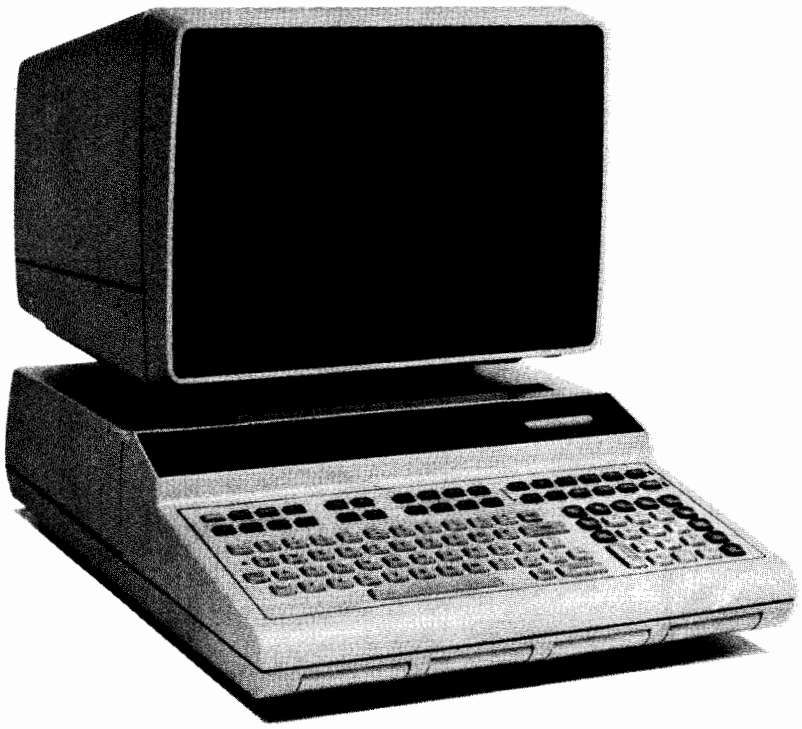
System 35 Desktop Computer

The Workbook

Supplement to the System 35 Introductory Training Cartridge

HEWLETT-PACKARD

The Workbook



Hewlett-Packard Desktop Computer Division
P.O. Box 301, Loveland, Colorado 80537
(For World-wide Sales and Service Offices see back of manual.)

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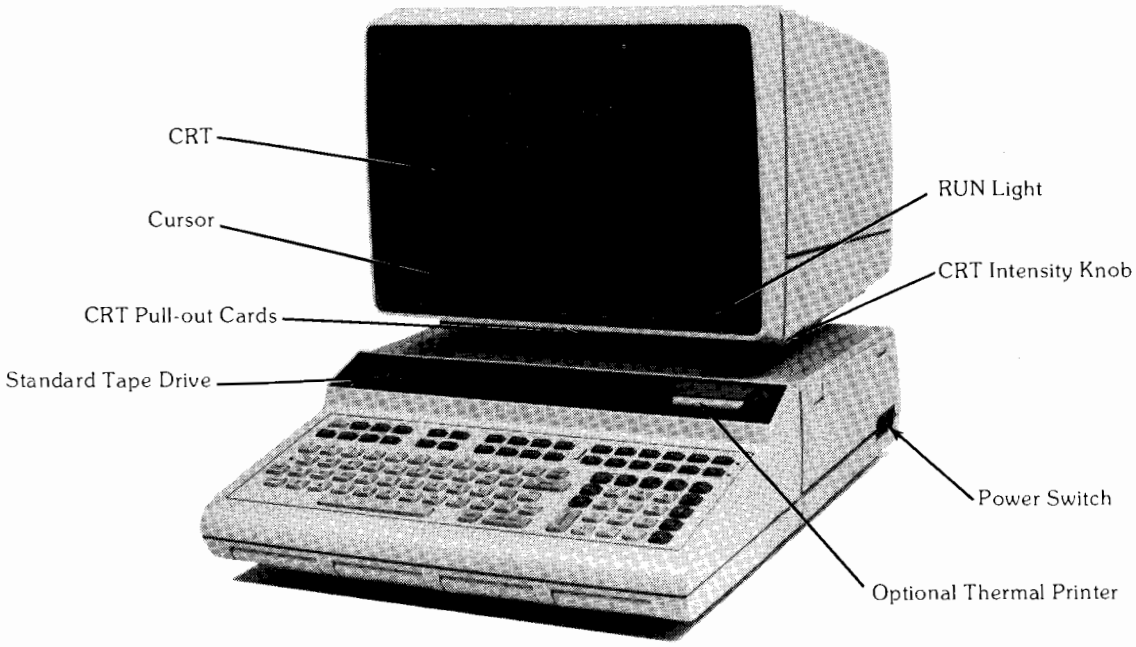
AN OVERVIEW OF THE SYSTEM 35



To prevent accidental recording of the tape cartridge, move the record slide tab to the left, away from the direction of the arrow, (as shown).

To remove the tape cartridge, press the eject bar, if it is pulled out without pressing the eject bar, another cartridge can't be inserted until the eject bar is pressed.

INTRODUCTION

The Introductory Training Program can be completed in three sessions of approximately one hour each. Although it is possible to access specific portions of the sessions individually, it is intended that the materials should be accessed sequentially as they are presented.

Part 1: During the first hour of contact with the machine, you learn to interact with a running program and to perform simple computations, which can be printed on the printer or CRT.

Part 2: During the second hour, you learn to define the Special Function keys, to add, delete and change program lines, to record programs on tape, and to bring programs from tape into memory.

Part 3: During the third hour, you learn to create data files, to record data on tape, to bring data from tape into memory, and to trace program execution for debugging purposes.

This workbook is referenced during the training program to provide additional information and problems to work on. You may spend as much or as little time as necessary, depending upon background knowledge. To gain just a general knowledge of the machine, for example, you can omit the workbook exercises.

Part 1

During the first hour of contact with the machine, you learn to interact with a running program and to perform simple computations, which can be printed on the printer or CRT.

To begin Part 1 of the Training Program, follow the steps for getting started in HOW TO #1.

You will be reminded to take a break after approximately one hour. At that time, you can review the material in Part 1 as necessary.

#1 HOW TO: Get Started

When to Use

The System 35 Introductory Training Package is a self-instructing program intended for use by the individual. You follow a few very simple steps to get started, and from then on you proceed at your own speed. You interact with the computer as you learn the purpose for each of its keys.

You will need

- The HP 9835A Desktop Computer
- The Introductory Training Program Cartridge, p.n. 09835-10024
- This workbook
- Time

NOTE

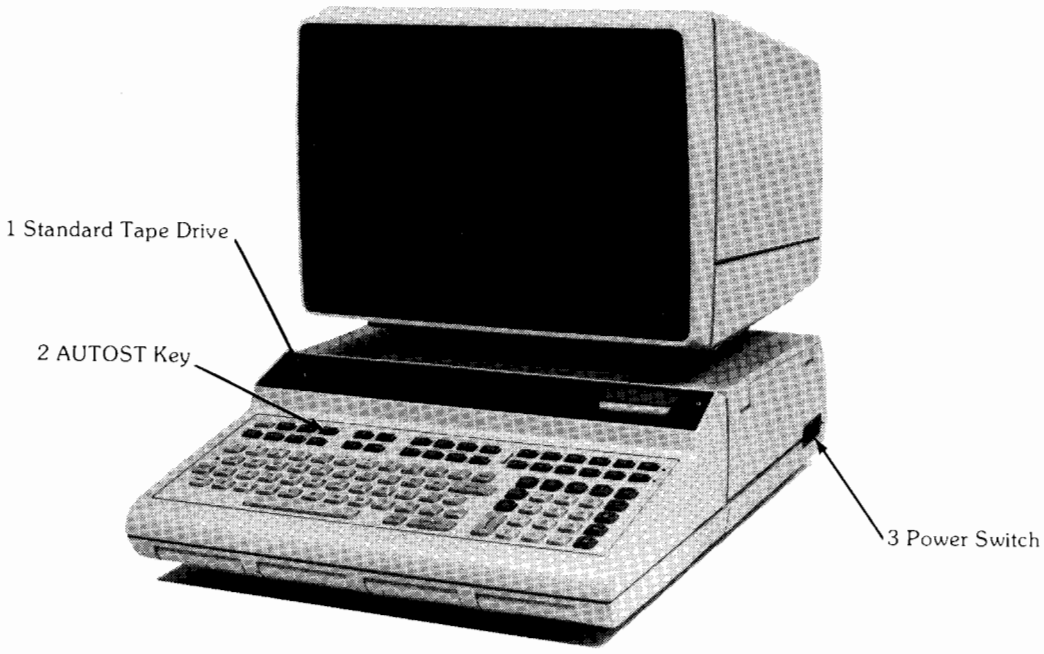
It usually takes about three hours to complete this program.

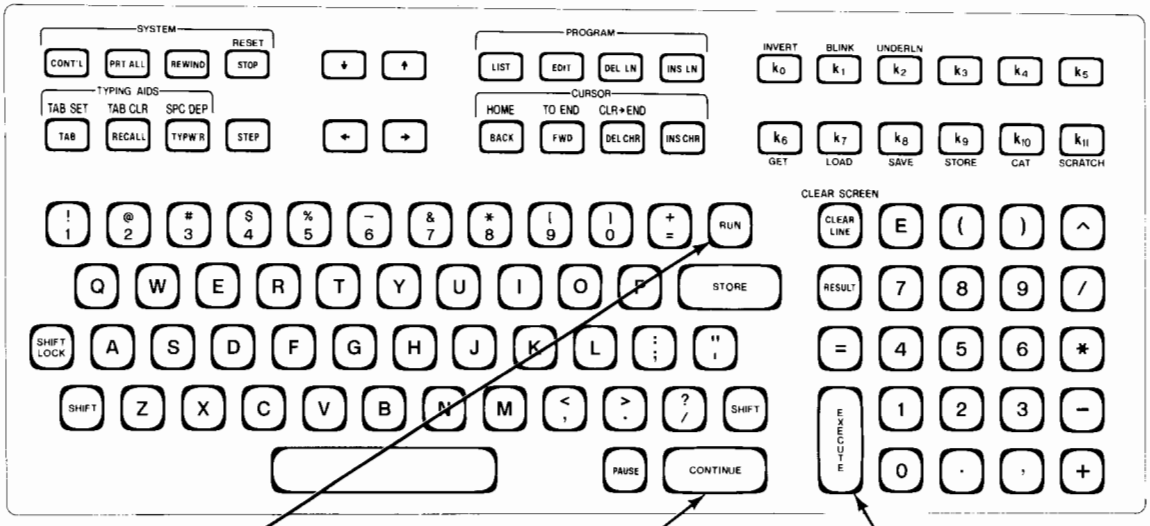
If Possible, You Should Also Have

- The 9835A Operating and Programming Manual, p.n. 09835-90000

Getting Started — Step-By-Step

1. If the machine is turned on, turn it off.
2. Insert the System 35 Introductory Training Program Cartridge in the tape cartridge unit.
3. Turn the machine on. The Introductory Training Program will be brought into memory and started running.
4. When "READY" appears in the display, press CONTINUE





Use the RUN key to start the program running from its beginning.

Use the CONTINUE key to continue the program running from its current position.

Use the EXECUTE key to compute values, to list the program in memory, or to continue running the program from a different position.

The Introductory Training Program will let you know when you need to access the remaining materials in this workbook.

#2 HOW TO: Continue After You Have Stopped

When to Use

a. You are completely lost.

b. The machine isn't acting like you expected it to.

c. Someone else has been using the machine.

d. Someone turned the machine off or pulled the plug while you were working.

e. You would like to skip ahead or go back to a different part of the training program.

General Information

There are three parts to these instructions. A Fresh Start, How to Continue and Checkpoint List. A Fresh Start is optional.

- IF you have been running the Intoductory Training Program,
  AND you just want to return to some part of the program,
  AND you have not erased the program from memory,
  THEN skip A Fresh Start and go straight to How to Continue.

- IF the machine is turned off,
  OR you think the machine is acting differently than you expected,
  THEN you need A Fresh Start.

Look at the Checkpoint List. Checkpoints are listed in order as they appear in the program. Choose the checkpoint you want to reach from this list.

Checkpoint List

Part 1	**Part 2**	**Part 3**
Welcome	Special keys	Dimensions
Oops	Keyfiles	Create
Introduction	Programs	Data on tape
Pea game	Programs on tape	Finish
Keyboard	Edit	
Arithmetic	Scratch	
Variables	List	
Printing	Editline	
Emphasis		
Display		
Tabs		
Functions		

Substitute the checkpoint name, exactly as it appears in the list, for the word "Checkpoint" in the following instructions.

A Fresh Start — Step-By-Step

1. Turn the machine off.
2. Make sure that the SHIFT LOCK key is in the up (unlatched) position.
3. Turn the machine on.
4. The Introductory Training Program will be brought into memory. When "READY" appears in the display, continue as below.

How to Continue — Step-By-Step

1. If the program is running, press STOP.
2. Press CLEAR LINE
3. Type CONT Checkpoint NOTE: Substitute the desired Checkpoint name here.
4. Press EXECUTE

#3 HOW TO: Play The Pea Game

When to Use

a. You have reached the pea game while following the lesson.

b. You have decided to take a fun break and you followed HOW TO #2 to get to the pea game.

c. You would like to show the pea game to your friends.

General Information

The pea game is a computer version of a fast-hand trick. There are three shells shown as ( ), and one has the pea under it, (+). The shells move around, and you have to guess where the shell with the pea under it ends up.

You will have to watch the display carefully.

The last place you see the pea is 1, 2, or 3:

```
----(+)------(  )------(  )----      1- on the left,
                                    or
----(  )------(+)------(  )----      2- in the center,
                                    or
----(  )------(  )------(+)----      3- on the right
```

The Pea Game — Step By-Step

1. When "Press CONTINUE when ready to play" is displayed,
   Press CONTINUE
2. Watch the pea move in the display.
3. When the display asks, "Where's the pea?"
   Type 1, 2, or 3
   Press CONTINUE
4. You get three chances to win in each game.

#4 HOW TO: Perform Arithmetic Operations

When to Use

a. The machine is free and you need to compute an answer in a hurry.

b. The machine is working on another problem but the display is blank; you need to compute an answer in a hurry.

c. You are running a program and it is requesting an input; you don't have the answer, but you can compute it.

d. Those pocket calculators are nice, but you left yours in the car when you were figuring out your gas mileage. Now you need to compute an answer.

General Information

Don't forget that the desktop computer can solve very simple problems as well as very complex ones. Also, it can often compute answers while a program is running.

Arithmetic Operations — Step-By-Step

1. Type the expression
2. Press EXECUTE

Practical Exercise #1

A. Compute the following pairs of expressions and see if they are the same or different.

1.	2↑4	and	2*2*2*2
2.	3↑2	and	3*3
3.	2↑3	and	2*2*2
4.	2E3	and	2*1000
5.	12.34E5	and	123.4E4
6.	1E6	and	10↑6
7.	5*4-2	and	5*(4-2)
8.	3+1/3	and	(3+1)/3

B. Translate the following into single-line expressions and compute the answers:

1. $\dfrac{7}{6+5}$

2. $\dfrac{4*6}{8}$

3. $\dfrac{7}{6+5} + \dfrac{6+5}{7}$

4. $\dfrac{\dfrac{5+2}{3} + \dfrac{5}{2+3}}{2\uparrow 2}$

Turn the page for the answers...

Answers to Practical Exercise #1

A. 1.	16	and	16	same
2.	9	and	9	same
3.	8	and	8	same
4.	2000	and	2000	same
5.	1234000	and	1234000	same
6.	1000000	and	1000000	same
7.	18	and	10	different
8.	3.33333333333	and	1.33333333333	different

B. 1. 7/(6=5)= .636363636364

2. 4*6/8= 3

3. 7/(6+5)+(6+5)/7 = 2.20779220779

4. ((5+2)/3+5/(2+3))/2↑2 = .833333333333

#5 HOW TO: Specify the Printer Select Code

When to Use

a. When a PRINT statement is executed, the printing appears on the CRT, but you wanted it on paper.

b. When a PRINT statement is executed, the printing appears on the printer, but you wanted it on the CRT.

General Information

Changing the printer select code does not move printing which has already been done, but it specifies the device for future printing.

To change the printer select code, you need to know what the select code is for the type of printer you have. If you have the printer which is built-in, its select code is 0. If you have another kind of printer, the select code is set on the interface. If you don't know the select code in this case, use the CRT until you can find out. The select code for the CRT is 16.

The training tape puts all material on the CRT. Each time a part of the tape is accessed, therefore, the program resets the printer select code to 16 for the CRT automatically.

PRINTER IS — Step-By-Step

1. To specify the built-in printer for printing:
   Type PRINTER IS 0
   Press EXECUTE
2. To specify the CRT for printing:
   Type PRINTER IS 16
   Press EXECUTE

#6 HOW TO: Use Functions in Computations

When to Use

If your mathematical computations go beyond the capabilities of the operators, ↑, *, /, +, −, DIV and MOD, additional operations listed in the Function List below may be useful.

General Information

Some functions require one or more values as inputs in order to compute their results. Others are able to provide the necessary results without additional inputs. The values which are provided as inputs to functions are called arguments, and they can be simple constants, variables, or complex expressions.

If the argument for the function is computed, it must be enclosed in parentheses. For example, SIN A + B does not equal SIN (A + B).

The trigonometric functions, SIN, COS, TAN, etc., use angular units of measure. When the machine is turned on, angular units are radians. Angles can be expressed in degrees or grads. To change the way that angles are expressed, look in the Operating and Programming Manual under DEG, GRAD or RAD.

The random number function (RND) returns a pseudo random number greater than or equal to 0 and less than 1. Each succeeding use of RND uses a previously computed seed. This seed can be scrambled by using the RANDOMIZE statement, which is explained in the Operating and Programming Manual.

Functions — Step-By-Step

1. Type the function name.
2. Type the argument or arguments needed by the function, enclosed in parentheses.
3. Functions are just like arithmetic operations. Press EXECUTE to see the results, or continue to enter the expression if it requires additional computations.

Function List:

Function (Arguments)	Description
ABS (Expression)	Absolute value
ACS (Expression)	Arccosine
ASN (Expression)	Arcsine
ATN (Expression)	Arctangent
COS (Expression)	Cosine
DROUND (Expr, digits)	Digit rounding
EXP (Expression)	Exponential
FRACT (Expression)	Fractional part
INT (Expression)	Integer part
LGT (Expression)	Common log
LOG (Expression)	Natural log
MAX (Expr1, Expr2...,)	Maximum
MIN (Expr1, Expr2,...,)	Minimum
PI	3.1415926536
PROUND (Expr, Position)	Power of ten rounding
RND	Random number
SGN (Expression)	Sign
SIN (Expression)	Sine
SQR (Expression)	Square root
TAN (Expression)	Tangent

Practical Exercise #2

A. Compute the following pairs of expressions and see if they are the same or different.

1. ABS (PI-PI ↑2)	and	ABS (PI ↑ 2-PI)
2. SGN (PI-PI ↑ 2)	and	SGN (PI ↑ 2-PI)
3. INT (180/PI)	and	180/PI
4. FRACT (180/PI)	and	180/PI-INT (180/PI)
5. DROUND (PI*75,4)	and	DROUND (PI,4)*75
6. MIN (-1,0,1)	and	MIN (-1,0,100)
7. MAX (-1,0,1)	and	MAX (-1,0,100)
8. MIN(MAX(23,24),22)	and	MAX(MIN(23,24),22)

B. Using the functions described in HOW TO #6, translate the following word problems into single-line expressions and compute the answers.

1. Find the square root of 576.
2. Look at three random numbers in the display.
3. Look at three random numbers between 1 and 5 in the display.
4. Find out whether 850 is rounded to 800 or 900 when a power of ten rounding is performed to the hundreds place.

Turn the page for the answers.....

Answers to Practical Exercise #2

A.

1.	6.72801174755	and	6.72801174755	same
2.	-1	and	1	different
3.	57	and	57.2957795129	different
4.	.2957795129	and	.2957795129	same
5.	235.6	and	235.65	different
6.	-1	and	-1	same
7.	1	and	100	different
8.	22	and	23	different

B.

1. SQR(576)	;	24
2. RND;RND;RND	;	---- ---- ---- random
3. RND*4+1;RND*4+1;RND*4+1	;	---- ---- ---- random
4. PROUND (850,2)	;	900

Part 2

During the second hour, you learn to define the Special Function Keys, to add, delete and change program lines, to record programs on tape and to bring programs from tape into memory.

To begin Part 2 of the Training Program,

1. If the machine is turned on, turn it off.
2. Insert the System 35 Introductory Training Program Cartridge in the tape cartridge unit.
3. Turn the machine on.
4. When "READY" appears in the display, type CONT Part 2
5. Press EXECUTE

You will be reminded to take a break after approximately one hour. At that time, you can review the material in Part 2 as necessary.

#7 HOW TO:
Use Special Function Keys as Typing Aids

When to Use

If you find yourself pressing the same sequence of keys very often, defining the Special Function keys as typing aids may be useful.

General Information

There are three parts to these instructions. Listing a Special Function Key, Erasing a Special Function Key, and Defining a Special Function Key. First, follow the steps under Listing a Special Function Key. If it is already defined, you can either erase it or choose another key to define. To erase a previous definition, follow the steps under Erasing, and to define a key, follow the steps under Defining.

Look in the Operating and Programming Manual under EDITKEY for a complete description of Special Function key definition. This workbook contains only a simplified set of instructions intended for the most common applications.

Listing a Special Function Key — Step-By-Step

1. Type LIST
2. Press the Special Function key

Erasing a Special Function Key — Step-By-Step

1. Type SCRATCH
2. Press the Special Function key

Defining a Special Function Key — Step-By-Step

1. Type EDIT
2. Press the Special Function key
3. The CRT is now in edit key mode with the key number at the top and any current definition displayed.

    a. Enter your new key definition, using any key on the keyboard except for those listed in the Exception Key List and the Special Terminator Key List below.

    b. To leave the key definition as it was before you entered the edit key mode, press STOP. If you press STOP, omit Steps 4 and 5 below.

4. One key from the Special Terminator Key List may be entered as part of the key definition, but if used, it must be the last entry in the definition.
5. Press the Special Function key again to store the new key definition. The display will be cleared and the machine will be ready for the next operation.

Exception Key List:

- TYPW'R
- PRTALL
- REPEAT
- SHIFT LOCK
- STOP
- CONTROL
- SHIFT

Special Terminator Key List:

- STORE
- CONTINUE
- EXECUTE
- RUN
- PAUSE
- STEP
- INS LN
- DEL LN

Practical Exercise #3

A. Define Special Function key 2 so that it types PRINT each time it is pressed.

B. Define Special Function key 3 so that it prints "Do Not Disturb" each time it is pressed.

C. Define Special Function key 4 so that it types CONT Pea game and presses EXECUTE for you each time it is pressed. (Use this key only if you want to play the pea game again.)

D. Define Special Function key 5 so that it types 1 and presses CONTINUE for you each time it is pressed. (Use this key when playing the pea game and you think the pea is in the leftmost position.)

E. Define Special Function key 6 so that it types 2 and presses CONTINUE for you each time it is pressed. (Use this key when you think the pea is in the center position.)

F. Define Special Function key 7 so that it types 3 and presses CONTINUE for you each time it is pressed. (Use this key when you think the pea is in the rightmost position.)

Turn the page for the answers...

Answers to Practical Exercise #3

To Check Your Results:	Compare Your Results With:
A. Type LIST Press [k2]	KEY 2 PRINT
B. Type LIST Press [k3]	KEY 3 PRINT "Do Not Disturb" -Execute
C. Type LIST Press [k4]	KEY 4 Continue Pea game -Execute
D. Type LIST Press [k5]	KEY 5 1 -Continue
E. Type LIST Press [k6]	KEY 6 2 -Continue
F. Type LIST Press [k7]	KEY 7 3 -Continue

#8 HOW TO:
Check the Contents of the Tape Cartridge

When to Use

a. You want to know what is already recorded on the tape.

b. You need to know if the tape cartridge contains certain programs or data files you plan to use.

c. Before recording a file on the tape cartridge with a certain name, you want to make sure that a file does not already exist with the same name.

General Information

If you get ERROR 85 when you check the contents of the tape cartridge, the tape cartridge has not been initialized. If this happens, see How to Initialize a Tape Cartridge.

The Operating and Programming Manual explains the information provided by the CAT command in addition to the file name. Look in the index for the CAT (catalog) command.

Contents of the Cartridge — Step-By-Step

1. Insert the tape cartridge in the cartridge unit.
2. Type CAT
3. Press EXECUTE

#9 HOW TO: Purge an Existing File

When to Use

It is a good idea to permanently remove files from the tape cartridge for two reasons. One, this prevents later confusion about the value of the contents when there are many files on the tape cartridge. And two, it makes room available for new files when the tape begins to get full.

General Information

If you get ERROR 56 when you try to purge a file, this means that the file does not exist. When this happens, make sure that the name of the file to be purged is spelled properly. Otherwise, you may have already purged that file.

If you get ERROR 62 when purging a file, the file has been protected. This means that someone has intentionally made it more difficult to remove this file from the tape. Usually, a file is protected because it is especially valuable. You must know the protection password to purge such a file, or you can re-initialize the entire tape to remove it. Look in the Operating and Programming Manual to learn how to purge protected files.

Purging a File — Step-By-Step

1. Type PURGE "MYFILE" (Substitute any file name for MYFILE)
2. Press EXECUTE

Practical Exercise #4

Complete the instructions below, filling in the blanks.

A. Store Key Definitions — Step-By-Step

1. Type STORE KEY_____

2. Press _____

B. Load Key Definitions from Tape into Memory — Step-By-Step

1. Type _____

2. Press _____

#10 HOW TO: Initialize a Tape Cartridge

When to Use

a. A new tape cartridge must be initialized before any other storage operations can be performed.

b. An old tape cartridge can be initialized when all of the information on it is obsolete and the tape is to be completely erased.

General Information

It takes approximately 3 minutes to initialize a tape cartridge. During this time, blank records are being written on the tape. This means that the process of writing to and reading from the tape later on is speeded up, because this work is only done once when the tape is new.

If you have doubts about whether to initialize a tape, make sure that it does not contain someone else's valuable information. To do this, see How to Check the Contents of the Tape Cartridge.

Initialization — Step-By-Step

1. Make sure that the tape does not already contain valuable information.
2. Make sure that the RECORD slide is moved to the right so that the tape can be recorded.
3. Insert the tape cartridge in the tape cartridge unit.
4. Type INITIALIZE ":T15"
5. Press EXECUTE

#11 HOW TO:
Borrow the Pea Game From the Training Tape

When to Use

These instructions serve as a review of the methods used to take an existing program, customize it, and then save the new version of the program for one's own use.

General Information

If the Introductory Training Program is already in memory, it is not necessary to bring the program into memory again. If the machine is turned off, or does not have the training program in memory, follow the steps for A Fresh Start, described in HOW TO #2.

Saving the Customized Program — Step-By-Step

1. Type SAVE "KEEPER"
2. Press EXECUTE
3. If you get ERROR 54, the file name already exists. Refer to HOW TO #9 to purge the existing file, then go to Step 1 again, or use RE-SAVE instead of SAVE in Step 1.

Bringing the Customized Program into Memory — Step-By-Step

1. Type GET "KEEPER"
2. Press EXECUTE
3. Wait until the run light goes out and tape movement stops.
4. Press RUN

Testing a Program — Step-By-Step

1. Press RUN
2. Make sure that the program works as you want it to. If necessary, make additional changes using the STORE key to change the program in memory.
3. To record updated versions of the program on tape, follow the steps for saving the Customized Program, above.

Practical Exercise #5

A. Compare the programs and the outputs below. If necessary, look up unfamiliar statements in the Operating and Programming Manual.

1. Program #1:

```
10   Y=7
20   PRINT "MULTIPLY BY";Y
30   PRINT
40   X=1
50   PRINT X;"*";Y;"=";X*Y
60   X=X+1
70   IF X<10 THEN 50
80   END
```

Output:

```
MULTIPLY BY 7

 1 * 7 = 7
 2 * 7 = 14
 3 * 7 = 21
 4 * 7 = 28
 5 * 7 = 35
 6 * 7 = 42
 7 * 7 = 49
 8 * 7 = 56
 9 * 7 = 63
```

2. Program #2

Output:

```
10   Tax(0)=.052
20   Tax(1)=.054
30   Tax(2)=.057
40   Tax(3)=.059
50   Tax(4)=.062
60   Tax(5)=.064
70   Tax(6)=.067
80   Tax(7)=.069
90   Tax(8)=.072
100  Tax(9)=.074
110  Tax(10)=.077
120  I=0
130 Label:  PRINT Tax(I)
140  I=I+1
150  IF I<=10 THEN Label
160  END
```

```
.052
.054
.057
.059
.062
.064
.067
.069
.072
.074
.077
```

B. How would you change Program #1 to produce a multiplication table for 9's?

C. How would you change Program #1 to include 10x, 11x, 12x, 13x, and 14x in the multiplication table?

D. How would you change Program #2 to print the heading. "TAX TABLE" above the tax values?

E. How would you change Program #2 to label tax values, such as Tax (0) = .052. Tax (1) = .054, etc.

Turn the page for answers B, C, D, & E...

Answers to Practical Exercise #5

B. Replace line 10 with the following:
   10 Y = 9

C. Replace line 70 with the following:
   70 IF X<15 THEN 50

D. Add lines 115 and 116 as follows:
   115 PRINT "TAX TABLE"
   116 PRINT

E. Replace line 130 with the following:
   130 Label: PRINT "TAX(";I;")=";TAX(I)

PART 3

During the third hour, the user learns to create data files, to record data on tape, to bring data from tape into memory, and to trace program execution for debugging purposes.

To begin Part 3 of the Training Program,

1. If the machine is turned on, turn it off.
2. Insert the System 35 Introductory Training Program Cartridge in the tape cartridge unit.
3. Turn the machine on.
4. When "READY" appears in the display, type CONT Part 3
5. Press EXECUTE

#12 HOW TO: Create a Data File

When to Use

Large quantities of data in the form of numbers and character strings can be stored in memory. When a computational project cannot be completed in a short time, it is useful to record the data which is in memory onto tape for later use. Before data can be recorded on the tape, space must be reserved for the data in a file.

General Information

If a small amount of data is to be placed in a file initially, and later more data is to be added, then the file must be created large enough to hold the data which is to be added later. For the beginner, a method for estimating data storage requirements is provided below.

For complete details on computing exact file sizes, look up the CREATE statement and Data Storage in the Operating and Programming Manual.

Estimating Data Storage Needs

A record in a data file can contain any combination of numbers and character strings. To help you to compute the total number of records needed, here are some examples of what one (256-byte) record can contain:

- 32 numeric values, each having 12-digit accuracy, or
- A string of 250 characters, or
- 16 numeric values and a string of 125 characters, or
- 10 strings of 20 characters each

If you're a beginner, approximate your need, then add 10% extra to be sure there's plenty of space.

Creating a Data File — Step-By-Step

1. Substitute the unique file name, of up to 6 characters in quotes, for 'MYFILE' in Step 3, below.
2. Substitute the necessary number of records for 'Number of Records' in Step 3, below.
3. Type CREATE "MYFILE", Number of Records
4. Press EXECUTE

#13 HOW TO: Assign a Data File

When to Use

Before a data file can be used for either READ# or PRINT# operations, it must be assigned a file number in memory. Then, each reference to the file is by number.

General Information

The file number is a numeric expression; its range of values is 1 through 10.

In memory, the file number is kept in a table with a corresponding file pointer. When a file is assigned, the pointer starts out at beginning of the file. After each READ # or PRINT # operation, the pointer moves to the next position, ready for the next READ # or PRINT # statement.

To prevent accidental use of a data file after completion of a project, either remove the tape from the unit or unassign the file according to the instructions below.

Assigning a Data File — Step-By-Step

1. Substitute the unique file name, of up to 6 characters in quotes, for 'MYFILE' in Step 3, below.
2. Substitute the file number, from 1 to 10, for 'N' in Step 3, below.
3. Type ASSIGN "MYFILE" to # N
4. Press EXECUTE

Unassigning a Data File — Step-By-Step

1. Substitute the file number, from 1 to 10, for 'N' in Step 2, below.
2. Type ASSIGN * TO # N
3. Press EXECUTE

#14 HOW TO: Record Data in a File

When to Use

These instructions serve as a review of the steps required to record data in a file.

General Information

Before data can be recorded, the file must be created (see HOW TO # 12) and assigned to the file table in memory (see HOW TO #13). These instructions assume that the file is new, and therefore contains no information which can be overwritten by this exercise. Also, it is assumed that the file has just been assigned, so that the pointer is at the beginning of the file.

Recording Data in a File — Step-By-Step

1. Substitute the assigned file number, from 1 to 10, for 'N' in Step 3, below.
2. Substitute any list of variables, character strings, constants, or expressions, separated by commas, for the Name$, Address$, and Age in Step 3, below.
3. Type PRINT #N; Name$, Address$, Age.
4. Press EXECUTE
5. Repeat Steps 3 and 4 until all data is recorded.

#15 HOW TO: Read Data From a File

When to Use

These instructions serve as a review of the steps required to read data from a file.

General Information

Before data can be read from a file into memory, the file must be assigned to the file table in memory (see HOW TO #13.) These instructions assume that the file has just been recorded, so that the pointer needs to be repositioned at the beginning of the file. Repositioning of the pointer is not necessary if the file has just been assigned.

Repositioning the Pointer — Step-By-Step

1. Substitute the assigned file number, from 1 to 10, for 'N' in Step 2, below.
2. Type READ #N, 1
3. Press EXECUTE

Reading Data From a File — Step-By-Step

1. Substitute the assigned file number, from 1 to 10, for 'N' in Step 3, below.
2. Substitute any list of variables, separated by commas, for the Name$, Address$ and Age in Step 3, below.
3. Type READ #N; Name$, Address$, Age
4. Press EXECUTE

#16 HOW TO:
Use SPC DEP (Space Dependent) Mode

When to Use

The particular mixture of upper and lower case letters in program lines can be a challenge to even the best typist. If pressing the SHIFT key to type a mixture of upper and lower case letters slows you down, space dependent mode may be useful.

General Information

In space dependent mode, everything is typed in upper case, with spaces separating key words. In this way, the meaning of the statement becomes dependent upon the spacing of characters, or "space dependent".

In space dependent mode, it is possible that BASIC statements can be confused with variable names. For example, 'PRINT' could be a variable (Print) or PRINT statement, depending upon its position in a line, and the spacing between key words. If there is a question about the results of an operation, exit from space dependent mode and try the same operation again.

Entering Space Dependent Mode — Step-By-Step

1. Hold down the CONTROL key and press the TYPW' R key at the same time.
2. While in space dependent mode, 'SPACE DEPENDENT' is displayed in the system comments area of the CRT.
3. Type statements and commands without concern for upper and lower case rules but using spaces instead to separate key words.

Exiting Space Dependent Mode — Step-By-Step

1. Hold down the CONTROL key and press the TYPW' R key at the same time.
2. The machine returns to normal mode when 'SPACE DEPENDENT' is not present in the system comments area of the CRT.

#17 HOW TO: Use PRT ALL (Print All) Mode

When to Use

1. You want an easy way to print all of your computations, plus the answers.
2. You want a record of what was entered or appeared in the display when that information has been overwritten.

General Information

Normally, the program outputs answers to the printer or CRT, and it uses the display area at the bottom of the screen for messages and requests to the user for data, for inputs from the user, and for system comments.

In general, the items which appear in the display area at the bottom of the screen are not included in the final outputs from a program. For example, it is not necessary to see the questions which were used to request the data in a report. However, at times it is useful to see this information, along with final outputs, in order to locate problems, or to check the sequence of operations performed.

The print all mode causes all items which appear in the display to be printed on the CRT. By changing the select code for the print all printer, those items can also be printed on other printers. To change the print all device select code, use the PRINT ALL IS statement, below.

PRINT ALL IS — Step-By-Step

1. To specify the built-in printer for print all messages:
   Type PRINT ALL IS 0
   Press EXECUTE
2. To specify the CRT for print all messages:
   Type PRINT ALL IS 16
   Press EXECUTE

Using Print All Mode — Step-By-Step

1. To enter print all mode, press the PRT ALL key.
2. To exit print all mode, press the PRT ALL key again.

Practical Exercise #6

A. Try the following exercises, first in print all mode, and then without print all. Compare the results in the screen in each case to see the effect of print all mode.

1. 7/ (6+5) + (6+5) /7
   EXECUTE
2. RND; RND; RND
   EXECUTE
3. Name$ = "Orphan Annie"
   EXECUTE
4. PRINT Name$
   EXECUTE
5. Name$
   EXECUTE

B. If you have a built-in printer, change the print all device select code using the PRINT ALL IS Statement. Then try Exercise A again. Notice that you do not have to use PRINT statements to have both the computations and the answers recorded on the printer.

#18 HOW TO: Use the Step Key

When to Use

The power of a computer comes from its ability to execute hundreds of computations every second. However, the mere mortal that programs the machine does not think at these speeds, and the powerful computer can turn into a frustrating monster when just one of those computations goes astray.

To monitor the results of program execution at your own speed, use the STEP key. Each time the STEP key is pressed, just one line of the program is executed.

General Information

Each time the STEP key is pressed, a single program line is executed. The next program line to be executed is displayed in the system comments area of the CRT.

When the program pointer is at the beginning of the program, the first line of the program is displayed the first time the STEP key is pressed. Pressing the STEP key a second time executes the first program line.

When the STEP key is pressed, the execution of one program line is completed. Then the program pauses, ready to execute the next line, and that next line appears in the display. Press the STEP key to execute one line only, or press CONTINUE to continue normal program execution.

After entering data from the keyboard, press STEP instead of CONTINUE to stay in step mode. When program instructions say to type the answer and press CONTINUE, type the answer and press STEP.

While you are paused between steps in step mode, you can take a variety of actions to help in understanding the program and in correcting any existing problems. Here are just a few:

1. Check the current value of a variable by typing the variable name and pressing EXECUTE
2. Change the current value of a variable by typing the variable name, equals (=), a new value, and pressing EXECUTE
3. Change the program itself by typing a new line or a replacement line and pressing STORE

Using the STEP Key — Step-By-Step

1. To execute just one program line,
   Press STEP
2. To continue normal line by line program execution,
   Press CONTINUE

#19 HOW TO:
Trace Variables and Program Execution

When to Use

a. Learn about tracing variables and program execution now by using a program that already works. Thus, avoid having to take time to learn these skills at the critical moment when a program doesn't give the expected results.

b. Wait until a program doesn't give the expected results, and then use tracing to find out why.

General Information

In the days of old when computers were in their infancy, it was very difficult to find out why a certain program didn't work as expected. For example, to find out whether a certain line was executed in a program, or the value of a variable at a certain point, temporary statements would be added to the program. Then when the program finally worked properly, the extra statements would be removed. Of course, the TRACE statement changed all that.

Now, without disturbing the program in memory, a certain variable or variables can be traced. Each time the value of the variable changes, the new value is displayed. Or the order in which lines are executed can be traced. In this case, you can assume that lines are executed sequentially until a branching is displayed. When a GOTO statement is executed, for example, the program branches and the transfer of execution is noted in the display.

TRACE statement outputs are printed in the display area of the CRT and thus are not mixed with program outputs in the upper portion of the screen. To see tracing outputs in the screen, use PRT ALL (print all) mode as explained in HOW TO #17.

To slow down tracing so that the program runs in "slow motion", use the TRACE WAIT statement.

Tracing the Values of Variables — Step-By-Step

1. Type TRACE ALL VARIABLES
2. Press EXECUTE
3. Continue running the program as usual.

NOTE

A variation of variable tracing allows tracing of specific variables, in case it is desirable to monitor the changes on a few variables without obtaining excessive tracing information about other variables. Look up the TRACE VARIABLES statement in the Operating and Programming Manual for more information.

Tracing Program Logic Flow — Step-By-Step

1. Type TRACE 1,9999
2. Press EXECUTE
3. Continue running the program as usual.

NOTE

The beginning and ending line numbers where tracing is desired can be specified to allow tracing of only part of the program in memory. In this case, tracing displays appear only between the specified line numbers. Refer to the TRACE statement in the Operating and Programming Manual for more information.

Tracing Program Logic Flow and Variables — Step-By-Step

1. Type TRACE ALL
2. Press EXECUTE
3. Continue running the program as usual.

Canceling Trace Operations — Step-By-Step

1. Type NORMAL
2. Press EXECUTE
3. Continue running the program as usual.

Slowing Down Tracing — Step-By-Step

1. To start, try a wait of 500 milliseconds as used below. Then increase or decrease the wait time between steps according to your own needs.
2. Type TRACE WAIT 500
3. Press EXECUTE
4. Try tracing as explained above.

Practical Exercise #7

There is a short program saved on the Introductory Training Tape Cartridge that you will use for these exercises. First, bring the exercise program into memory:

1. Type GET "WORK"

2. Press EXECUTE

When the exercise program is brought into memory, press RUN and see the output in the CRT. This program has been used earlier in the training program, and is probably familiar to you. You may also want to LIST the program. Then try the following for additional programming information.

A. Use the STEP key as explained in HOW TO #18. Compare the results of STEP key operation with the results from just pressing RUN.

B. Turn on PRT ALL (print all) mode and use the STEP key again. Compare the results of STEP key operation with and without print all mode.

C. Trace variables as explained in HOW TO #19. Compare these results with the results from just pressing RUN.

D. If print all mode was turned on during Exercise C, above, turn it off. If it was turned off, turn it on now. Compare results of tracing with and without print all mode.

#20 HOW TO: Use the RESET Key

When to Use

When the STOP key doesn't bring the machine to a ready state, and the machine is otherwise inoperative, it may need to be reset.

General Information

Resetting the machine can be compared to using the emergency brake to stop a car. It works, but not nearly so smoothly as the regular brake.

Usually, the machine becomes inoperative and needs to be reset because of some system or I/O malfunction. For example, an inoperative state which can be cleared only by resetting is caused when an improper select code is used in the PRINTER IS statement. The system tries in this case to output to a printer which is not there.

RESET aborts all output in order to return the machine to its ready state. Therefore, information may be lost during a reset operation.

At certain times the reset operation will cause the entire memory to be scratched in order to return the machine to its ready state. Although this doesn't always happen, it is possible, and therefore RESET should be used only when the STOP key does not bring the machine to a ready state.

Resetting — Step-By-Step

1. Try the STOP key first. If the problem is cleared away, then you don't need to RESET.
2. To RESET, hold down the CONTROL key and at the same time press STOP.
3. If the problem was not too severe, the program will still be in memory. Type LIST and press EXECUTE to see if the program is still in memory.

#21 HOW TO: Use the Control Key

When to Use

a. You want to turn the video features (inverse video, blinking and underlining) on or off.

b. You want to use the RESET key to bring the machine to a ready state.

c. You want to use SPCDEP (space dependent) mode for keying in programs.

d. You want to include control codes such as CR (carriage return), LF (line feed) or FF (form feed) in your outputs to the CRT or printer.

e. You want to include the four editing actions: Insert character, Delete character, Right arrow and Left arrow in your Special Function Key definitions.

General Information

Some functions of the CONTROL key are stenciled on the front of the appropriate key. For example, in examining the front face of the STOP key, you will find the word RESET, and on the front face of k0 you wll find INV-VIDEO. You will also notice that the lettering is white, and matches the lettering on the CONTROL key. This is to remind you to press the CONTROL key at the same time you press these keys.

Other uses of the CONTROL key are considered below:

Using Video Features — Step-By-Step

1. To turn on the video feature, press CONTROL and k0, k1, or k2 at the same time.
2. To turn off the video feature, press CONTROL and the same key again.
3. Another way to turn off all video features is press the CLR→END key.

Using the RESET key

HOW TO #20 explains the RESET key in detail.

Using SPCDEP (Space Dependent) Mode

HOW TO #16 explains space dependent mode.

Using Control Codes

Look in the Operating and Programming Manual under Control Codes for details on using CR (carriage return), LF (linefeed), FF (formfeed), etc. in your outputs to the CRT or printer.

Using Editing Actions in Special Function Key Definitions — Step-By-Step

1. Begin EDIT KEY mode as explained in HOW TO #7.
2. Include Insert character, Right arrow and Left arrow in your key definition by holding down the CONTROL key when you press one of these keys.
3. Complete the definition of the Special Function Key as explained in HOW TO #7.

#22 HOW TO:
Use the AUTOST (Autostart) Feature

When to Use

a. A program tape cartridge has been given to you which includes the autostart feature.

b. In order to make it as easy as possible for someone else to run your program, you would like to provide them with a tape which includes the autostart feature.

General Information

The autostart feature causes the machine to automatically load a program from a tape and start running. The program must be recorded by using a STORE statement, and it must be named "AUTOST". There can be only one file named "AUTOST" on a tape, and therefore only one autostart program per tape.

Using the Autostart Tape — Step-By-Step

1. If the machine is turned on, turn it off.
2. Insert the autostart tape in the tape cartridge unit.
3. Turn the machine on. The autostart program will be brought into memory and started, just as if the RUN key had been pressed.

Creating an Autostart Tape — Step-By-Step

1. Select a program which is to be the autostart program. When the autostart tape is created, this program will automatically start running when the machine is turned on.
2. Bring the autostart program into memory.
3. Type STORE "AUTOST:T15"
4. Press EXECUTE

NOTE

There can be only one autostart program (AUTOST) on a tape. If the tape already includes an autostart program, use a different tape.

#23 HOW TO: Learn More About the System 35

When to Use:

If you have completed the Introductory Training Program and the accompanying exercises in this workbook, you are well on your way to exploring this machine on your own. Here, we have provided a few more hints to help you to continue to learn at your own speed.

General Information:

A series of manuals are provided with the System 35, each for a specific purposes as indicated in the titles below.

- Operating and Programming Manual (p.n. 09835-90000)
- Beginner's Guide (p.n. 09835-90001)
- Programmer's Introduction (p.n. 09835-90002)
- System 35 Reference Guide (p.n. 09835-90010)

Study the various manuals that fit your needs, and pay particular attention to examples of programs or parts of programs. These will often provide an understanding of the interaction between several statements, and it is from these that you begin to build up a knowledge of programming.

In analyzing a program, first observe how it works when you press RUN. It may be helpful to write down the order of inputs requested, if any, and outputs. From this, you may have some idea of what computations are needed within the program.

After you run a program, obtain a listing of the program and compare the program lines with the observed operation. If necessary, look up unfamiliar statements in the Operating and Progamming Manual. If you still need to further understand how the program is working, use the STEP key or the tracing features, as explained in HOW TO #18 and HOW TO #19.

When you are writing your own program, first determine how it should work when you press RUN. Write down the order of inputs needed, if any, and outputs. Also write down any computations which will be needed.

Borrow sections of already-written programs, and then change them and add to them to obtain the results you want. If you like the way a program works, find out what features make it work that way. Think about using the same features in your own programs.

Finally, you will want to increase your System 35 BASIC vocabulary. There are many ways to watch your knowledge of the language expand. For example, keep a list of all of the statements, commands, functions, etc., as you learn them. When you have time, compare your list with the index in the Operating and Programming Manual, or with the syntax lists in the System 35 Reference Guide.

You will notice that there can be many variations of one statement such as TRACE or PRINT. The Syntax lists in the Reference Guide will indicate the great variety of possibilities for a single statement. For example, under PRINT there is PRINT, PRINT#, PRINT USING, PRINT ALL IS, and PRINTER IS. And within these, there are two ways to use the PRINT# statement and two ways to use the PRINT USING statement.

You are working with a powerful machine. And although we have talked about a few basics, you will be pleased to learn that the System 35 offers much, much more than we have discussed. You can continue to learn it at your own speed.

The Workbook
Supplement to the System 35 Introductory Training Cartridge

HEWLETT hp PACKARD

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