's preference, or to match the user's HP hardware.

CONTROL and STATUS

Depending on the hardware interface, some CONTROL and STATUS registers may be different.

In some instances, HTBasic for Windows can pass arrays to and from a single register. This capability is used for things like gain control lists in data acquisition drivers.

COPY

HTBasic for Windows does not support the copy of a full disk to another disk. Use the operating system for full disk copies. Under Windows you can use

either the File Manager or the DOS "DISKCOPY" or "XCOPY" commands. The DOS XCOPY command is an extended COPY command that, among other things, allows you to copy entire disks when the disk sizes are not the same. The DOS COPY command is used to copy individual files. If wildcards are included in the command, then several files can be copied with a single command.

CREATE

Because Windows supports extendible files, the number of records specified in the CREATE statement is ignored. An invalid number does not generate an error as it will under HP BASIC/9000. Programs that depend on errors occurring by writing past the last specified record will not function correctly, as HTBasic for Windows will simply extend the file as needed. Programs that depend on the pre-allocation of the requested records should write dummy data at the time the file is CREATED. Under Windows it is sufficient to write data in the last record. Do not confuse a LIF ASCII file, created with CREATE ASCII, with a DOS ASCII or UNIX ASCII file, created with CREATE. Use the CONFIGURE BDAT MSB FIRST statement before creating BDAT files that will be moved to HP BASIC/9000.

DEF FN

Nested I/O is not allowed under HP BASIC/9000. For example:

```
10 PRINT FNX
20 END
30 DEF FNX
40 PRINT "DEBUG: START"
50 RETURN 0
60 FNEND
```

will produce an error under HP BASIC/9000. Nested I/O does not return an error under HTBasic for Windows, but should not be used.

HTBasic for Windows limits the depth that recursion can occur. The depth is limited by the size of the processor stack, not the BASIC workspace size.

DELSUB

HTBasic for Windows allows a string variable to specify the name of the subprogram or function to delete.

DLL Keywords

The Dynamic Link Library (DLL) Toolkit is provided to permit the use of exterior DLLs in HTBasic programs. Several keywords have been added to HTBasic for Windows to facilitate this new functionality.

DUMP DEVICE IS

By default, HTBasic for Windows uses the WIN-DUMP driver to provide support for any printer supported by Windows that supports bit maps. WIN-DUMP is only supported through select code 10. There are several other drivers for files and printer languages.

EDIT

EDIT SUB and EDIT FN are extensions in HTBasic for Windows. Several new edit functions are also included. (See the OUTPUT KBD section.)

ENABLE INTR

Depending on the hardware inter-face, some ENABLE INTR mask values may be different.

ENVIRON

ENVIRON\$ is an HTBasic for Windows function that returns information from the operating system environment.

ERRDS

ERRDS is not supported.

ERRM\$

HTBasic for Windows error messages are usually similar to those in HP BASIC/9000. Programs that depend on ERRM\$ returning the exact same message as HP BASIC/9000 should be modified accordingly. In particular, where an HP BASIC/9000 error message has seemed less descriptive than it should be, HTBasic for Windows returns a more descriptive message.

ERRN

Any error number of 2000 or greater is an HTBasic for Windows extension to HP BASIC/9000. Not all errors that can occur under HP BASIC/9000 can occur under HTBasic for Windows.

In general, and whenever possible, the error numbers returned for errors are the same as those returned by HP BASIC/9000. But in some instances, the operating system or environment in which HTBasic for Windows runs makes

it impossible or impractical to return the same number.

EXECUTE

The EXECUTE statement has been added to run operating system commands or other programs while HTBasic for Windows is running.

FIX

FIX is an HTBasic for Windows function that truncates a value to INTEGER.

FRACT

HTBasic for Windows allows the FRACT of a complex value, returning the fractional part of the real part of the complex value. HP BASIC/9000 gives error 620.

FRE

FRE is an HTBasic for Windows function that returns the amount of free memory.

GESCAPE Only HP BASIC/9000 operation selectors 1 to 6 are supported by GESCAPE. Operation selectors greater than 29 are enhancements to HTBasic for Windows.

GFONT

GFONT is a new command for HTBasic for Windows that allows the use of a true type Windows font with the LABEL command.

GLOAD and GSTORE

HTBasic for Windows enhances GLOAD and GSTORE with the capabilities of the HP BASIC/9000 BLOAD and BSTORE CSUBs to load and store partial screen images (rectangular blocks).

When performing a full screen GSTORE, HTBasic for Windows translates the image into the Windows .BMP format. If the resulting image array is output to a file, any application that recognizes the .BMP format can read, display, or modify that image. However, when performing partial screen GLOAD/GSTOREs, the format used is not sharable with other applications. In either case, the images are not compatible with those generated by HP BASIC/9000.

These subprograms can be used in place of the BLOAD and BSTORE CSUBs for users that want to continue calling

BLOAD/BSTORE instead of switching to the new GLOAD/GSTORE syntax:

```

10 SUB Bstore(INTEGER
   Int_array(*), W, H,
   OPTIONAL Rule, REAL X, Y)
20   SELECT NPAR
30   CASE 3
40   GSTORE CRT,
   Int_array(*), W, H
50   CASE 4
60   GSTORE CRT,
   Int_array(*), W, H, Rule
70   CASE 5
80   WHERE XO, YO
90   GSTORE CRT,
   Int_array(*), W, H,
   Rule, X, YO
100  CASE 6
110  GSTORE CRT,
   Int_array(*), W, H,
   Rule, X, Y
120  END SELECT
130 SUBEND
140 SUB Bload(INTEGER
   Int_array(*), W, H,
   OPTIONAL Rule, REAL X, Y)
150   SELECT NPAR
160   CASE 3
170   GLOAD
   CRT, Int_array(*), W, H
180   CASE 4
190   GLOAD
   CRT, Int_array(*), W, H,
   Rule
200   CASE 5
210   WHERE XO, YO
220   GLOAD
   CRT, Int_array(*), W, H,
   Rule, X, YO
230   CASE 6
240   GLOAD
   CRT, Int_array(*),
   W, H, Rule, X, Y
250   END SELECT
260 SUBEND

```

Note that only rule 3, replace, is currently supported.

GRAPHICS INPUT IS

Both HP BASIC/9000 and HTBasic for Windows do an implicit GRAPHICS INPUT IS assignment if you attempt to use graphic input statements before an explicit GRAPHICS INPUT IS.

The difference is that HTBasic for Windows does the implicit GRAPHICS INPUT IS as soon as HTBasic for Windows is started, and HP BASIC/9000 waits until the first graphic input statement is executed. The only known effect of this different approach is that under HP BASIC/9000, a SYSTEM\$ ("GRAPHICS INPUT IS") returns "0" until the first graphic

statement is executed and HTBasic for Windows returns the correct value anytime.

HELP

The HELP statement is an HTBasic for Windows statement. It provides on-line help for all language statements. Just enter HELP followed by the keyword of interest and HTBasic for Windows brings up the Reference Manual page for the requested keyword.

HIL

HIL related statements are not supported.

IMAGE

Entering data from a string using:

```
ENTER L$ USING "Y"
```

will always use the internal byte ordering of the computer. For PCs the byte ordering is LSB FIRST. For HP BASIC/9000, the byte ordering is MSB FIRST. This limitation applies to ENTER and OUTPUT with strings only. With devices, the byte ordering can be selected in the ASSIGN statement.

INITIALIZE

HTBasic for Windows does not support INITIALIZE. To initialize a new LIF disk, use "INITIALIZE" on an HP BASIC/9000. To initialize a new DOS disk, use the "FORMAT" command under DOS. To initialize a new HP-UX floppy disk, use the "mediainit" and "newfs" commands under HP-UX.

RAM disks are not supported with the INITIALIZE": MEMORY, 0" command. Many excellent RAM disk programs are available for the PC.

INP and INPW

INP and INPW are HTBasic for Windows functions for communicating with devices having no HTBasic for Windows device driver.

KBD CMODE

HP BASIC/9000 and HTBasic for Windows both use KBD CMODE for Nimitz keyboard softkey compatibility. The Nimitz keyboard is used on the 9836 and has ten softkeys, starting with k0. The labels are displayed at the bottom of the screen in two rows.

The difference between HP BASIC/9000 and HTBasic for Windows

implementation of KBD CMODE ON is that HTBasic for Windows exactly emulates the screen format for the labels, while HP BASIC/9000 uses an emulation that gives physical correspondence with the ITF 4-2-4 softkey layout.

LEXICAL ORDER

Several extensions are present in the LEXICAL ORDER statement of HTBasic for Windows to allow user definition of upper/lowercase rules for languages that are not built-in. The rules can also be loaded from a file.

LINE TYPE

LINE TYPE sets the style or dash pattern and repeat length of lines. This is, however, limited to available Windows line types.

LINK

LINK is not supported.

LIST BIN

LIST BIN lists the name and version number of each BIN currently in memory. (Programmable in HTBasic for Windows, but not in HP BASIC/9000.)

LOAD

HP BASIC/9000 PROG files and HTBasic for Windows PROG files are not compatible. To move programs between the two environments, use ASCII program files.

LOAD BIN

The LOAD BIN statement has been enhanced to allow software switches to be passed to device drivers. HP BASIC/9000 BIN files are not compatible with HTBasic for Windows.

LOADSUB

HTBasic for Windows allows a string variable to specify the name of the subprogram or function to load.

LONG

LONG is a new data type for HTBasic for Windows. LONG declares, dimensions and reserves memory for integers between -2,147,483,648 and 2,147,483,647. LONG variables can be declared and used in exactly the same ways that INTEGER variables are used. The only difference is the range of values allowed.

MASS STORAGE IS

The current "MASS STORAGE IS" includes not only the device, but also the current directory. In other words, it specifies not only which tree (device) you are in, but where in the tree (current directory) you are.

OUT and OUTW

OUT and OUTW are HTBasic for Windows statements for communicating with devices having no HTBasic for Windows device driver.

OUTPUT KBD

Three editor functions have been added to HTBasic for Windows and should not be used in programs that will be executed with HP BASIC/9000: DEL LEFT, NEXT WORD, and PREV WORD. Otherwise, all the two-character function key sequences (i.e., CHR\$(255)& CHR\$(X)) used by HP BASIC are compatible with HTBasic for Windows. If multiple statements are output in a single OUTPUT KBD statement, they are all executed before the next BASIC line. HP BASIC/9000 sometimes intermixes the execution with multiple BASIC lines, based on the presence or absence of "closure keys".

PERMIT

PERMIT is used under UNIX to set the permissions (mode) of a file, directory, or device. Permissions specify who can read, write, or execute a file, and who can search a directory. To change file attributes under DOS, use the PROTECT statement.

PHYREC, Phyread, Phywrite

The PHYREC utilities under HP BASIC/9000 allow physical disk sectors to be read or written. Such access usually provides enhancements or file utilities for LIF formatted disks. No PHYREC utilities are supplied with HTBasic.

PLOTTER IS

Both HP BASIC/9000 and HTBasic for Windows do an implicit PLOTTER IS assignment if you attempt to use graphic statements before an explicit PLOTTER IS. The difference is that HTBasic for Windows does the implicit PLOTTER IS as soon as HTBasic for Windows is started, and HP BASIC/9000 waits until the first graphic statement is executed. The only known effect of the different approaches is that under HP

BASIC/9000, a SYSTEM\$ ("PLOTTER IS") returns "0" until the first graphic statement is executed and HTBasic for Windows returns the correct value anytime.

HP BASIC/9000 supports only "INTERNAL" and "HPGL" graphic languages. HTBasic for Windows supports loadable graphic device drivers so it is not limited to these two choices. HTBasic for Windows also allows clip-limits to be specified when output is directed to a device, allowing use of plotters or printers that are incapable of returning p-points.

PRINT

HTBasic for Windows has been extended to allow the displacement of the attribute and color control characters that normally have the values CHR\$(128) to CHR\$(143). Since the PC has characters in this range that sometimes need to be displayed, HTBasic for Windows has the capability of moving the range with the statement CONTROL CRT, 100; 1.

PRINT LABEL and READ LABEL

PRINT LABEL and READ LABEL are used to set and read the volume label of a disk drive. HTBasic for Windows does not support PRINT LABEL; you must use the DOS "LABEL" command. To change the label of a disk from an HTBasic for Windows program, use the EXECUTE "LABEL x:" command. 9

PROTECT

PROTECT is used to set LIF file passwords under HP BASIC/9000 and DOS file attributes under HTBasic for Windows. A special form of PROTECT is used by HTBasic for Windows to change file attributes.

PRT

Under HTBasic for Windows, PRT is set by default to ISC 10, the default Windows printer. Therefore, PRT is set to ISC 10 instead of 701. Programs with statements that use PRT explicitly, such as "PRINTER IS PRT" need not be changed if a parallel printer is used on the PC. To change PRT back to 701, for IEEE-488 printers at primary address 1, use the statement "CONFIGURE PRT TO 701". It may be convenient to include this statement in your AUTOST file. This statement is not necessary if

you use the value 701 (or any other value) explicitly.

PURGE

PURGE is similar to a combination of the DOS DELETE and RD or RMDIR commands. Unlike DELETE, PURGE will only delete one file at a time, and will delete directories. PURGE will not delete a directory unless there are no files in that directory. Also, DOS will allow you to PURGE an ASSIGNED file if SHARE.EXE has not been loaded. The actual PURGE takes place after the file is closed.

QUIT

The QUIT command closed the child window. The QUIT ALL command exits HTBasic for Windows and returns you to Windows. Any program or data in memory is lost. You will be prompted to save or store any program changes before quitting.

READIO and WRITEIO

READIO and WRITEIO access hardware registers directly, and therefore, if the interface hardware is different than the hardware on an HP BASIC/9000, the READIO and WRITEIO registers will not be compatible.

RENAME

RENAME is used to change the name of a file or directory, or to move a file from one directory to another directory on the same disk. However, RENAME cannot move one directory to another.

SAVE

The SAVE statement in HTBasic for Windows can be set to save programs in either ordinary ASCII or LIF ASCII. This is done with the CONFIGURE SAVE ASCII statement.

SCRATCH BIN

SCRATCH BIN is not supported for HTBasic for Windows binaries. You must QUIT and restart HTBasic for Windows to scratch all binaries.

SET ALPHA/DISPLAY MASK

SET MASK is not supported.

SET CHR

SET CHR is not supported.

SET TIME/TIMEDATE

HP BASIC/UX keeps a BASIC time that is separate from the actual system time. SET TIME and SET TIMEDATE, specified without any time value, resynchronizes the two. However, in HTBasic for Windows, SET TIME and SET TIMEDATE with no time value, is ignored.

STATIC

STATIC is a new data condition for HTBasic for Windows. STATIC variables are persistent during a single run of an HTBasic program. Typically, STATIC variables will only be used in SUB programs and/or FN functions because the MAIN context is usually called only once.

STATUS

STATUS @Iopath, 2 always returns a 4.

STATUS @File, 3 returns the current length, not the CREATE length. This is because files are extendible under DOS and UNIX.

The STATUS() function (as opposed to the STATUS statement) is an addition to HTBasic for Windows. Any STATUS or CONTROL registers greater than 99 are also additions.

As in HP BASIC/9000, STATUS register 0 of interface cards contains the card ID. Interface cards that are available on a PC, but not on an HP BASIC/9000 are identified with ID numbers greater than or equal to 300.

STORE

HP BASIC/9000 PROG files and HTBasic for Windows PROG files are not compatible. To move programs between the two environments, use ASCII program files.

STORE SYSTEM

In HP BASIC/9000 this statement stores a copy of the operating system with all loaded BINs already linked in. Under HTBasic for Windows, this is not possible. Use AUTOST to load HTBasic for Windows device drivers.

SYMBOL

LORG 5 moves the symbol origin from (0,0) to (5,8). In HP BASIC/9000 it moves the origin to (4.5,7.5).

SYSBOOT

HTBasic for Windows does not support SYSBOOT, which under HP BASIC/9000 reboots the computer. Since HTBasic for Windows runs as a guest of the operating system, it is considered inappropriate to reboot the computer.

SYSTEM

The SYSTEM\$("DISP LINE") function is an HTBasic for Windows extension that returns the present contents of the display line.

The SYSTEM\$("VERSION: HTB") function returns the HTBasic for Windows version description, for example, "Windows Release 8. 0". This function can be useful for programs that run on both HP BASIC/9000 and HTBasic for Windows systems, enabling them to determine which system they are currently running on. This example sets a variable according to the system running the program:

```
10 SUB Whi ch_ system
20   COM /Whi ch_ system
   /Basi c_9000
30   Basi c_9000=(SYSTEM$
   ("VERSI ON: HTB")="0")
40 SUBEND
```

TIMEZONE

HTBasic for Windows does not require this statement and will return an error if an attempt is made to execute it. The editor will allow it to be entered, and the syntax checker will check it for correctness to allow you to develop programs and run them under HP BASIC/9000. HP BASIC/9000 requires this statement for two reasons:

- HP BASIC/UX keeps a time clock independent of the UNIX time
- It is possible to boot HP BASIC/WS on a computer whose real-time clock is set to Greenwich Mean Time (GMT)

TRANSFER

Currently TRANSFER is supported for files, buffers, the Serial bus, and GPIB.

WRITEIO

See the explanation under READIO for some differences. Other processors cannot execute the Motorola code accessed by WRITEIO 9827. The code must be rewritten.

XREF

HTBasic for Windows allows a string variable to specify the name of the subprogram or function.

Summary

This overview of the differences between HTBasic for Windows and other HP BASIC platforms should give you a good understanding of how easily your applications will move to this platform. If you have any further questions, please refer to the documentation supplied with the product or contact TransEra or your international distributor.