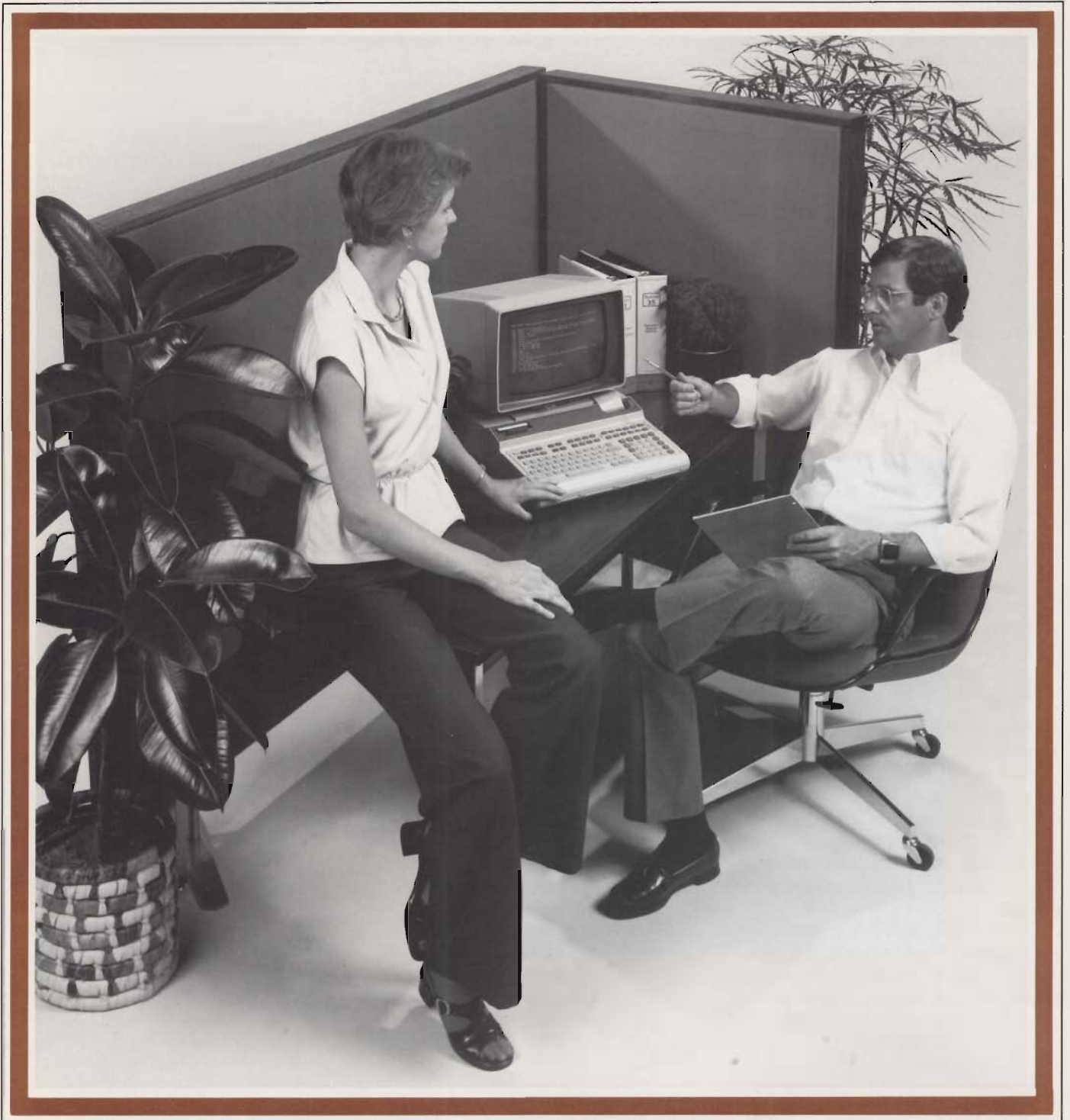


A Hewlett-Packard Software Summary
for the System 35 Desktop Computer

System 35 HPL to BASIC Translator



Translate 9825A/S programs easily to work with System 35

The Hewlett-Packard HPL to BASIC Translator helps translate programs written in HPL language for the 9825A/S Desktop Computer to BASIC language programs for the System 35 Desktop Computer. The translator, the first step in the translation process, is very useful as a time-saving device. The time ratio for translating an HPL program versus rewriting the program is approximately 1:10. For many programs, the translator will convert 80-90% of the HPL statements into BASIC.

A 9825 data-file translator provides for the translation of 9825 data files to HP BASIC mass-storage files. It includes options to obtain a list of the files on a 9825 tape, and to obtain a translation of Special Function Key files.

What Is It?

The HPL to BASIC translator is a series of BASIC language programs that run in the System 35 Desktop Computer. One of the most useful features is the capability of inserting 9825A tape cartridges into the System 35 for translation without using other peripherals or storage media. This is done by means of a binary program in the System 35 that can read 9825A cartridges.

How It Aids Translation

Translating a program from one language to another can be tedious in checking that all information is keyed in correctly, in determining the conversion of statements, and in knowing which portions of a program cannot be directly translated. The HPL to BASIC translator aids in all these areas.

Since HPL and BASIC are very different in some respects, the conversion process may not be complete. Some manual interaction will probably be required after the translator has converted the majority of the HPL code. This manual translation is necessary for the HPL statements that will not translate directly and for optimizing the translated code, when possible, to utilize the added power of the BASIC language.

To assist in the manual translation and optimization process, cross references of line numbers, labels, format statements and subprogram and function calls are provided.

Operation

The translator contains several different programs:

- Introduction and system set up
- Pass 1
- Pass 1B
- Pass 2
- Output Utility Routines
- 9825 Tape Cartridge Driver

These programs are used in the following sequence to translate an HPL program to BASIC.

1. The introduction program is loaded into the System 35.
2. You specify the method by which the HPL program is to be input:
 - from a 9825A tape cartridge placed in the System 35 tape transport,
 - from a 9825A through an HP-IB interface card into the System 35, or
 - from the System 35 keyboard.
3. You specify other system options for source file name, output file name, printer, interactive mode and additional variable dimensioning.
4. Pass 1: "PASS1" file is loaded into the System 35. A line-by-line translation is then done with the option to print each program line.
5. If any subprograms or functions exist in the HPL program, Pass 1B is then loaded. Pass 1B places all functions and subprograms at the end of the program, creates all subprograms and function headings, places all variables needed for the subprograms or functions in a *COM* statement in each subprogram or function and then calls Pass 2. In the interactive mode, Pass 1B also allows subprograms to be converted to simple subroutines.
6. Pass 2: "PASS2" file is loaded into the System 35. A second pass is done with each line of the translated HPL program printed. Any

translator errors or warnings are printed at this time directly above the line in which an error exists.

7. At this point, three different options are available:
 - Restart the translator by loading the introduction program.
 - Execute a *GET* of the BASIC language version of the HPL program translated. Using the *EDIT* mode of the System 35, errors in the translation can be corrected.
 - Load the utility routines which allow printing of various cross-reference tables to aid in debugging the BASIC program.

Figure 1 shows an example of an HPL program which has been translated to BASIC.

Program Exchange From The 9825 To The System 35

Several alternatives exist for transferring programs from the 9825 to the System 35. In each case, the program must be transferred as a list of ASCII string characters, one program line per string.

Method 1: Directly reading a 9825 program file from a 9825 tape cartridge. This method requires a special binary program supplied on the translator tape cartridge.

Method 2: Connecting the 9825 to the System 35 with an interface cable such as the HP-IB and transferring programs as string variables from the 9825 to the System 35.

Method 3: HPL programs stored as strings in a data file on a flexible disk initialized in the 9825 can be used directly on the System 35 to access programs for translation.

Errors Occurring During Translation

While an HPL program is being translated, various error conditions (HPL statements that will not translate) or warning situations (statements that need checking) are generated. These errors are printed directly above the affected program line during the output of the BASIC code. The only fatal errors that occur during translation are because of either invalid HPL syntax or an array limit being exceeded. These fatal errors are trapped and an error message is printed. The translation will then continue.

The two arrays used by the translator are dimensioned for a very large HPL program (700 program lines and 700 label characters). In case they overflow, the size of each array can be increased. Increasing the array size may result in needing a larger memory in the System 35.

What Instructions Does It Translate?

Mainframe: Most of the 9825 mainframe instructions will be translated. The majority of statements which will not translate directly are associated with the tape cartridge and the way files are structured in the 9825.

Strings/Advanced Programming ROM: All statements in this ROM will be translated.

Plotter ROM: All translatable HPL plotter statements are converted to the appropriate 9872A Plotter commands in BASIC, regardless of whether the HPL program was written for a 9862A or 9872A Plotter. This is because the System 35 is not compatible with the 9862A Plotter.

- The *axe* command (9862A ROM) will translate only if all parameters are present (both intersection and tic marks).
- The statement *psc0* (9862A and 9872A ROM) will translate to a PLOTTER select code IS OFF.
- The following HPL 9862A and 9872A ROM commands will not translate directly: *ofs*, *cpit*, *ptyp*.
- The *ltr* command of the 9862A ROM will not translate directly.
- The *pcir*, *xax*, and *yax* commands will not translate directly.

Flexible Disk ROM: Most of the HPL statements will be translated. Exceptions are:

- A *cat* to a buffer or string is not allowed in BASIC.
- The return variable from the *asgn* operator in HPL may not match the return variable in BASIC.
- The *ens* operator in a *sprt* or *rprt* statement does not have a BASIC equivalent.
- The *typ* function results in different values for string variables in BASIC.
- The BASIC equivalent of the HPL statement *getm* cannot appear in a BASIC program.
- The following statements do not have an equivalent translation into BASIC: *copy* (either total

```

0: "DERINT":cfa
3: if M>N:dim
B[M]:sto +2
1: dim B[N]
2: dim S[N],G[N-
1]:+1
3: if (I+1)>N-
1:sto +3
4: .5(X[I]-X[I-
1])/X/(X[I+1]-
X[I-1])/H)+B[I]
5: 2*((Y[I+1]-
Y[I])/(X[I+1]-
X[I])-(Y[I]-
Y[I-1])/X)/H+T
->S[I]:+3+G[I]:
sto -2
6: 0+S[I]:S[N]:
8-4r3+W
7: 0+U:2+I
8: W(-S[I]-B[I]S
[I-1]-(.5-B[I])
S[I+1]+G[I]):T
9: if (abs(T)+H
)>U:H+U
10: S[I]:T+S[I]
11: if I#N-1:I+
1+I:sto -3
12: if U>E:sto
-5
13: 0+I
14: if (I+1)>N
-1:sto +2
15: (S[I+1]-S[I]
)/X/(X[I+1]-X[I])
+G[I]:sto -1
16: if M=0:sto +
13
17: 0+J:dim D[M]
18: if (J+1)>M
:sto +11
19: 1-I:if (T[U]
+T):X[I]:sto +
2
20: sfa 3:dsp
"ARG OUT OF
BOUND":ret
21: if (I+1)>N
:sto -1
22: if T>X[I]:
sto -1
23: 1-I+I
24: T[U]-X[I]:H:
T[U]-X[I+1]:T:
HT+X
25: S[I]+HG[I]:S
26: (1/6+Z)(S[I]
+S[I+1]+S)+U
27: ((Y[I+1]-
Y[I])/(X[I+1]-
X[I])+W)H+Y[I]+
XU+B[U]
28: W+(H+T)U+
ZXG[I]:D[U]:
sto -10
29: 0+I+A
30: if (I+1)>N
-1:ret
31: A+.5(X[I+
1]-X[I])/H(Y[I]
+Y[I+1])-(1/
24)H+3(S[I]+
S[I+1]):A:sto
-1
*16954

```

START OF PASS 2

```

HPL # BASIC # BASIC
-----
( ) 20 OPTION BASE 1
( ) 25 COM RV(0:0),Flas(0:15)
( ) 30 DEG
(0 ) 35 Flag(3)=0 ! DERINT
(0 ) 40 IF NOT(M>N) THEN GOTO 55
***** WARNING ** INVALID dim
(0 ) 45 DIM B(M)
(0 ) 50 GOTO 60
***** WARNING ** INVALID dim
(1 ) 55 DIM B(N)
***** WARNING ** INVALID dim
***** WARNING ** INVALID dim
***** WARNING ** INVALID dim
(2 ) 60 DIM S(N),G(N-1)
(2 ) 65 I=1
(3 ) 70 I=I+1
(3 ) 75 IF ((I)>N-1) THEN GOTO 115
(4 ) 80 X=X(I)-X(I-1)
(4 ) 85 H=X(I+1)-X(I-1)
(4 ) 90 B(I)=.5*(X)/(H)
(5 ) 95 T=((Y(I+1)-Y(I))/(X(I+1)-X(I))-(Y(I)-Y(I-1))/X)/H
(5 ) 100 S(I)=2*(T)
(5 ) 105 G(I)=3*T
(5 ) 110 GOTO 70
(6 ) 115 S(N)=S(1)=0
(6 ) 120 W=8-4*SQR(3)
(7 ) 125 U=0
(7 ) 130 I=2
(8 ) 135 T=W*(-S(I)-B(I)*S(I-1)-(.5-B(I))*S(I+1)+G(I))
(9 ) 140 H=ABS(T)
(9 ) 145 IF ((H)>U) THEN U=H
(10 ) 150 S(I)=S(I)+T
(11 ) 155 IF NOT(I#N-1) THEN GOTO 170
(11 ) 160 I=I+1
(11 ) 165 GOTO 135
(12 ) 170 IF U>E THEN GOTO 125
(13 ) 175 I=0
(14 ) 180 I=I+1
(14 ) 185 IF ((I)>N-1) THEN GOTO 200
(15 ) 190 G(I)=(S(I+1)-S(I))/(X(I+1)-X(I))
(15 ) 195 GOTO 180
(16 ) 200 IF M=0 THEN GOTO 325
(17 ) 205 J=0
***** WARNING ** INVALID dim
(17 ) 210 DIM D(M)
(18 ) 215 J=J+1
(18 ) 220 IF ((J)>M) THEN GOTO 325
(19 ) 225 I=1
(19 ) 230 T=T(J)
(19 ) 235 IF ((T)>X(I)) THEN GOTO 255
(20 ) 240 Flag(3)=1
(20 ) 245 DISP "ARG OUT OF BOUND"

(20 ) 250 RETURN
(21 ) 255 I=I+1
(21 ) 260 IF ((I)>N) THEN GOTO 240
(22 ) 265 IF T>X(I) THEN GOTO 255
(23 ) 270 I=I-1
(24 ) 275 H=T(J)-X(I)
(24 ) 280 T=T(J)-X(I+1)
(24 ) 285 X=H*T
(25 ) 290 S=S(I)+H*G(I)
(26 ) 295 Z=1/6
(26 ) 300 U=(Z)*(S(I)+S(I+1)+S)
(27 ) 305 W=(Y(I+1)-Y(I))/(X(I+1)-X(I))
(27 ) 310 B(J)=(W)*H+Y(I)+X*U
(28 ) 315 D(J)=W+(H+T)*U+Z*X*G(I)
(28 ) 320 GOTO 215
(29 ) 325 A=I=0
(30 ) 330 I=I+1
(30 ) 335 IF ((I)>N-1) THEN RETURN
(31 ) 340 H=X(I+1)-X(I)
(31 ) 345 A=A+(.5*(H)*(Y(I)+Y(I+1))-(1/24)*H+3*(S(I)+S(I+1)))
(31 ) 350 GOTO 330

END OF PASS 2--END OF TRANSLATOR

```



Figure 1. An example HPL program and its BASIC translation.

disk or partial file), *dump*, *load*, *repk* and all statements associated with the 9825A/9885M System Tape.

General I/O ROM: The internal format of the HPL *fmt* and the BASIC *IMAGE* statements are different and may require additional decoding after the translator program is used.

- The *wtb* statement is replaced with an *OUTPUT USING* with the proper *IMAGE* statements or with a *WRITE BIN*.

- The HPL *wtc* command is replaced with a *WRITE IO* with a register number of 5.
- There is no direct translation for a *list* statement contained in an HPL program.

Extended I/O ROM: Many of the statements will be translated, with these exceptions:

- BASIC language does not contain octal and decimal I/O modes as in HPL (*moct* and *mdec*).

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- The binary add contained in HPL will be translated as a BASIC function call.
- The *CONVERT* command in BASIC replaces the *conv*, *ctbl*, and *par* HPL instructions.
- The HPL error routine functions *erl*, *ern*, and *rom* are flagged as non-translated functions.
- The *buf* and *tfr* statements of HPL do not have a one-to-one translation in BASIC. User may have to make changes to implement the same operation as an HPL program had.

Systems Programming ROM:

Some of the statements can be translated into BASIC language. Since there is no comparable ROM in the System 35, many of the HPL statements have no analogous BASIC statement. The statements which will not translate are: *asc*, *bred*, *rkbd*, *store*, *nal*, *aum*, and *cln*.

System 35 Enhancements

The System 35 offers the following enhancements over the 9825 which you may want to make use of after the HPL program has been translated to BASIC:

- Offers CRT for program development to allow display of 20 lines of program or data, with four more lines reserved for keyboard entries and system comments.
- Offers option for assembly language programming for the skilled programmer to provide greater power and speed for special applications.
- Offers unified mass storage for tape cartridge or disk. This capability greatly improves the method by which data can be filed and accessed.
- Offers a variety of ways to store data internally. Common storage for subprograms, integer and short precision are all allowed.
- Has enhanced plotting capability through a larger set of instructions.
- Automatically buffers all I/O. Each file pointer for mass storage can be buffered. In overlap processing mode, this buffering can be used to speed up processing of I/O-intensive programs.

Hardware Configuration

The System 35 HPL to BASIC Translator pack is designed to run most conveniently on the standard System 35A with CRT display. The programs will run on either model with the standard 64K read/write memory.

In addition to System 35, the pack requires one of the following external printers:

- the HP 9876A Thermal Printer
- the HP 9871A Impact Printer
- the HP 2631A Serial Impact Printer
- the HP 7245A Printer/Plotter.

If you use an interface cable to transfer programs from the 9825 to the System 35, you will need the I/O ROM (98332A) for entering data from external devices.

Available as options, the following hardware may be ordered to enhance your system:

- The HP 9885M/S Flexible Disk Drive for storing larger amounts of data and to speed up the translation process.
- The Plotter ROM (98337A) if you use the 98212A or 98214A 9862A ROM or 98215A or 98216A 9872A ROM in the 9825 program.
- The Mass Storage ROM (98331A) if you use the 98217A Flexible Disk ROM in the 9825 program.

Ordering Information

Order Part Number 09835-10030 to receive the HPL to BASIC Translator pack, which includes the following items:

- Program cartridges (one master and one spare copy)
- User's instruction manual



3404 E. Harmony Road, Fort Collins, Colorado 80525

For assistance call: Washington (301) 948-6370, Chicago (312) 255-9800, Atlanta (404) 955-1500, Los Angeles (213) 877-1282. Ask for an HP Desktop Computer representative.