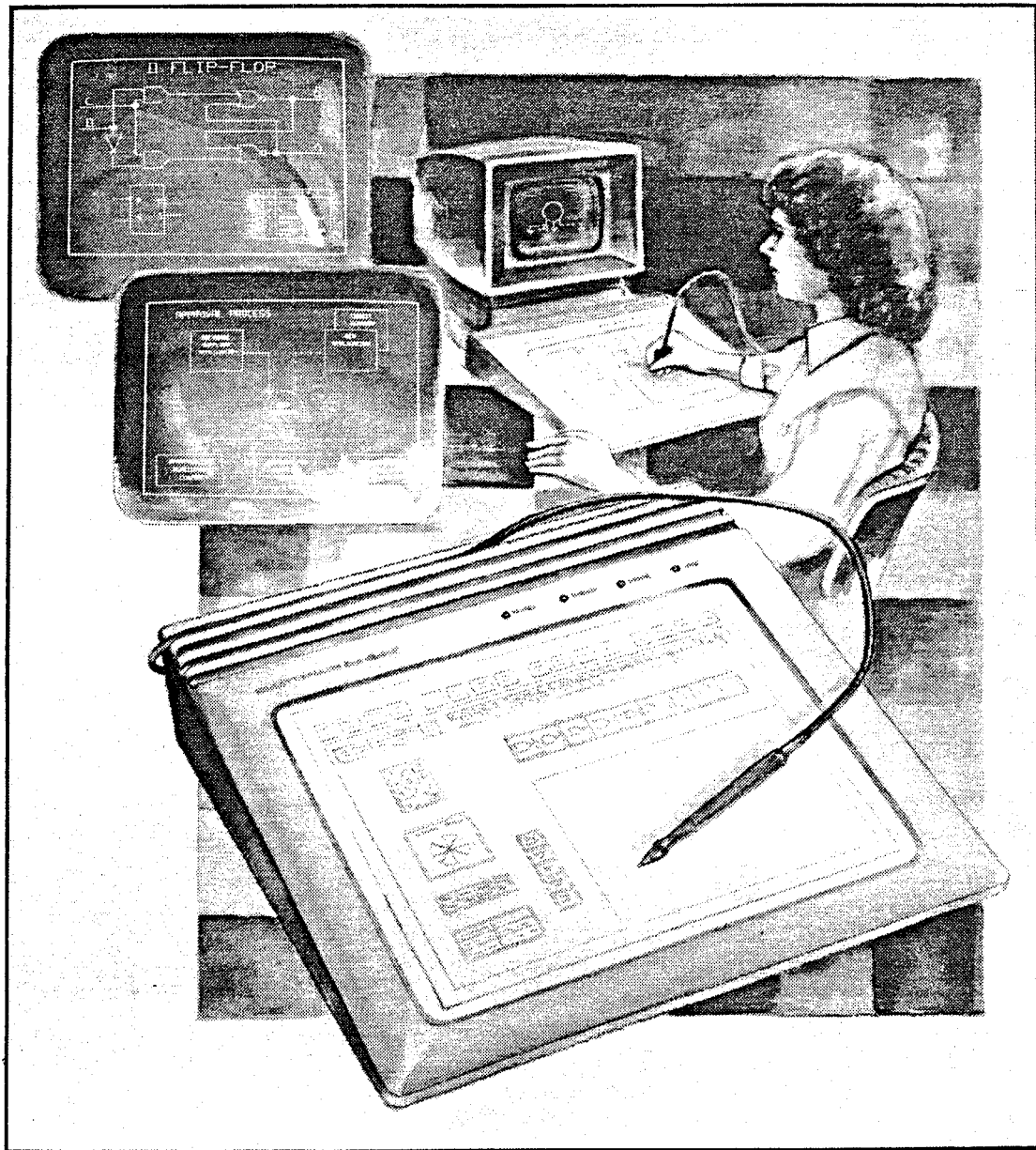


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HP-86/87

Hewlett-Packard HP 9111A System Tools User's Guide

For Use with HP Series 200,
HP-86, and HP-87 Computers



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Chapter 1

BECOMING FAMILIAR WITH THE HP 9111A SYSTEM TOOLS

The HP 9111A Graphics Tablet System Tools are designed to be exactly that -- tools. You can use these tools to make the tablet and the computer work together for you. For example, there are special graphics routines for creating drawings, storing them on discs, and plotting them on paper or transparency film. You can even custom-design some of the programs so they'll be more useful in your particular application. This chapter will provide you with some basic background information, and will show you how best to use this guide to become acquainted with the HP 9111A system tools.

How To Use This Guide

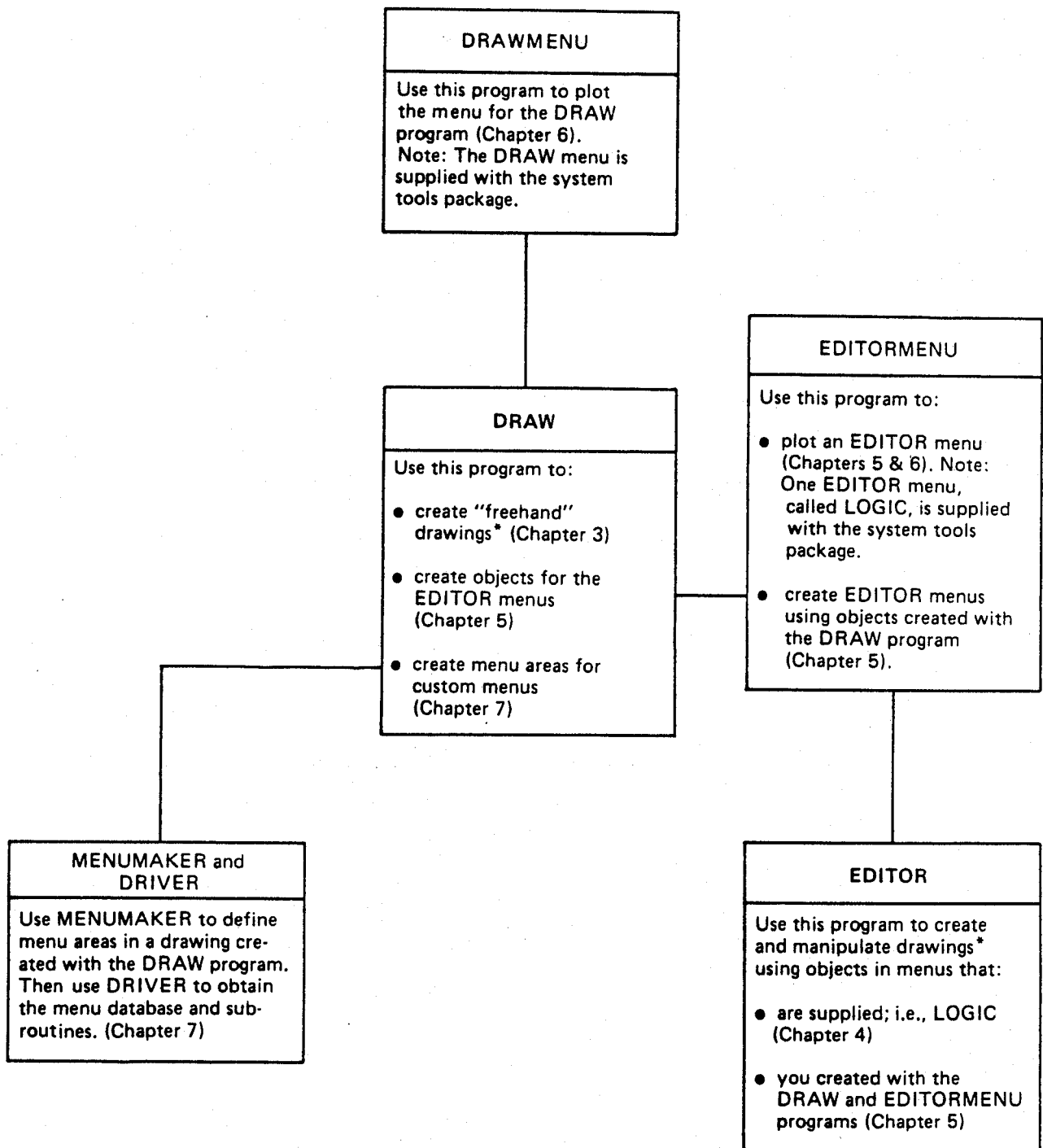
This System Tools User's Guide is set up to help you become proficient quickly. Each chapter introduces you to a new program or combination of programs, using step-by-step procedures to create example drawings. The examples show you how to use most of the features of each program. Appendices provide more detailed reference information about the programs.

The System Tools

The system tools consist of six main programs. The illustration on the following page provides a short description of each program, plus a diagram of the relationships between the programs. Each program is further explained in the chapters noted in this illustration.

Essentially, there are two main programs that you will probably use to create the majority of your drawings: DRAW and EDITOR. In fact, the two menus that are supplied with the system tools are for use with the DRAW and EDITOR programs. If you need extra copies of the DRAW menu, you can plot them with the DRAWMENU program. The other supplied menu, called LOGIC, is for the EDITOR program. You can plot LOGIC, or create a different EDITOR menu, with the EDITORMENU program. In addition, there are two other programs to help you turn any part of the platen into a custom menu area; these are called MENUMAKER and DRIVER.

**Descriptions and Relationships of the Programs
in the HP 9111A System Tools Package**



* Drawings created with DRAW and EDITOR are not interchangeable. That is, you cannot create a drawing with DRAW and then modify it with EDITOR, or vice versa.

The system tools programs are stored on two discs, the DRAW disc, and the EDITOR disc. The programs that are on each disc are listed next.

<u>DRAW Disc</u>	<u>EDITOR Disc</u>
DRAW	EDITOR
DRAWMENU	EDITORMENU
DRIVER	GKEYB (HP-86/87
MENUMAKER	only)
GKEYB (HP-86/87 only)	

Using the Programs and the Examples

The examples are set up so that you can work through the chapters in almost any order*. However, we suggest you work through them in sequence; this will help clarify the relationships and functions of each program. In any case, **be sure to read Chapter 2 first**. This chapter contains important information about making copies of your program discs so that you can still use your system tools if anything happens to the original discs.

Unless otherwise noted, all examples and descriptions apply to both HP Series 200 and HP-86/87 computers. Whenever an action applies to only one set of computers, the appropriate model numbers appear in parentheses: either (HP Series 200) or (HP-86/87).

The major difference between the two types of computers is with respect to "prompts." That is, often a program will automatically perform a particular task when you digitize a softkey or menu item. But sometimes you must perform specific actions before the task will be completed. On the HP Series 200 computers, the program will "prompt" you with audio tones and messages on the CRT when actions are necessary. On the HP-86/87 computers, the program will only prompt you with tones. The examples in this guide will tell you what actions are necessary.

If you would like to know more about how to use a particular softkey or menu item, refer to Appendix B, where you will find detailed descriptions. In addition, if you are in the middle of an operation and don't know what to do next, you can obtain information by pressing the stylus in the **HELP** softkey on the menus.

*The example in Chapter 5 assumes you understand the DRAW and EDITOR programs (Chapters 3 and 4). The example in Chapter 7 assumes you understand both the DRAW program (Chapter 3), and BASIC programming and editing methods.

NOTE: If you do not wish to do the examples, turn to the chapter that describes the program which you're interested in. Then follow the first few steps to load and run the program. After this, if you need help, digitize the **HELP** softkey on the tablet or refer to Appendix B.

Enhancing the System Tools

The examples introduce you to the major features of the system tools, but you may find that other features would be helpful for your particular needs. Because these are tools, they have been programmed in the BASIC language so that you can make changes. While BASIC puts some limitations on the flexibility of the tablet, you will find it easier to modify than other programming methods. For information on the structure of each program, refer to Appendix A.

Terms You Should Understand

The following list provides definitions of some terms that are used throughout this guide.

CRT. Cathode Ray Tube; provides the display on a video terminal.

Cursor. An indicator (+) that guides data entry on the CRT.

Default. A value that is automatically assumed if no other value is specified.

Digitize. To press the stylus on the tablet's surface, causing the tablet to send the coordinates of that location to the computer. Depending on the menu used, that location might have significance to the program as representing a softkey or menu item that will cause a task to be performed. Or, that location might represent a point on a drawing. The **DIGITIZE** indicator on the tablet blinks on and off when a point has been digitized. Also, an audio tone indicates that a point has been digitized. There are five different tones as follows:

- an acknowledgment sequence to indicate a softkey or menu area has been correctly digitized
- an error sequence to indicate something has been incorrectly digitized

- a query tone to indicate an action is expected of you
- a completion sequence to indicate a series of steps has been completed
- a single tone to indicate a point in the placement area has been digitized

Enter. To send information to the computer via the keyboard. When entering a command (such as LOAD), type in the command and then press **EXECUTE** (HP Series 200) or **END LINE** (HP-86/87). When entering an answer to a question posed by a CRT prompt, type in the answer and then press the key asked for by the prompt. It is usually the **CONTINUE**, **EXECUTE**, or **ENDLINE** key.

Function keys. The definable keys located at the top of the computer keyboard, labeled **k1**, **k2**, etc. The definitions of the keys vary; the program will tell you when to press a function key, along with which keys you can press.

HP-IB. Hewlett-Packard Interface Bus. Hewlett-Packard's implementation of the IEEE 488-1978 Instrumentation Bus, used to connect multiple devices together with well-defined hardware protocol.

Menu. A list of available choices, laid out in a graphic or tabular format. These choices represent tasks that the program will perform. Menus are usually placed on the tablet in hardcopy form, but they might also be displayed on the CRT.

Object. A symbol used in the EDITOR program. Once the symbol is drawn and placed in an EDITOR menu as an object, you need only digitize the menu object to place it in a drawing, rather than constantly redrawing the symbol from scratch.

What You Should Know Before Proceeding

Equipment and Accessories

Take a moment to be sure you have the proper equipment and accessories for the system tools. First, you must have either an HP Series 200 computer (model 16A/S, 26A/S, or 36A/S) or an HP-86A/B or HP-87A/XM computer. Second, of course, you must have an HP 9111A graphics tablet. The first table below shows the equipment necessary for each computer to run the system tools. The second table shows all of the components supplied with the system tools.

Equipment	Model/Part Number
<p>HP Series 200 Computer with BASIC 2.0 operating system and 256K available memory (excluding SRM, operating system, and any other utilities or extensions)</p> <p>Disc drive</p> <p>Plotter</p> <p>Printer</p> <p>Blank discs</p>	<p>Model 16A/S, 26A/S, or 36A/S</p> <p>Standard in models 26 and 36; or use compatible external disc drive¹</p> <p>Optional but highly recommended²</p> <p>Optional but recommended³</p> <p>Use discs for your drive</p>
<p>HP Series 80 Computer with 128K total available memory (excluding any ROMs)</p> <p>HP-IB interface</p> <p>ROM Drawer</p> <p>Plotter ROM</p> <p>Disc drive</p> <p>Plotter</p> <p>Printer</p> <p>Blank discs</p>	<p>HP-86A/B or HP-87A/XM</p> <p>Standard in HP-87A/XM and HP-86B; HP82937A for HP-86A</p> <p>HP 82936A</p> <p>HP 00087-15002</p> <p>Compatible disc drive¹</p> <p>Optional but highly recommended²</p> <p>Optional but recommended³</p> <p>Use discs for you drive</p>

Required Equipment

(footnotes to previous table)

¹ Any compatible single or dual disc drive is acceptable; for example, the HP 82901 dual disc drive or the HP 9121 micro disc drive. Ask your dealer or local HP Sales and Support Office for details on available disc drives.

² The following Hewlett-Packard plotters may be used: 7470A, 7475A, 7580A/B, 7585A/B, and 9872C/T. However, if you have an HP 7470A plotter and want to plot menus to fit on the surface of the tablet, the system tools will plot sections of a menu, which you will then need to tape together. This is because this plotter only accommodates A4-size (210 x 297 mm) or A-size (8.5 x 11 in.) paper. The tablet's dimensions are 285 x 349 mm (11.2 x 13.7 in.), requiring A3-size (297 x 420 mm) or B-size (11 x 17 in.) paper to plot a whole menu. You can use menu overlays (HP 7121-0988) over these taped menu sections to provide a smooth digitizing surface.

³ Any compatible printer may be used. However, if your HP 9111A tablet has a serial prefix number of 2251A or higher, the HP 9876 printer is not supported for use with the tablet. Ask your dealer or local HP Sales and Support Office for details on available printers.

Component	Quantity
User's Guide	1
Program discs	2 (DRAW Disc and EDITOR Disc)
Paper menus	2 (DRAW Menu and EDITOR Menu)

**Components
Supplied
with the
System
Tools**

What You Should Know about Your Equipment

Before using the system tools, you should be familiar with the operation of your computer, tablet, printer, and plotter; refer to the appropriate operating manuals supplied with the equipment. If you plan to modify the system tools, you should also know how to program in BASIC; refer to the programming manuals supplied with the tablet and your computer.

Setting Up Your System

Specific setup instructions are not included in this manual, because of the number of possible configurations. Refer to your operating manuals for instructions on connecting your equipment.

For the system tools programs to operate, set the HP-IB address switches on your equipment as follows:

- printer = 01
- tablet = 06
- plotter = 05

If asked for a device's address, you must give it as the HP-IB select code plus the address code. The HP-IB select code is usually 7. Thus, your response for the plotter address would be 705.

If your equipment (for both HP Series 200 and HP-86/87 computers) uses different addresses or select codes, you can change the switch settings on the equipment to be compatible with the system tools. Or, you can change the address/select code assignments in the programs. To do this, you must understand how to edit programs on your computer. Then load a program (e.g., LOAD "DRAW"*), list the first several lines to find the assignments, change the assignments, and store the program again. Repeat for each program. The programs are:

<u>DRAW Disc</u>	<u>EDITOR Disc</u>
DRAW	EDITOR
DRAWMENU	EDITORMENU
DRIVER	GKEYB (HP-86/87
MENUMAKER	only)
GKEYB (HP-86/87	
only)	

*On the HP-86/87 computers, after loading the program, you must also enter the command LOADBIN "GKEYB" for every program except DRAWMENU.

NOTE: If you have an HP-86A, refer to the HP-IB Interface Owner's Manual (part number 82937-90017) for instructions on checking the setting of the HP-IB select code. To avoid electrical damage, the select code of the HP-IB interface card should **not** be set to the same select code used by the HP-86A printer/disc interface. This interface uses the select code 7. The HP-IB interface card can therefore use any select code between 3 and 10 except 7. **The system tools assume you are using the select code 6**, connecting the plotter and tablet to the same HP-IB interface card. Also, the system tools assume that your printer is connected to the **PRINTER** interface on the HP-86A. This means that the tablet's address is 606, the plotter's address is 605, and the printer's address is 701.

A Note for HP-86/87 Owners

Many of the menu operations take **several minutes** on the HP-86/87 computers. This is because of the way the computers execute the program. Please have patience; as long as the **POWER** light at the front of the keyboard is blinking, the program is running. Avoid digitizing or pressing keyboard keys while waiting for an operation to be performed, as this might halt the program and cause loss of data.

The **COPY CRT** softkey on the DRAW and EDITOR menus assumes that you have an HP 82905B printer. If you have another type of printer, you might need to change the parameters of the DUMPGRAPHICS statement used by **COPY CRT** (check your HP-86/87 Plotter ROM Owner's Manual). To change this statement, load the DRAW program and GKEYB binary program as described for changing addresses under the previous section, Setting Up Your System. Then list the program until you find the "K7: COPY CRT" subroutine. Next, change the DUMPGRAPHICS statement as required for your printer, and store the program again. Repeat for the EDITOR and MENUMAKER programs.

If you have an HP-86, you will notice that shapes drawn on the CRT are elongated vertically. For example, circles appear as ellipses on the CRT and squares appear as rectangles. This phenomenon is due to the shape of the pixels in the CRT screen, and is restricted to the CRT. When you plot your drawings, all shapes will be drawn on the plotter without distortions.

If you have an HP-86A, please read the note in the previous section. This note contains important information about the HP-IB select code.

--NOTES--

Chapter 2 SETTING UP DISCS FOR YOUR COMPUTER

You're probably anxious to begin using the HP 9111A system tools right away. But please have a little patience. The system tools are all contained on two discs, and discs are subject to wear and tear. If anything happens to your discs, you will have to buy a new set of system tools. Therefore, we recommend that you make backup "working" copies of your discs before you do anything else. Then store your original discs in a safe, dust-free place. If something happens to your working discs (for example, they get scratched or simply get old), you can always make another copy from your original discs. The first section of this chapter discusses the procedures for copying your discs.

In addition, you will need a separate disc, which we will refer to as the storage disc. Use this disc for storing drawings and custom menus. To learn how to set up a storage disc, refer to the final section of this chapter.

Making Back-up Copies of the HP 9111A System Tools

In your HP 9111A system tools package, you will find two program discs, one labeled DRAW, and the other labeled EDITOR. After you have made copies of these discs, they will be your "original program discs;" the copies will be your "working discs."

Listed below are a few general principles that you should keep in mind when copying discs. Please refer to the INITIALIZE and COPY statements in your computer's operating and programming manual for specific instructions on copying discs. If you have a single disc drive, you might also be able to copy the disc using the CBACKUP utility (HP Series 200 computers) or the BACKUP program (on the system demonstration disc supplied with the HP-86/87 computers).

1. Choose discs for your working copies. You can use either blank discs or discs that have data which you don't mind erasing.

2. Before you can use the new discs, you must format them so that they will operate properly with your computer. This is accomplished with the INITIALIZE statement. Be sure to remove any label covering the notch on the right side of each disc; if this notch is covered, the disc is "write-protected" and cannot be initialized. **Make sure you are initializing the "working" discs, not an original program disc.** If you initialize an original program disc, the entire disc will be erased and you will no longer have any 9111 system tools. As a safeguard, leave the write-protect labels on the original program discs.

NOTE: To increase the speed at which your programs run, we suggest you add an "interleave factor" when you initialize your discs. Refer to your computer and disc drive documentation for hints on determining the optimum interleave factor for your system.

3. Now you can copy the original program disc to the initialized working discs. Follow the procedures recommended in your computer documentation. When you've finished, be sure to store the original program discs in a safe, dust- and moisture-free place. In addition, place write-protect labels on the working discs.

Preparing a Storage Disc

It's a good idea to have a storage disc before running the programs. If you create a drawing, then decide to store it but don't have a storage disc, you would have to stop the program in order to prepare a storage disc. This would destroy the drawing.

To create a storage disc, you only need to initialize a disc so that it will be formatted to run on your computer. You can use either a blank disc or a disc that has data which you don't mind erasing.

To initialize the storage disc, refer to the INITIALIZE statement in your computer's programming manual. As discussed in the sections on copying discs, we recommend you add the optimum interleave factor for your system.

Do not place write-protect labels on storage discs, because they defeat the purpose -- you need to store drawings and menus on storage discs, and the write-protect labels won't allow you to do so!

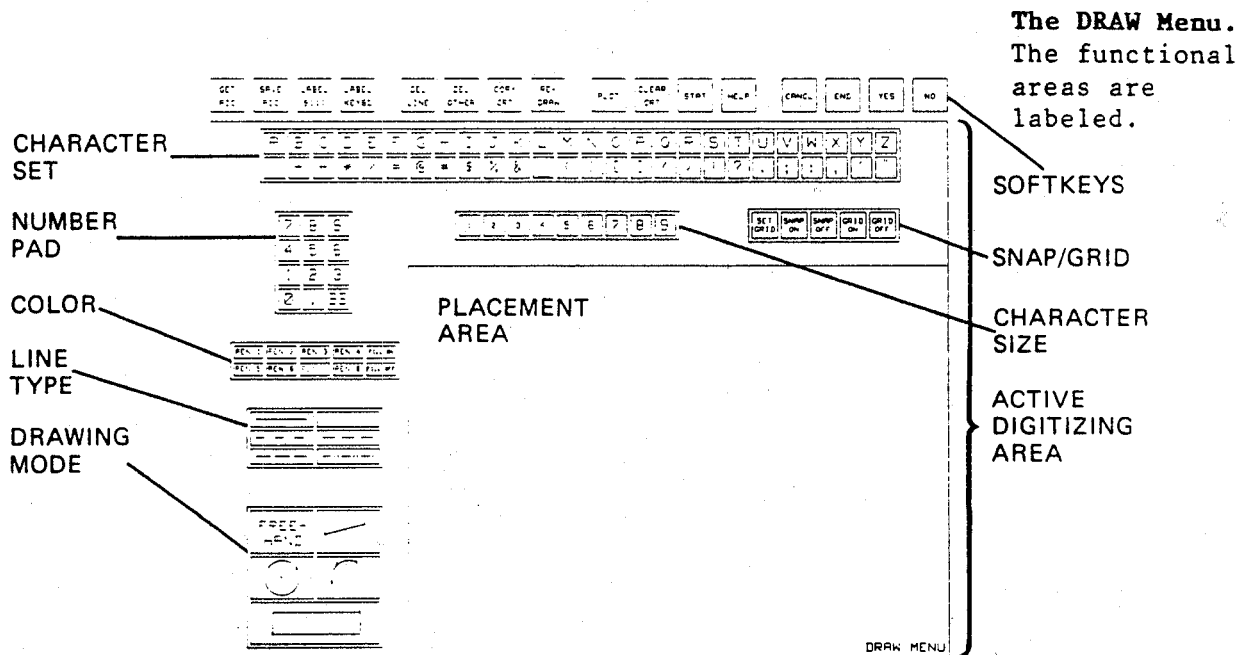
Chapter 3

THE DRAW PROGRAM: CREATING A "FREEHAND" DRAWING

The DRAW program allows you to create a drawing, store it, retrieve it, and copy it to a printer or plotter. You can draw "freehand," just as you would with pen and paper, or you can specify that the tablet draw straight lines, rectangles, circles, or arcs automatically for you.

Understanding the Menu for the DRAW Program

First, take a moment to become acquainted with the DRAW menu, shown below. This menu is supplied with your system tools package; if you do not have this menu, refer to Chapter 6 for instructions on plotting it.



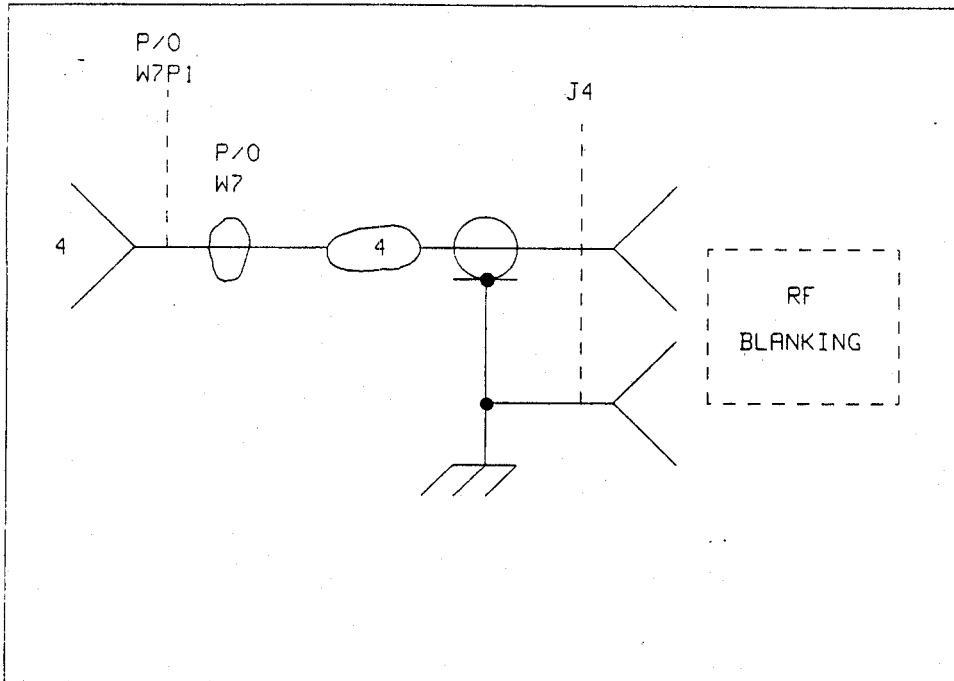
The DRAW menu is divided into several areas that provide you with various drawing functions. These areas are described briefly here to help familiarize you with the menu. They are defined in more detail in Appendix B.

- The **softkeys** allow you to perform various operations on your drawing. For example, you can erase parts of the drawing or request a status report of your drawing.
- The **character set** and **number pad** can be used to place labels in your drawing.
- The **character size** area permits you to specify how large the labels will be.
- The **snap/grid** area allows you to define certain grid conditions. The grid consists of lines of dots spaced equally in the horizontal and vertical directions. You can define how dense you want the grid. You can also specify the snap function so that any point you digitize will automatically be placed over the nearest grid dot (except with the freehand mode). Snapping makes it easy to line up objects in your drawing.
- The **color** area allows you to define which pens will be used to plot different portions of your drawing.
- The **line type** area allows you to choose line patterns for different portions of your drawing.
- The **drawing mode** area permits you to choose whether to draw freehand or to have the program draw shapes for you.
- The **placement area** is the portion of the menu where you create your drawing.
- The **active digitizing area** is a portion of the tablet, rather than a portion of the menu. The active digitizing area includes the area within the large box outlined in the platen, below the softkeys.

Using the DRAW Menu To Create a Drawing

In this section, you will use step-by-step procedures to create the drawing shown next. The procedures are designed to illustrate the main functions of most of the menu areas. For more complete information about softkeys or menu areas, refer to Appendix B.

If you do not want to do the example, simply follow steps 1 through 6 to start the program.



Circuit Diagram.

You can create this diagram using the steps listed in this section.

1. Place the DRAW menu on the tablet's platen. Be sure to align the softkey boxes and the frame around the active digitizing area. If you do not have this menu, refer to Chapter 6 for instructions on plotting the menu.
2. Be sure your computer, tablet, and plotter are connected and turned on. (Always turn on your computer before turning on the tablet.) If you have an HP Series 200 computer, be sure your BASIC 2.0 operating system is loaded. (Refer to the appropriate operating manuals.)

NOTE: If you anticipate using the plotter, connect it and turn it on now. If you connect or turn on the plotter after the program is running, it might cause I/O interference. This could halt the program and destroy the current drawing data. (This example uses the plotter.)

3. Insert your working copy of the DRAW disc into the primary disc drive of your computer.
4. Type this command, followed by **EXECUTE** (HP Series 200) or **END LINE** (HP-86/87): **LOAD "DRAW"**

If you have an HP-86/87 computer, wait for the light on the disc drive to turn off. Then type this command, followed by **END LINE**: **LOADBIN "GKEYB"**

5. After the light on the disc drive turns off, press **RUN** on your computer keyboard. Then, if you have an HP Series 200 computer, skip to step 7.

6. When prompted on an HP-86/87 computer, press the keyboard function key corresponding to your computer model number.
7. When the frame has been drawn on the CRT, you can begin digitizing. This frame represents the placement area of the menu. First press the stylus in the softkey box marked **STAT**. (This is called "digitizing" the softkey. When you digitize a softkey or menu area correctly, you will hear an acknowledgment tone. If you digitize an inappropriate area, you will hear an error tone.) You should then see the following status listing on your CRT.

As you work with the different menu areas, the drawing status will change. Feel free to digitize the **STAT** softkey at any time to view the current status. (You do not have to digitize **STAT** as the first step in creating a drawing. This step is simply to acquaint you with the status report.)

CURRENT STATUS OF DRAWING

COLOR = PEN 1
LINE TYPE = SOLID LINE
CHARACTER SIZE = 4
DRAWING MODE = SINGLE POINT MODE
SNAP GRID MODE = OFF
GRID SIZE = 20
AREA FILL = OFF

PERCENT OF DRAWING SPACE USED = 0
PERCENT OF LABEL SPACE USED = 0

The Status

Report:

Digitize the **STAT** softkey to obtain this listing.

8. Now return to the digitizing mode. On HP Series 200 computers, press the stylus anywhere on the softkeys or active digitizing area. On the HP-86/87 computers, press **CONT** on the keyboard.
9. To make it easier to draw the circuit diagram, set a grid and set the snap mode, using these steps. When you digitize the menu boxes in steps a-c, the tablet will respond with an acknowledgment tone.
 - a. First digitize the box labeled **SET GRID**. When asked for the grid size, type 30 and press **CONTINUE** (HP Series 200) or **END LINE** (HP-86/87).
 - b. Digitize the **GRID ON** box, to cause the grid dots to be drawn on the CRT.
 - c. Finally, after the grid has been drawn, digitize the **SNAP ON** box. Now when you begin digitizing your drawing, each point that you digitize will be placed over the nearest grid dot.

10. Using the following illustration to help you in placement, draw two lines as described in this step. (Hint: To draw the illustrations as shown, count the number of grid dots from the upper-left corner. If you have an HP-86/87 computer, notice that the frame is slightly shorter than shown for HP Series 200 computers.)

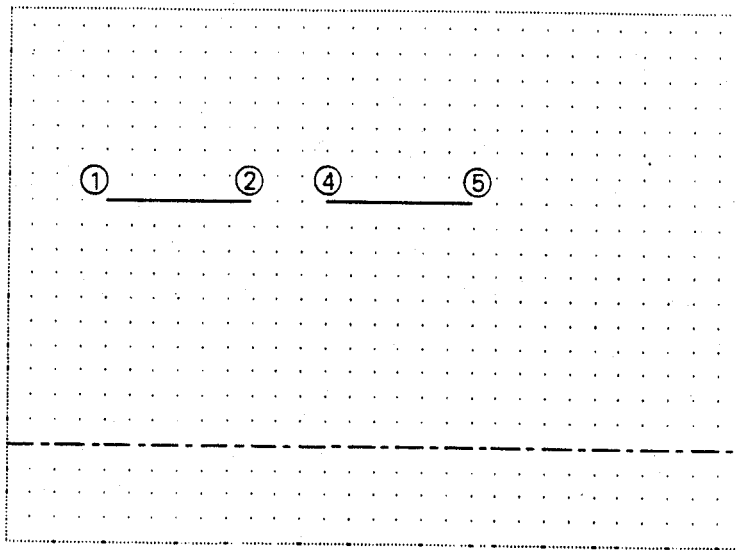
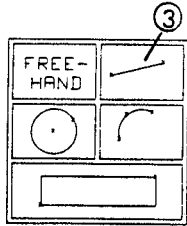
First, move the stylus lightly across the platen so that you can see how the cursor (+) on the CRT follows its movement. When the cursor is positioned at the point labeled 1 in the illustration, digitize the point by pressing down on the stylus. You will hear a single, digitized-point tone. (If you have an HP-86/87 computer, the cursor and grid dot will disappear for a few moments. Continue holding the stylus on the platen until you see the cursor.) Next digitize the endpoint labeled 2. A line will automatically be drawn between the two endpoints.

If you were to digitize another endpoint, a line would be drawn between the last endpoint and the new one. However, you want to draw a new line not connected to the first line. Therefore, digitize the single-point mode box (labeled 3) or digitize endpoint 2 again to terminate the last line. (If you digitize the single-point mode box, you will not hear a tone. If you digitize endpoint 2, you will hear a tone indicating you have completed the line.)

Now digitize points 4 and 5 to draw the second line. Terminate this line by digitizing point 5 again or by digitizing the single-point mode box.

NOTE: If you want to erase a line, be sure you have terminated it as described above, and then digitize the **DEL LINE** softkey. Then digitize two endpoints on the line. (A query tone will prompt you to digitize each point.) After the computer has found the line in the data base, the line will start blinking (HP Series 200) or turn to a dotted line type (HP-86/87). If you still want to erase this line, digitize the **YES** softkey. If not, digitize either the **CANCL** or **NO** softkey. You cannot delete parts of a line drawn with the single-point mode box; you can only delete the whole line from endpoint to endpoint. However, if you drew a line with the freehand box, you can delete portions of the line. Refer to Appendix B for more information. Also, if it looks as though something was erased by mistake, digitize the **REDRAW** softkey. Your drawing as it currently exists will be redrawn on the CRT.

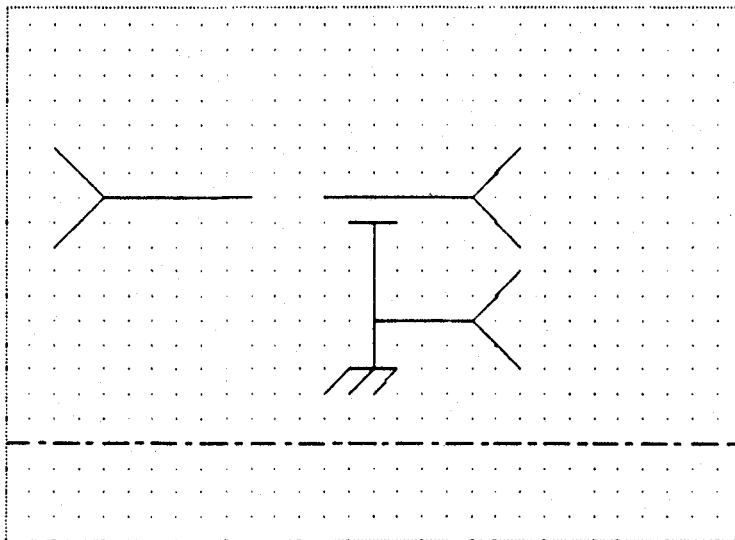
Placement
for Step 10



Frame ends here on
HP-86/87 computers

11. Now follow the same procedure to draw the rest of the lines shown in the following illustration.

Placement
for Step 11

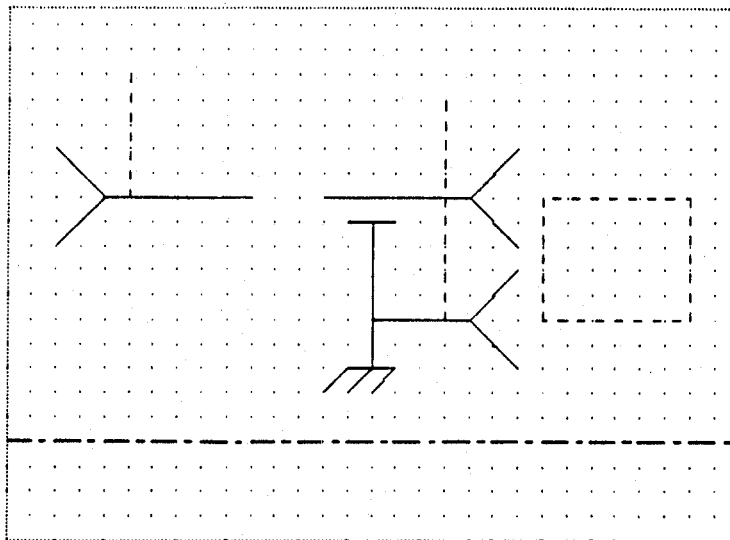


Frame ends here on
HP-86/87 computers

12. The next shapes you digitize will be drawn in a different line pattern. First digitize the left-center box in the line type area of the menu. (This box shows the line pattern - - - - .) Then digitize the two vertical lines shown in the following illustration. To draw the rectangle, digitize the rectangle box in the drawing mode area. Then digitize two diagonal corners of the rectangle, such as the lower-left and upper-right corners. The rectangle will be drawn automatically.

NOTE: If you want to erase a label, or a rectangle or circle created with the rectangle and circle drawing mode boxes, digitize the **DEL OTHER** softkey. Then digitize the center of the rectangle/circle, or the first character of the label. (A query tone will prompt you to do so.) When the computer has found it in the data base, the shape will blink (HP Series 200) or turn to a dotted line type (HP-86/87). If you still want to erase it, digitize the **YES** softkey. If not, digitize either the **CANCL** or **NO** softkey. Note that rectangles or circles drawn with the drawing mode boxes must be erased with **DEL OTHER**. If they were drawn with single-point or freehand lines, you must erase them with **DEL LINE**. Refer to Appendix B for more information.

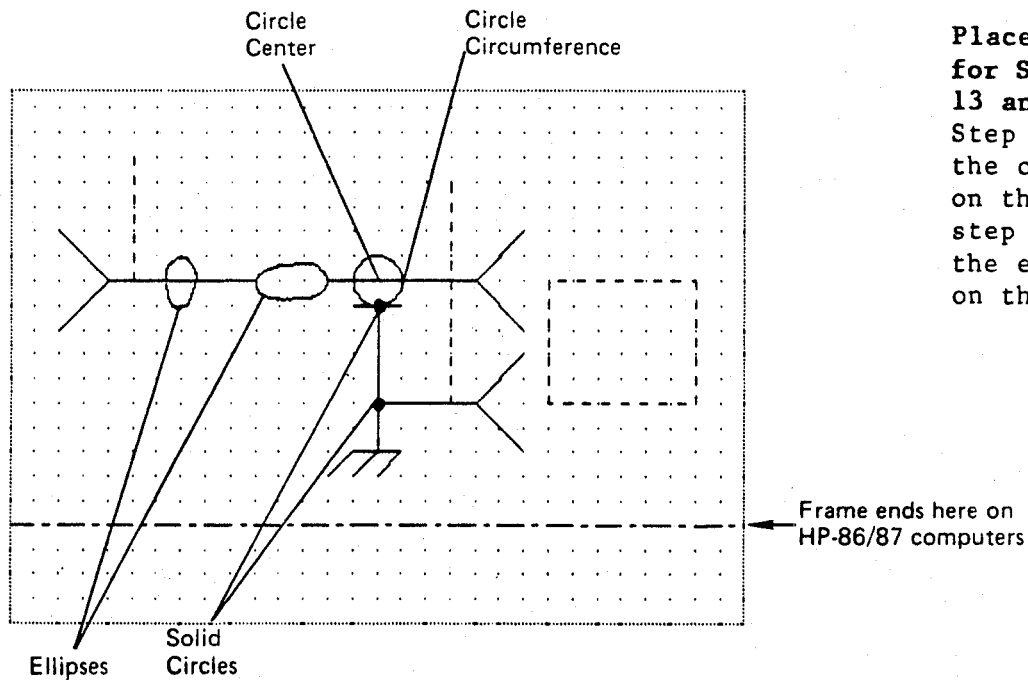
Placement
for Step 12



Frame ends here on
HP-86/87 computers

- Now draw the outlined circle shown on the right in the following illustration. First, switch back to the solid-line mode by digitizing the solid-line box in the line type area. Now digitize the circle box in the drawing mode area. Then digitize the center of the circle, followed by a point on the circumference. (The center of the circle is shown in the illustration. The circumference of the circle is 1 grid dot away from the center.) A circle will be drawn automatically.

To draw the solid circles, first digitize the **FILL ON** box in the color area. Then digitize the **SNAP OFF** box so that you can draw circles that are smaller than 1-dot units. Now digitize the center of one of the circles, followed by a point on the circumference. A solid circle will be drawn. Repeat for the other circle.



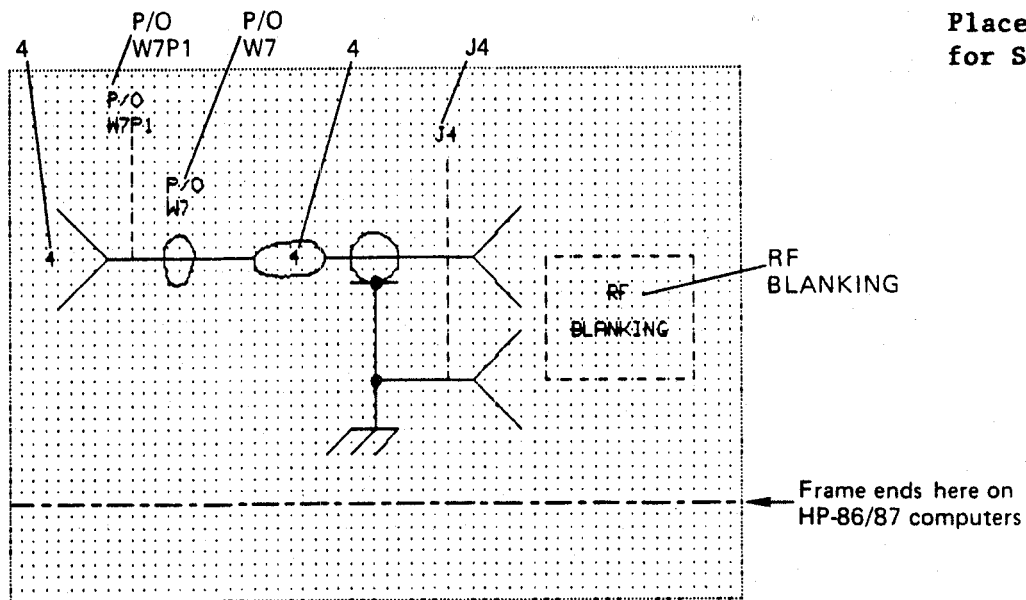
Placement for Steps 13 and 14. Step 13 draws the circles on the right; step 14 draws the ellipses on the left.

- Draw the two ellipses shown in the previous illustration by first digitizing the **FILL OFF** box, then the **FREEHAND** box. Now exert even pressure on the stylus and draw each ellipse as though you were using a pen. Draw slowly enough for the cursor to follow the stylus' movement. If you have an HP Series 200 computer, the drawing stops when you release the stylus. If you have an HP-86/87 computer, digitize the **FREEHAND** box once after you have drawn one ellipse, and once after you have drawn the other ellipse. This signals the program that you have finished each freehand shape so that the two shapes won't be connected.

15. Now place labels on your drawing using a different pen color. First change the grid size to 60 and specify the snap-on mode to help you in aligning the labels. (Follow step 9.) After the CRT has been redrawn, digitize the **PEN 2** box. Next select a larger character size by digitizing the **6** box in the character size area. Finally, follow these steps to place the labels.

- a. Digitize the **LABEL 9111** softkey.
- b. Using the character set and number pad areas, digitize the first label ("P/O") in the following illustration.
- c. Digitize the point in the diagram where you want the center of the left edge of the label to be placed.
- d. Repeat steps a through c for each label. The labels are printed around the illustration so that you can read them more easily.

NOTE: If you make a mistake while digitizing the characters of a label, you can digitize the **BS** (backspace) character in the number pad. If you notice a mistake after you have placed a label, you must use **DEL OTHER** to delete the label, then place the label again using steps a-c above.



16. Congratulations -- you have finished your first drawing. To store it, remove the program disc and insert your storage disc. Then digitize the **SAVE PIC** softkey. Finally, enter **DIAGRAM** as the file name for your drawing. (It is a good idea to store your drawing as soon as you've finished it, as a safeguard.)
17. If you want to plot the diagram, be sure your plotter is set up. Load pens in the first two pen stalls (black and red are recommended). Then load paper; any size is fine. (If you have an HP 7580/7585 plotter, press the **REMOTE** button on the front panel. Also, if you are loading paper with the long side along the pen axis, press **ENTER** and **ROTATE** on the front panel so that the plot will be oriented properly on the paper.)

Now digitize the **PLOT** softkey. If you have an HP-86/87 computer, enter your plotter's model number when asked. If you have an HP Series 200 computer, the computer finds the model number automatically.

For all computers, when asked whether you're plotting on paper or transparency film, answer **YES** for paper (the plotting speed is faster). When asked if you want a menu plot, answer **NO**. Finally, when asked whether you want a frame around your plot, answer **YES**. If your plotter is ready, press **CONTINUE**.

NOTE: If you have an HP Series 200 computer, respond to the questions by digitizing the appropriate menu softkey. If you have an HP-86/87 computer, respond by pressing the designated keyboard function key.

While the drawing is being plotted, do not use the keyboard or tablet. This could halt the program and result in loss of data.

18. If you want to alter or plot this drawing again at a later date and you have saved it on your storage disc, just load the **DRAW** program, insert your storage disc, and digitize the **GET PIC** softkey. When asked for the file name, enter **DIAGRAM**. Then, after the picture is drawn on the CRT, alter the drawing or digitize the **PLOT** softkey as described in step 17. Remember, the **DIAGRAM** file is classified as a **DRAW** program file; it cannot be used with the **EDITOR** program.
19. If you are ready to go on to the next chapter, digitize the **END** softkey. Then press the keyboard function key designated **QUIT**; this stops the program.

Chapter 4

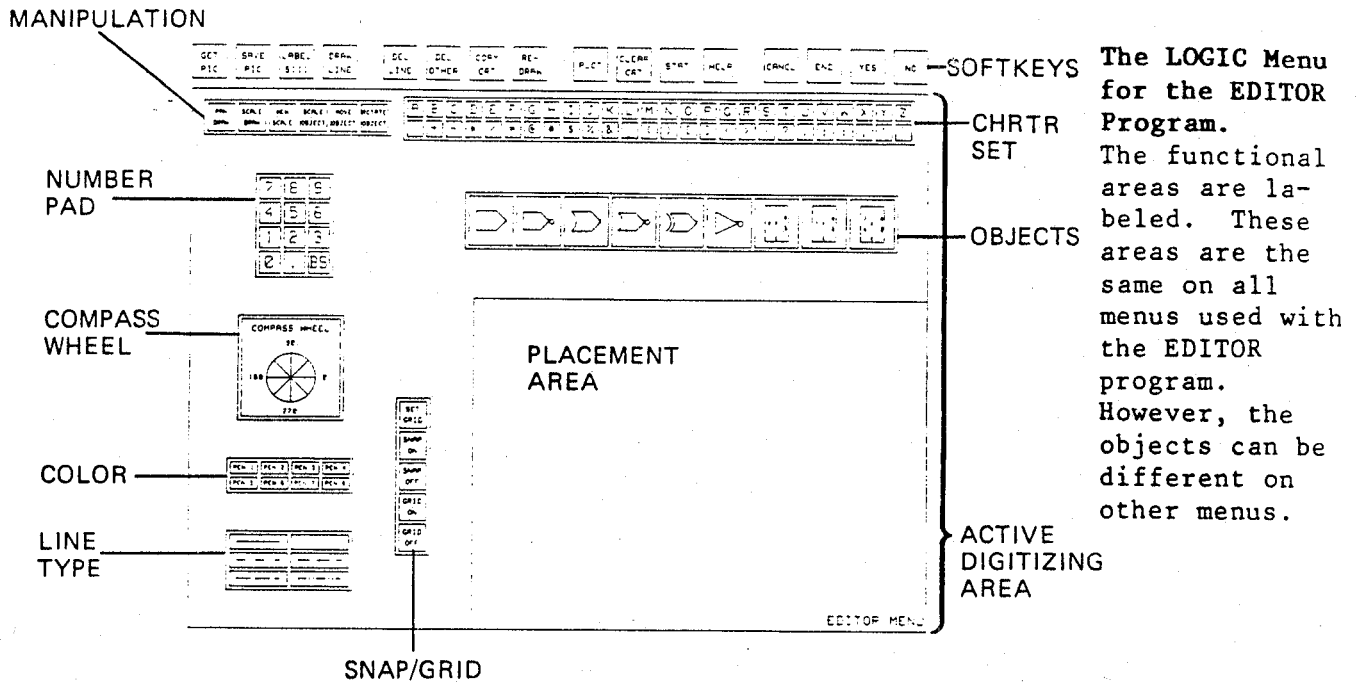
THE EDITOR PROGRAM: CREATING A DRAWING USING PREDEFINED OBJECTS

The EDITOR program allows you to create a drawing using predefined objects available on a special menu. These objects might be almost anything, perhaps symbols, labels, or logos that are used repeatedly in drawings. You need only digitize the box that contains the object, and the object will be drawn automatically. This saves you the time of redrawing the object each time you want to place it in a drawing. The EDITOR program also allows you to manipulate objects in several ways, such as rotating them and scaling them to different sizes.

The HP 9111A System Tools package provides you with one menu containing predefined objects for creating logic diagrams. This menu is called LOGIC. In this chapter, you will use the LOGIC menu to learn how the EDITOR program works. Then you can proceed to Chapter 5, where you will learn how to create your own objects and menu to use with the EDITOR program.

Understanding the Menus for the EDITOR Program

Although the objects in menus for the EDITOR program may vary, the functional areas are the same on each menu. The following illustration shows the LOGIC menu, which will be used in this chapter. If you do not have this menu in your system tools package, refer to Chapter 6 for instructions on plotting it.



The LOGIC Menu for the EDITOR Program. The functional areas are labeled. These areas are the same on all menus used with the EDITOR program. However, the objects can be different on other menus.

The menus used with the EDITOR program are divided into several areas that provide you with various drawing functions. These functions are described briefly below to help you become acquainted with the menu. For more detailed definitions, refer to Appendix B.

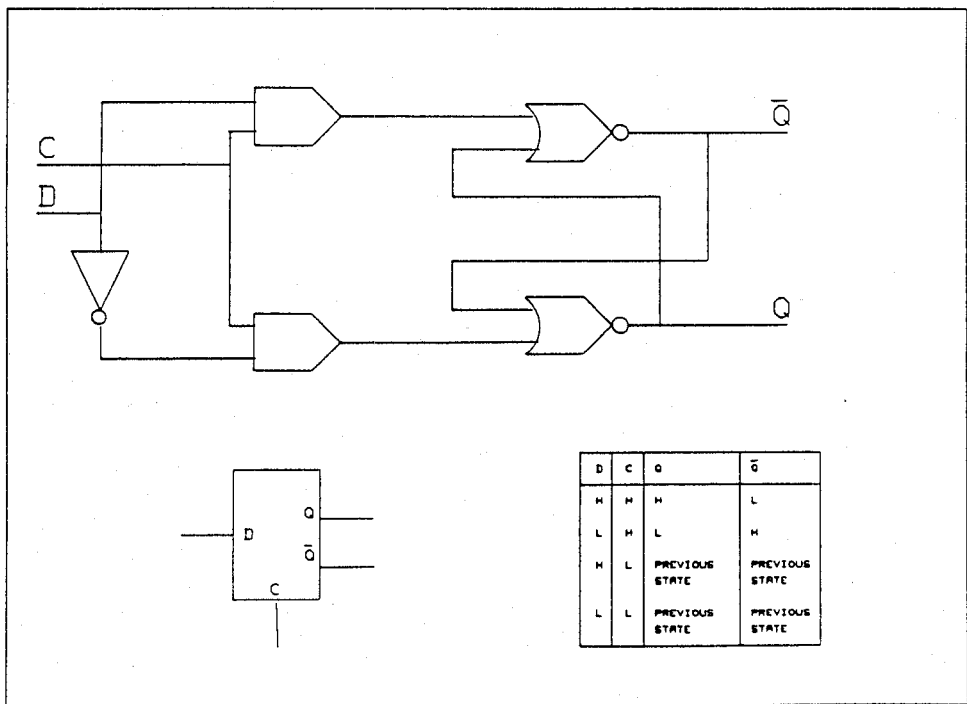
- The **softkeys** allow you to perform various operations on your drawing. For example, you can erase parts of the drawing or request a status report of your drawing.
- The **character set** and **number pad** can be used to place labels in your drawing.
- The **manipulation** area permits you to rotate or scale objects that you place in your drawing.
- The **objects** area can contain up to 20 objects that you have defined for your menu. (Refer to Chapter 5.)
- The **compass wheel** permits you to specify the degrees of rotation for objects and labels in your drawing.
- The **color** area allows you to define which pens will be used to plot different portions of your drawing.
- The **line type** area allows you to choose line patterns for different portions of your drawing.

- The **snap/grid** area allows you to define certain grid conditions. The grid consists of lines of dots spaced equally in the horizontal and vertical directions. You can define how dense you want the grid. You can also specify the snap function so that any point you digitize will automatically be placed over the nearest grid dot. Snapping makes it easy for you to line up objects in your drawing.
- The **placement area** is the portion of the menu where you create your drawing.
- The **active digitizing area** is a portion of the tablet, rather than a portion of the menu. The active digitizing area includes the area within the large box outlined in the platen, below the softkeys.

Using the LOGIC Menu to Create a Drawing with the EDITOR Program

In this section, you will use step-by-step procedures to create the drawing shown next. The procedures are designed to illustrate the main functions of most of the menu areas. For more complete information about softkeys or menu areas, refer to Appendix B.

If you do not want to do the example, simply follow steps 1 through 6 to start the program.



Logic Diagram.
You can create this diagram using the steps listed in this section.

1. Place the LOGIC menu on the tablet's platen. Be sure to align the softkey boxes and the frame around the active digitizing area. If you do not have this menu, refer to Chapter 6 for instructions on plotting the menu.
2. Be sure your computer, tablet, and plotter are connected and turned on. (Always turn on your computer before turning on the tablet.) If you have an HP Series 200 computer, be sure your BASIC 2.0 operating system is loaded. (Refer to the appropriate operating manuals.)

NOTE: If you anticipate using the plotter, connect it and turn it on now. If you connect or turn on the plotter after the program is running, it might cause I/O interference. This could halt the program and destroy the current drawing data. (This example uses the plotter.)

3. Insert your working copy of the EDITOR disc into the primary disc drive of your computer.
4. Type this command, followed by **EXECUTE** (HP Series 200) or **END LINE** (HP-86/87): `LOAD "EDITOR"`

If you have an HP-86/87 computer, wait for the light on the disc drive to turn off. Then type this command, followed by **END LINE:** `LOADBIN "GKEYB"`

5. After the light on the disc drive turns off, press **RUN** on your computer keyboard. Then, if you have an HP Series 200 computer, skip to step 7.
6. When prompted on an HP-86/87 computer, press the keyboard function key corresponding to your computer model number.
7. After the program has initialized, you'll be asked for the name of your menu file. Enter LOGIC. The program will then initialize for this menu.
8. When the frame has been drawn on the CRT, you can begin digitizing. This frame represents the placement area of the menu. First press the stylus in the softkey box marked **STAT**. (This is called "digitizing" the softkey. When you digitize a softkey or menu area correctly, you will hear an acknowledgment tone. If you digitize an inappropriate area, you will hear an error tone.) You should then see the following status listing on your CRT.

As you work with the different menu areas, the drawing status will change. Feel free to digitize the **STAT** softkey at any time to view the current status. (You do not have to digitize **STAT** as the first step in creating a drawing. This step is simply to acquaint you with the status report.)

CURRENT STATUS OF DRAWING

The Status Report.

Digitize the STAT softkey to obtain this listing.

MENU ITEM SELECTED = LINE

ANGLE OF ROTATION = 0 DEGREES
GLOBAL SCALE FACTOR = 1.00
SCALE DRAW FACTOR = 1.00

COLOR = PEN 1
LINE TYPE = SOLID LINE

SNAP GRID MODE = OFF
GRID SIZE = 20

PERCENT OF DRAWING SPACE USED = 0
PERCENT OF LABEL SPACE USED = 2

9. Now return to the digitizing mode. On HP Series 200 computers, press the stylus anywhere on the softkeys or active digitizing area. On the HP-86/87 computers, press **CONT** on the keyboard.
10. To make it easier to draw the logic diagram, set a grid and set the snap mode, using these steps. When you digitize the menu boxes in steps a-c, the tablet will respond with an acknowledgment tone.
 - a. First digitize the box labeled **SET GRID**. When asked for the grid size, type 30 and press **CONTINUE** (HP Series 200) or **END LINE** (HP-86/87).
 - b. Digitize the **GRID ON** box, to cause the grid dots to be drawn on the CRT.
 - c. Finally, after the grid has been drawn, digitize the **SNAP ON** box. Now when you begin digitizing your drawing, each point that you digitize will be placed over the nearest grid dot.
11. Move the stylus lightly across the platen so that you can see how the cursor (+) on the CRT follows its movement. Use this cursor to help you make your drawing.
12. First, place the labels for the function table, using the following steps and illustration as a guide. (Later, you will reduce and move the table to its final location in the lower-right portion of the diagram. For now, though, it is easier to create the table in a larger size.)

- a. Digitize the LABEL 9111 softkey.
- b. Using the character set area, digitize the first row of labels. Use the blank softkey in the character set to indicate a space. Thus, the first row would be (replace each . with the blank softkey):

D...C...Q.....Q

- c. Digitize the point in the diagram where you want the center of the left edge of the label to be placed. (Hint: To draw the illustrations as shown, count the number of grid dots from the upper-left corner. If you have an HP-86/87 computer, notice that the frame is slightly shorter than shown for HP Series 200 computers.)

The label will be drawn next. Because of distortions on the CRT, the labels might not look uniform. However, when plotted, they will be uniform.

- d. Repeat steps a through c for each row. Each row after the first one is listed here.

H...H...H.....L
 L...H...L.....H
 H...L...PREVIOUS....PREVIOUS
STATE.....STATE
 L...L...PREVIOUS....PREVIOUS
STATE.....STATE

NOTE: If you place a label in the wrong place, you can use the **MOVE OBJECT** box to move it, or the **DEL OTHER** softkey to delete it and start over. If you notice a spelling error before you have placed the label in the drawing, you can digitize the **BS** box to backspace and correct it. However, if you have already placed the misspelled label, you will have to use the **DEL OTHER** softkey to delete it and start over. Refer to Appendix B for instructions on using the **MOVE OBJECT** box and the **DEL OTHER** softkey.

Also, if it looks as though something was erased by mistake, digitize the **REDRAW** softkey. Your drawing as it currently exists will be redrawn on the CRT.

Placement
for Step 13.
The "NOT"
symbol over
the far-right
Q is drawn in
step 14.

D	C	Q	\bar{Q}
H	H	H	L
L	H	L	H
H	L	PREVIOUS STATE	PREVIOUS STATE
L	L	PREVIOUS STATE	PREVIOUS STATE

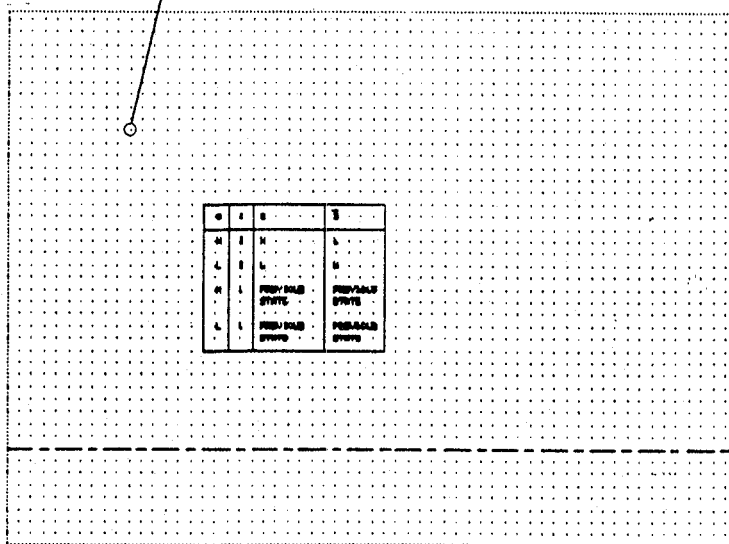
Frame ends here on
HP-86/87 computers

- Now draw the "NOT" symbol over the Q in the far-right column of the table (\bar{Q} , as shown in the previous illustration). First turn off the snap mode by digitizing the **SNAP OFF** box. Then digitize the two endpoints of the NOT symbol; a line will be drawn between them.
- The table seems to fill the whole drawing. However, it should only be a small portion of the drawing. You can zoom out to a larger drawing area, thus reducing the size of the table with relation to the whole drawing.

First digitize the **SCALE DRAW** box. When asked for the scale value, type .5 and press **CONTINUE** (HP Series 200) or **END LINE** (86/87).

NOTE: When your drawing is redrawn on the CRT, the table will be half its original size, and there will be twice as many lines of grid dots (refer to the following illustration). The grid is still 30 for a scale of 1. By making your drawing half as big, you have essentially doubled your drawing space. Therefore, you now have 60 rows of grid dots to fill the placement area.

Intended new center for
PAN DRAW in Step 16



Placement
for Step 15.
The point
marked is to
help you in
step 16.

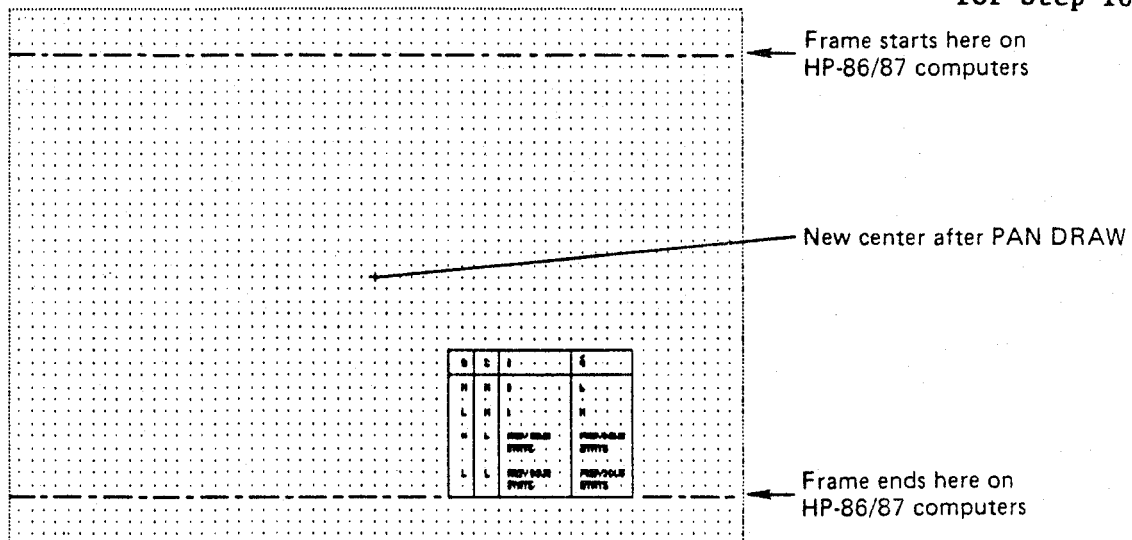
← Frame ends here on
HP-86/87 computers

16. Next reposition the table by specifying a new center for your drawing so that the table appears in the lower-right corner.

First, digitize the **PAN DRAW** box. Then digitize the intended new-center point marked in the previous illustration. (The intended new center in this example is 6 grid dots to the left and 6 grid dots above the upper-left corner of the table.)

The program will now move the drawing so that this point is the new center of the drawing area. After the drawing is redrawn on the CRT, it should look like the following illustration. For more information on how **PAN DRAW** works, refer to Appendix B.

**Placement
for Step 16**



- Specify that the rest of your drawing will have a scale of 3. This means that any new labels or objects that you place in the drawing will be drawn three times larger than the normal scale.

First digitize the **NEW SCALE** box. Then set a new scale factor by typing 3, followed by **CONTINUE** (HP Series 200) or **END LINE** (HP-86/87).

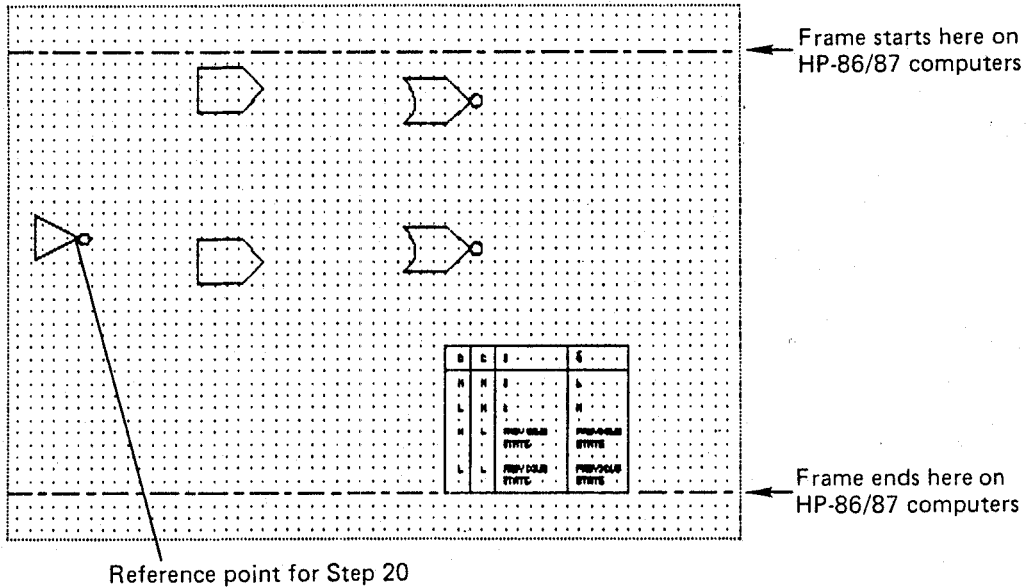
NOTE: **NEW SCALE** sets the global scale factor, which is different from the scale draw factor. Thus, if you digitize the **STAT** softkey, you will see that **GLOBAL SCALE FACTOR = 3**. However, **SCALE DRAW FACTOR = .5**. The global scale factor affects subsequent labels and objects that you place in your drawing. However, the scale draw factor changes the scale for the entire current drawing.

- Now turn on the snap mode by digitizing the **SNAP ON** box (remember, you turned the snap mode off in step 14).

19. Now place the logic symbols shown next into your drawing. First digitize the object box for the symbol you want to place. Then digitize the point in the drawing where you want the object to appear. After the program calculates the shape of the object, the object will be drawn so that its reference point (denoted on the menu by an X) will be placed over the point that you digitize.

When you place more than one of the same object, you need only digitize the object box once. Every time you digitize a point in the placement area, that object will be drawn, until you digitize the **DRAW LINE** or **LABEL 9111** softkeys, or another object box.

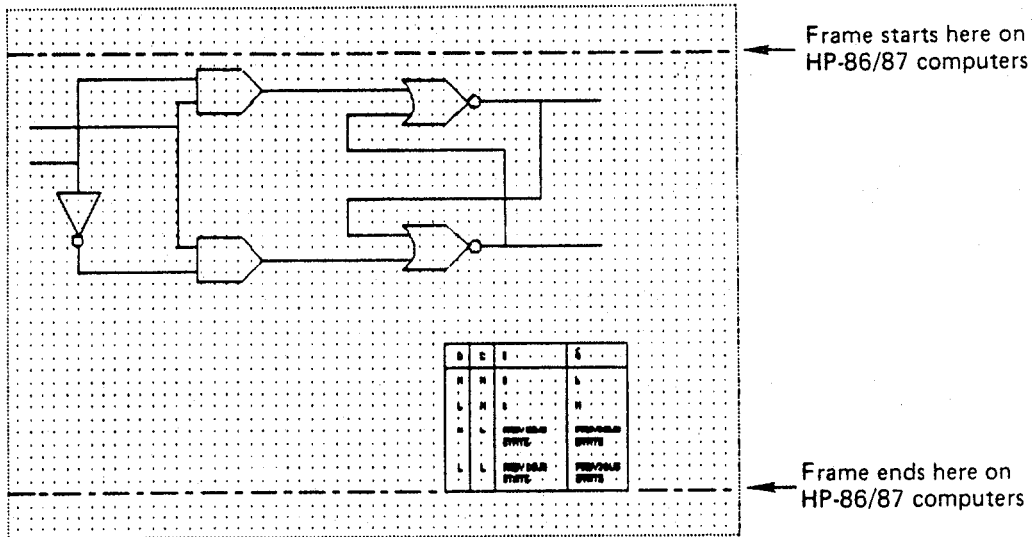
**Placement
for Step 19**



20. Now rotate the NOT object (▷), by first digitizing the **ROTATE OBJECT** box. Then select the object to be rotated by digitizing the reference point of the NOT object in the drawing, as shown in the previous illustration. (You do not have to digitize the reference point exactly. The program will look for the object nearest the point you digitize.) After the program has found the object, the object will start blinking (HP Series 200) or turn to a dotted line type (HP-86/87). If this is the correct object, digitize the **YES** softkey and follow step a (HP Series 200) or step b (HP-86/87). If the program found the wrong object, digitize the **NO** softkey to have the program search for the next nearest object, or digitize **CANCL** to end the search and start over.
- a. (HP Series 200). Move the stylus lightly around the compass wheel, and look at the CRT; you should see the number of degrees displayed there. When you see 270, press down on the stylus. This selects the angle of rotation as 270 degrees. Now the NOT object will be rotated 270 degrees in a counterclockwise direction. The "pivot point" is the reference point of the object.
 - b. (HP-86/87). Place the stylus on the compass wheel at approximately 270 degrees. Then press down on the stylus to select this as the angle of rotation. A message on the CRT will confirm the angle that you selected. If it is correct, press the keyboard function key designated YES. (If it is not correct, press NO or CANCEL. Then try again by digitizing another position on the compass wheel.) After the rotation has been calculated, the NOT object will be rotated 270 degrees in a counterclockwise direction. The "pivot point" is the reference point of the object.

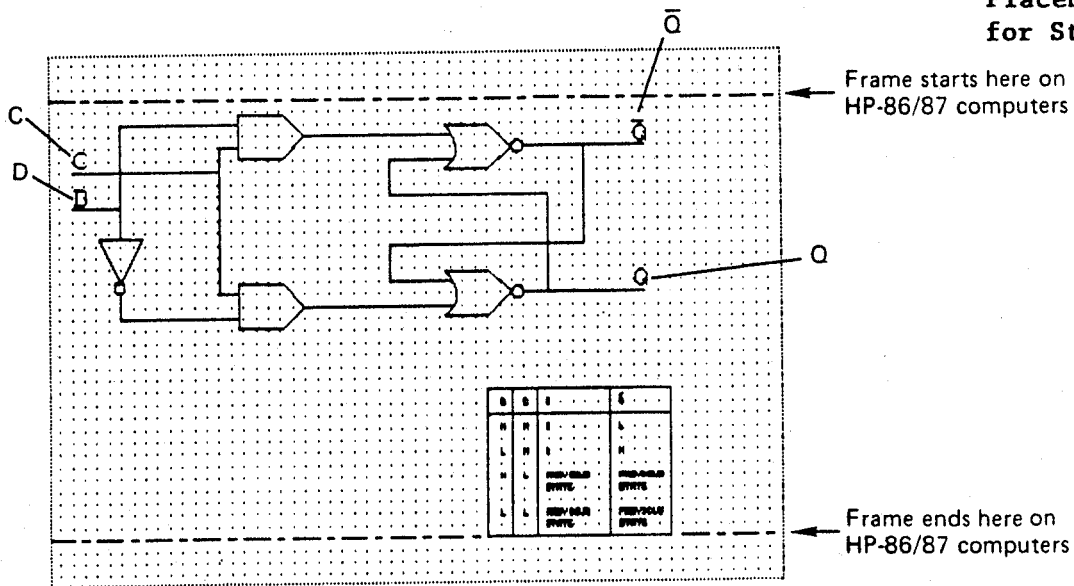
21. Next connect the objects with lines, as shown in the following illustration. First digitize the **DRAW LINE** softkey. Then proceed using the same procedures discussed in step 13 to draw separate lines between the objects. (You might need to turn the **SNAP GRID** mode off to connect the lines to the objects.)

**Placement
for Step 21**



22. To complete the logic diagram, add the labels shown in the following illustration. Use the same procedures discussed in step 12 to place the labels. Then draw the "NOT" symbol over the top-right Q, as you did in step 14.

**Placement
for Step 22**



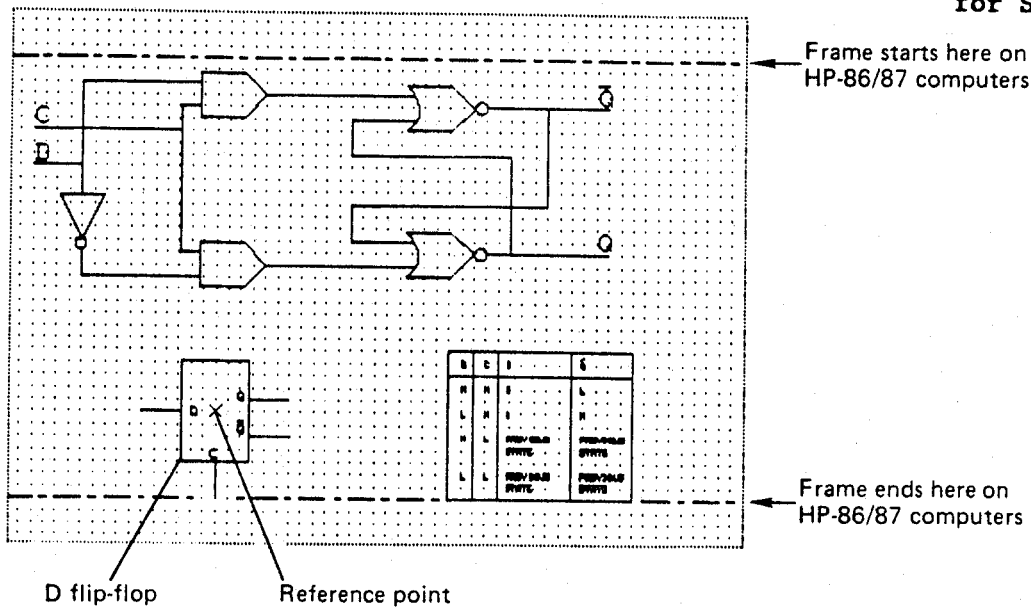
23. Finally, add the D flip-flop symbol. First change the pen color for this object by digitizing the **PEN 2** box.

Next you'll need a new scale for the object. The current scale is 3, but the new scale should be 2.25. To obtain this, digitize the **NEW SCALE** box and set a new scale factor of .75. The next object will be drawn in a scale that is three-quarters (.75) the size of the current scale. So, the new global scale factor when you digitize **STAT** should be $.75 \times 3 = 2.25$.

Now that the scale is established, digitize the D flip-flop object. Then digitize the point in the drawing where you want the object to be placed, as shown below. The reference point of the object (denoted on the menu by an X) will be positioned over the point that you digitize.

Finally, use the **DRAW LINE** softkey to add lines to the D flip-flop.

**Placement
for Step 23**



24. To keep a record of your achievement, remove the program disc and insert your storage disc. Then digitize the **SAVE PIC** softkey. Finally, enter DLATCH as the file name for your drawing. (It is a good idea to store your drawing as soon as you've finished it, as a safeguard.)
25. If you want to plot the drawing, be sure your plotter is set up. Load pens in the first two pen stalls (black and red are recommended). Then load paper; any size is fine. (If you have an HP 7580/7585 plotter, press the **REMOTE** button on the front panel. Also, if you are loading paper with the long side along the pen axis, press **ENTER** and **ROTATE** on the front panel so that the plot will be oriented properly on the paper.)

Now digitize the **PLOT** softkey. If you have an HP-86/87 computer, enter your plotter's model number when asked. If you have an HP Series 200 computer, the computer finds the model number automatically.

For all computers, when asked whether you're plotting on paper or transparency film, answer YES for paper (the plotting speed is faster). When asked whether you want a frame around your plot, answer YES. If your plotter is ready, press **CONTINUE**.

NOTE: If you have an HP Series 200 computer, respond to the questions by digitizing the appropriate menu softkey. If you have an HP-86/87 computer, respond by pressing the designated keyboard function key.

While the drawing is being plotted, do not use the keyboard or tablet. This could halt the program and result in loss of data.

26. If you want to alter or plot this drawing again at a later date and you have saved it on your storage disc, just load the EDITOR program, specify the LOGIC menu, insert your storage disc, and digitize the **GET PIC** softkey. When asked for the file name, enter DLATCH. Then, after the picture is drawn on the CRT, alter the drawing or digitize the **PLOT** softkey as described in step 25.

Remember, the DLATCH file can only be edited or plotted with the LOGIC menu and the EDITOR program. If you specify a different menu, the object areas will be interpreted differently, and your drawing will not look the same. The program also might halt.

27. If you are ready to go on to the next chapter, digitize the **END** softkey. Then press the keyboard function key designated QUIT; this stops the program.

--NOTES--

Chapter 5

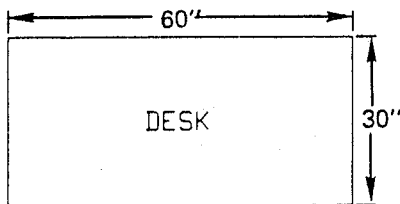
THE DRAW AND EDITORMENU PROGRAMS: CREATING OBJECTS FOR A MENU

With the system tools, it is possible to create your own menus similar to the LOGIC menu you used in Chapter 4. To do this, you first draw and save your objects using the DRAW program, then create a menu with these objects using the EDITORMENU program. Finally, you can use the EDITOR program to create and manipulate drawings with your new menu. In this chapter, you will draw pieces of office furniture as your objects and put them into a menu. Then, with your new menu, you can arrange this furniture in a drawing that represents your office -- either as it is currently, or move the furniture around to see how you can rearrange your office! Later you will be able to create your own objects and menus to meet the needs of your particular applications.

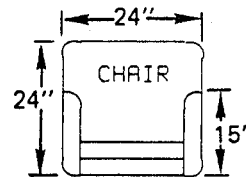
NOTE: This chapter assumes you understand the features of the DRAW program and the EDITOR program (refer to the examples in Chapters 3 and 4).

Drawing and Saving Objects with the DRAW Program

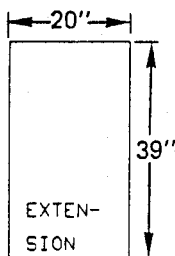
To create objects of an EDITOR menu, you must first draw and save them with the DRAW program. Each object must be drawn and saved separately. Several objects (pieces of office furniture) are shown next. Choose one to draw, using the guidelines listed after the objects.



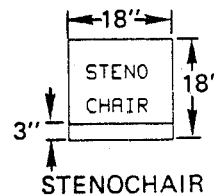
DESK



CHAIR



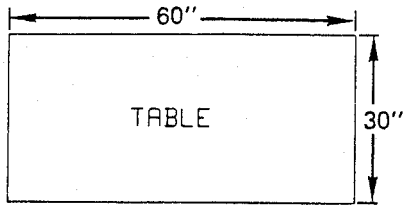
EXTENSION



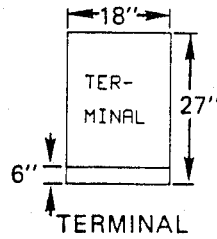
Furniture Objects.

Draw and save as many of these objects as you'd like.

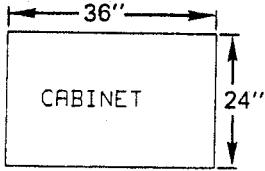
Furniture
Objects
(Continued)



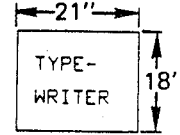
TABLE



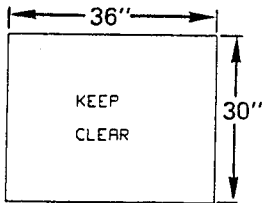
TERMINAL



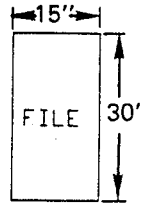
CABINET



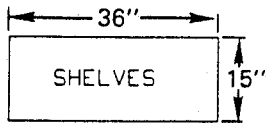
TYPEWRITER



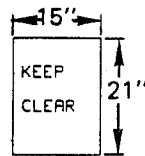
DOORCLEAR



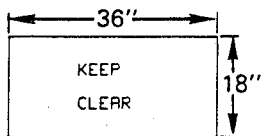
FILE



SHELVES



DRAWERCLR



SHELFCLEAR

Now use these procedures to draw and save the furniture objects.

1. Following steps 1 through 6 in Chapter 3, load and run the DRAW program.
2. Digitize **SET GRID** and establish a grid of 60. Digitize **GRID ON** to display the grid. (When making your own objects, instead of the furniture objects in this chapter, you can use any grid size. Also, it does not matter how large the drawing is.)
3. Select an object (office furniture) and draw it, using the procedures you learned in Chapter 3.

Use a scale of 1 grid dot = 3 inches. The measurements are shown in the previous illustrations in order to help you draw the objects to scale. However, don't include the measurements in your drawings, because they will clutter your office arrangement when you draw with the objects later using the EDITOR program.

Use the default pen 1 and solid line type for each object; this is because the EDITORMENU program converts all pen numbers to 1 and all line types to solid when it puts objects into a menu. In addition, for these objects, use character sizes ranging from 3 (for the "keep clear" objects) to 6 (for the larger objects, such as the table and desk). (However, you can use any character size from 1 to 9.)

4. When you are finished drawing the object, digitize the **SAVE PIC** softkey to save the drawing. (Make sure you remove the working disc and insert your storage disc so that the drawings will be saved on the correct disc!) When asked for the file name of your drawing, use the suggested name that is shown below the object. (Each file name can have as many as 10 characters.)
5. Digitize **CLEAR CRT** to erase the drawing. (If you have an HP-86/87 computer, you might find it faster to delete your drawing using **DEL OTHER** and **DEL LINE**.)
6. Choose another object, and repeat steps 2 through 5. Make sure that you use the same scale for each object. You do not need to draw every object shown. Select those that might be useful to you.
7. When you have finished, digitize the **END** softkey. Then, when prompted, press the keyboard function key designated **QUIT**; this stops the program.

Using the EDITORMENU Program to Create an EDITOR Menu

Now that you have several drawings that can be used as objects, you can use the EDITORMENU program to create an EDITOR menu similar to the one you used in Chapter 4. Simply follow these steps:

1. Be sure your tablet, plotter, and computer are connected and turned on. Also, if you have an HP Series 200 computer, be sure your BASIC 2.0 operating system is loaded. (Refer to the appropriate operating manuals.)

NOTE: The plotter must be connected and turned on now to avoid possible I/O interference that might halt the program later and result in loss of data.

2. Make sure your working copy of the EDITOR disc is in the primary disc drive of your computer.
3. Type this command, followed by **EXECUTE** (HP Series 200) or **END LINE** (HP-86/87): `LOAD "EDITORMENU"`

If you have an HP-86/87, wait for the light on the disc drive to turn off. Then type this command, followed by **END LINE**: `LOADBIN "GKEYB"`

4. After the light on the disc drive turns off, press **RUN** on your computer keyboard. Then, if you have an HP Series 200 computer, skip to step 6.
5. When prompted on an HP-86/87 computer, press the keyboard function key corresponding to your computer model number.
6. When asked to select your menu choice, press the keyboard function key designated **CREATE**.
7. Next you will be asked for the file name of the first object you want placed into the menu. First remove the program disc and insert your storage disc. Then enter the name of any one of the objects you created in the previous section of this chapter. If you want your menu to be the same as the menu shown after step 15, enter **DESK** as your first file name.
8. The program will search for the file and then draw it on the CRT, with an X in the center of the drawing. This X is the reference point for the object. Later, when you are using the EDITOR program to place this object in a drawing, this reference point will be centered directly over the point that you digitize in the drawing.

You will now be asked if you want to change the reference point. If not, enter N and press **CONTINUE** (HP Series 200) or **END LINE** (HP-86/87). If you do want to change the reference point, enter Y. (If you have an HP-86/87 computer and want to see the reference point again, use the **A/G** key to toggle between the graphics display and the alpha display.) Then use the stylus to digitize a new reference point. The menu shown at the end of this section often uses the upper-right corner as the reference point. This helps, for example, in lining up furniture against a wall in your layout.

9. Repeat step 8 for each object that you drew. If you want your menu to be the same as the menu shown after step 15, enter the file names in this order: DESK, CHAIR, EXTENSION, STENOCHAIR, TABLE, TERMINAL, TYPEWRITER, CABINET, DOORCLEAR, SHELVES, SHELFCLEAR, FILE, DRAWERCLR.
10. When you have entered all of your objects, simply press **CONTINUE** (HP Series 200) or **END LINE** (HP-86/87) without entering a file name. (This is in response to the question "OBJECT file # is?")
11. Now you will be asked to enter the file name for the menu that will be created using the objects you have just entered. This file name can have up to 10 characters. Enter OFFICE.
12. If you have an HP-86/87 computer, be sure your plotter is connected and turned on, and press **CONTINUE** when prompted.
13. Load pens in your plotter. We suggest you use thin pens, in this order.
 - 1) black 5-8) any colors
 - 2) red
 - 3) blue
 - 4) green

If your plotter does not hold 8 pens, load as many of the first colors as you can. For example, if you have an HP 7470 plotter, load only pens 1 and 2. The entire menu will be drawn with these pens.

Also, load your plotter with A3/B-size* paper. (If you have an HP 7580/7585 plotter, load the paper vertically and set the REMOTE mode. If you have an HP 7470 plotter, you have to use A4/A-size* paper; the program will draw sections of the menu, which you will then need to cut and tape together to form a menu.)

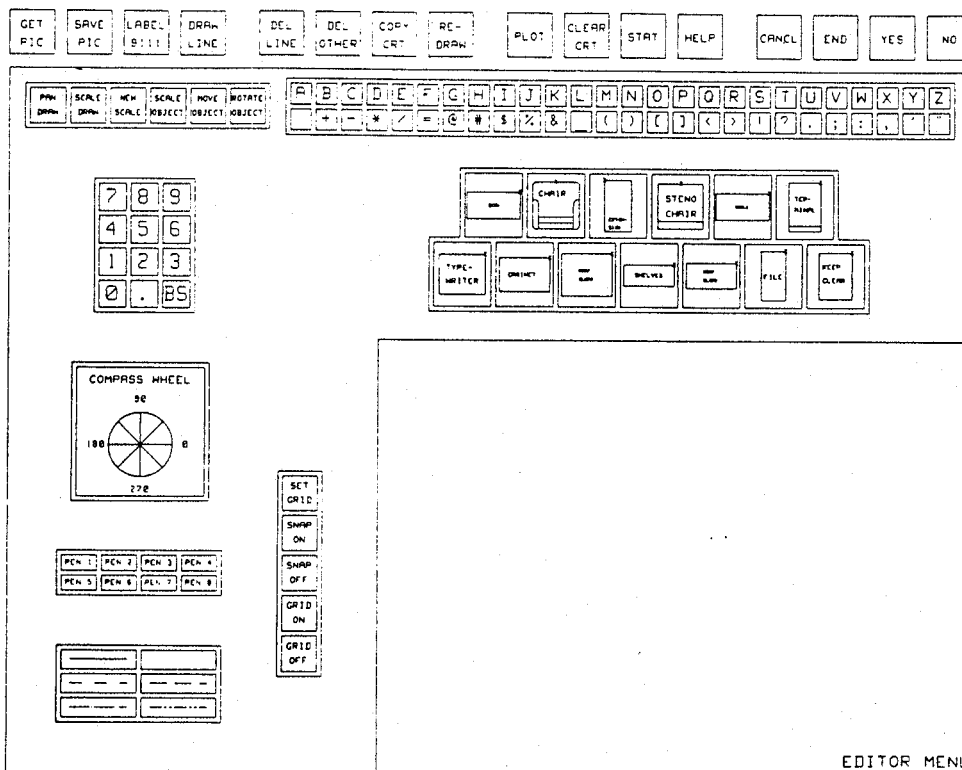
In addition, if you have an HP-86/87 computer, enter your plotter model number.

Then press **CONTINUE** (HP Series 200) or **END LINE** (HP-86/87).

14. If you have an HP 7470 plotter, follow the prompts on the CRT for changing paper for each section of the menu. When you have all four sections, cut them and tape them together to form a menu similar to the one shown after step 15. Depending on how many objects are on your menu, you might find that the menu quadrants don't divide an object exactly down the middle. This is due to the plotting routine. Simply cut around the object and tape it so that it interlocks. You can use menu overlays (HP 7121-0988) over the taped menu sections to provide a smooth digitizing surface.
15. When the plotted menu is complete, the program will quit running. You can start it again simply by pressing **RUN** on the keyboard. However, you do not need to use this program anymore for now.

The following illustration shows your complete plotted menu. The objects appear to be different sizes only because they are drawn in the menu utilizing the full object space available. When you select an object and place it in a drawing, the object will be the correct size and scale relative to the other objects (unless, of course, you change the drawing scale with the **SCALE OBJECT** or **NEW SCALE** boxes).

* A3-size paper measures 297 by 420 mm; B-size paper measures 11 by 17 in. A4-size paper measures 210 by 297 mm; A-size paper measures 8.5 by 11 in.



The OFFICE Menu.

This is what the OFFICE menu looks like if you include all of the furniture objects shown in the previous section.

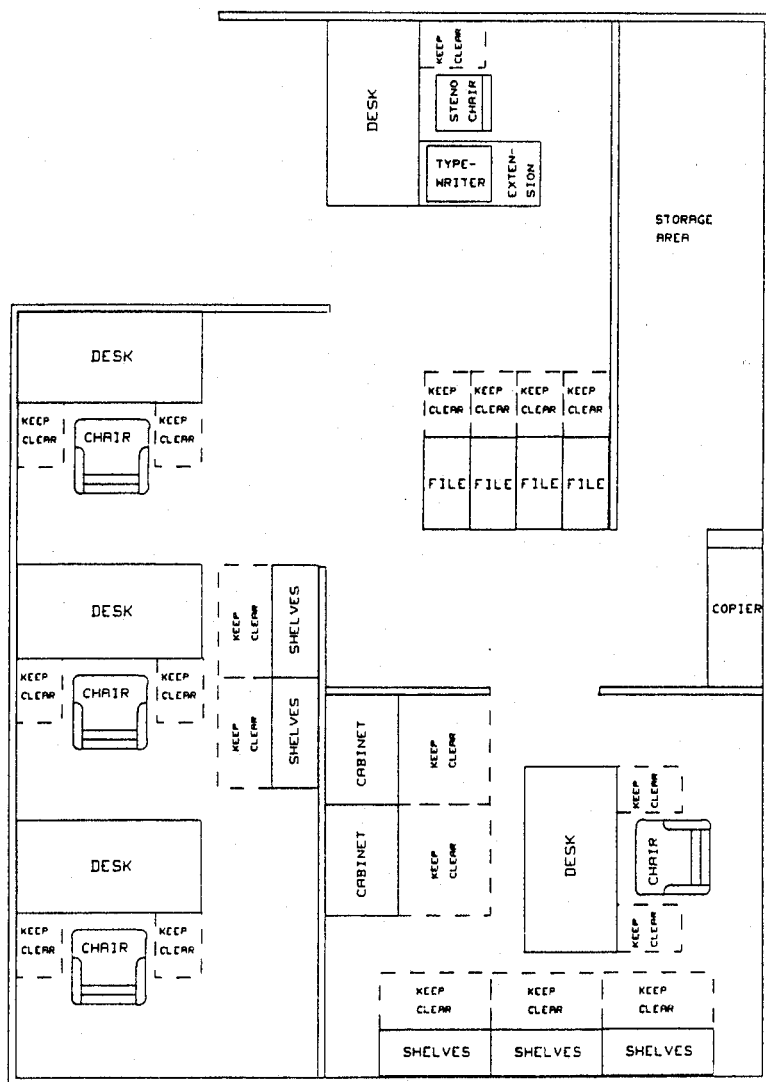
Arranging Your Office with the OFFICE Menu

Now you can create drawings with your OFFICE menu in the same way that you created drawings with the LOGIC menu in Chapter 4. Your new menu will have the same menu areas as the LOGIC menu. The only difference is the objects that are in the menu.

Place the OFFICE menu on the platen of the tablet. Then follow steps 1 through 7 in Chapter 4, except enter OFFICE instead of LOGIC for the name of your menu file. Finally, draw an office plan with the objects. You will probably want to start your drawing by digitizing **NEW SCALE** to set a new global scale of .5. Also experiment with the manipulation functions, such as **ROTATE OBJECT** and **MOVE OBJECT**. This will help you become even more familiar with the EDITOR program so that you can use it fully in creating drawings. For detailed descriptions of each softkey and menu area, refer to Appendix B. If you are in the middle of an operation, you can also digitize the **HELP** softkey.

NOTE: Remember that the drawings you create and store with the OFFICE menu can only be recalled from a storage disc, edited, and plotted with the OFFICE menu. If you try to use a different menu, the object areas will be interpreted differently, and your drawing will not look the same. The program might also fail. You can obtain a list of the files on your disc by executing the CAT command from the keyboard; however, you must make your own notes as to whether files are drawings or menus, and which program or menu file was used to create them. Forms are provided at the back of this guide for this purpose.

The following illustration is a sample office plan drawn with the OFFICE menu. Specify a dashed line type before placing the "KEEP CLEAR" objects.

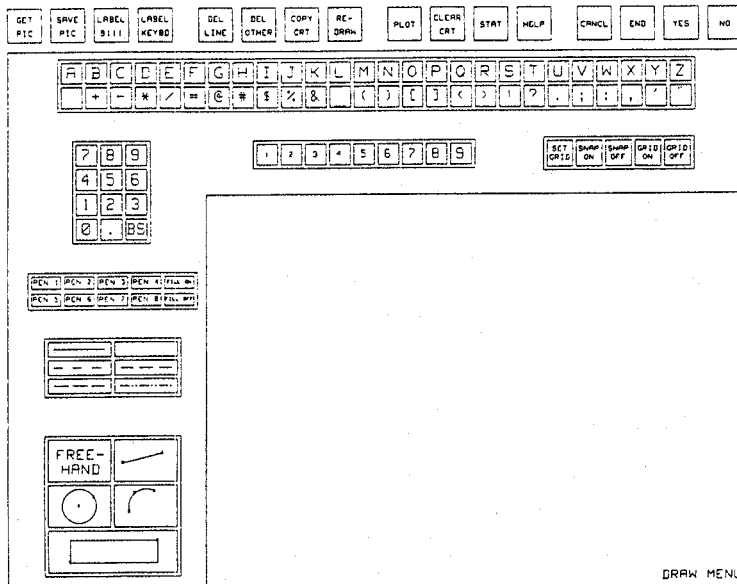


Sample Office Plan

If you need to plot either the DRAW menu or a previously created EDITOR menu, you can do so easily with the DRAWMENU or EDITORMENU programs. Refer to the appropriate section below.

Plotting the DRAW Menu

Follow the steps in this section to plot the DRAW menu, shown below. This menu is used in Chapter 3.



The DRAW Menu

1. Be sure your computer, tablet, and plotter are connected and turned on. (Always turn on your computer before turning on the tablet.) Also, if you have an HP Series 200 computer, be sure your BASIC 2.0 operating system is loaded. (Refer to the appropriate operating manuals.)

NOTE: The plotter must be connected and turned on now to avoid possible I/O interference later that could halt the program.

2. Insert your working copy of the DRAW disc in the primary disc drive of your computer.

3. Type this command, followed by EXECUTE (HP Series 200) or END LINE (HP-86/87): LOAD "DRAWMENU"
4. After the light on the disc drive turns off, press RUN on your computer keyboard. Then, if you have an HP Series 200 computer, skip to step 6.
5. When prompted on an HP-86/87 computer, press the keyboard function key corresponding to your computer model number. Then be sure your plotter is connected and turned on, and press CONTINUE when prompted.
6. Be sure pens are loaded in your plotter. We suggest you use thin pens, in this order.
 - 1) black
 - 2) red
 - 3) blue
 - 4) green
 - 5-8) any colors

If your plotter does not hold 8 pens, load as many of the first colors as you can. For example, if you have an HP 7470 plotter, load only pens 1 and 2. The entire menu will be drawn with these pens.

Also, load your plotter with A3/B-size* paper. (If you have an HP 7580/7585 plotter, load the paper vertically and set the REMOTE mode. If you have an HP 7470 plotter, you have to use A4/A-size* paper; the program will draw sections of the menu, which you will then need to cut and tape together to form a menu.)

In addition, if you have an HP-86/87 computer, enter your plotter model number.

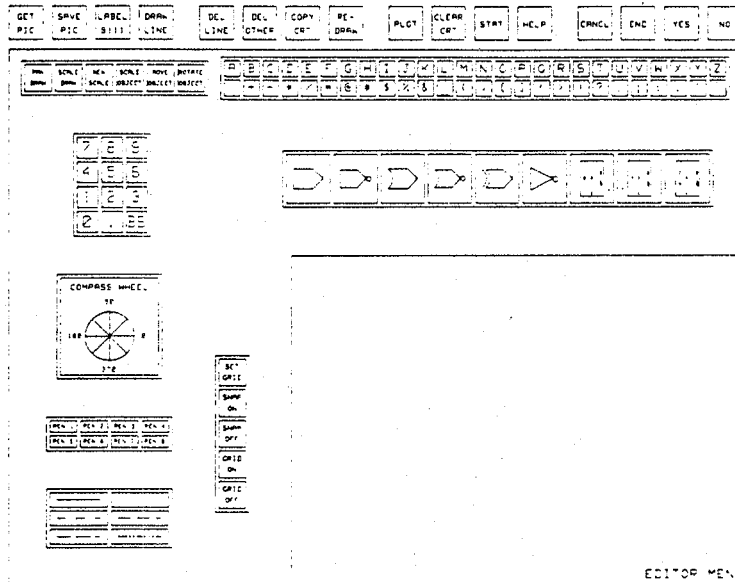
Then press CONTINUE (HP Series 200) or END LINE (HP-86/87).

7. If you have an HP 7470 plotter, follow the prompts on the CRT for changing paper for each section of the menu. When you have all four sections, cut them and tape them together to form the menu shown at the beginning of these steps.
8. When the plotted menu is complete, the program will quit running. If you want another DRAW menu, you can start the program again by pressing RUN on the keyboard.

* A3-size paper measures 297 by 420 mm; B-size paper measures 11 by 17 in. A4-size paper measures 210 by 297 mm; A-size paper measures 8.5 by 11 in.

Plotting EDITOR Menus

Follow the steps in this section to plot previously created menus that will be used with the EDITOR program. One such menu, LOGIC, is supplied with the system tools package. This menu is shown below; it is used in Chapter 4. In addition, if you have followed the procedures in Chapter 5, you should have the OFFICE menu.



The EDITOR Menu "LOGIC."

Other EDITOR menus would have different objects, rather than the logic symbols in this menu.

1. Be sure your computer, tablet, and plotter are connected and turned on. (Always turn on your computer before turning on the tablet.) Also, if you have an HP Series 200 computer, be sure your BASIC 2.0 operating system is loaded. (Refer to the appropriate operating manuals.)

NOTE: The plotter must be connected and turned on now to avoid possible I/O interference later that could halt the program and result in loss of data.

2. Insert your working copy of the EDITOR disc in the primary disc drive of your computer.

3. Type this command, followed by **EXECUTE** (HP Series 200) or **END LINE** (HP-86/87): `LOAD "EDITORMENU"`

If you have an HP-86/87 computer, wait for the light on the disc drive to turn off. Then type this command, followed by **END LINE**: `LOADBIN "GKEYB"`

4. After the light on the disc drive turns off, press **RUN** on your computer keyboard. Then, if you have an HP Series 200 computer, skip to step 6.
5. When prompted on an HP-86/87 computer, press the keyboard function key corresponding to your computer model number.
6. When asked to select your menu choice, press the keyboard function key designated **OLD MENU**. (The **DEFAULT** key causes a menu to be plotted with no objects, whereas the **CREATE** key allows you to specify the objects for a new menu. This process is described in Using the EDITORMENU Program To Create an EDITOR Menu in Chapter 5.)
7. Next you will be asked for the menu file name. Be sure that you have the correct disc in the primary disc drive. (The **LOGIC** menu is on your working copy of the EDITOR Disc. Any other menus that you've created are on your storage disc.) Then enter the name (e.g., **LOGIC** or **OFFICE**). If you have an HP Series 200 computer, skip to step 9.

NOTE: If you do not remember the menu file name, just press **PAUSE** and then enter **CAT**, followed by **EXECUTE** for HP Series 200 or **END LINE** for HP-86/87 computers. This will give you a listing of the file names on your disc. Then press **CONTINUE** to return to the program. Or, if you have kept a record of files on the forms at the end of this guide, refer to the forms.

8. If you have an HP-86/87 computer, be sure your plotter is connected and turned on, and press **CONTINUE** when prompted.

9. Load pens in your plotter. We suggest you use thin pens, in this order.

- 1) black 5-8) any colors
- 2) red
- 3) blue
- 4) green

If your plotter does not hold 8 pens, load as many of the first colors as you can. For example, if you have an HP 7470 plotter, load only pens 1 and 2. The entire menu will be drawn with these pens.

Also, load your plotter with A3/B-size* paper. (If you have an HP 7580/7585 plotter, load the paper vertically and set the REMOTE mode. If you have an HP 7470 plotter, you have to use A4/A-size* paper; the program will draw sections of the menu, which you will then need to cut and tape together to form a menu.)

In addition, if you have an HP-86/87 computer, enter your plotter model number.

Then press **CONTINUE** (HP Series 200) or **END LINE** (HP-86/87).

10. If you have an HP 7470 plotter, follow the prompts on the CRT for changing paper for each section of the menu. When you have all four sections, cut them and tape them together to form a menu similar to the one shown at the beginning of these steps. Depending on how many objects are on your menu, you might find that the menu quadrants don't divide an object exactly down the middle. This is due to the plotting routine. Simply cut around the object and tape it so that it interlocks. You can use menu overlays (HP 7121-0988) over these taped menu sections to provide a smooth digitizing surface.
11. When the plotted menu is complete, the program will quit running. If you want another EDITOR menu, you can start the program again by pressing **RUN** on the keyboard.

* A3-size paper measures 297 by 420 mm; B-size paper measures 11 by 17 in. A4-size paper measures 210 by 297 mm; A-size paper measures 8.5 by 11 in.

--NOTES--

Chapter 7

THE MENUMAKER AND DRIVER PROGRAMS: CREATING AND INTERPRETING MENU AREAS

The MENUMAKER and DRIVER programs allow you to take any drawing created with the DRAW program and convert it into a customized menu. These programs create a special database for the menu areas, and contain fundamental tablet I/O routines; all you have to do is add subroutines instructing the computer what to do when you digitize a specific softkey or menu area. Use these programs when the standard menu format does not meet your needs.

The example in this chapter sets up a payroll menu, complete with the subroutines necessary to use the menu. (The subroutines allow you to compute wages based on an employee code, hours worked, and the rate of pay.) This example is intended to show you the general procedures for creating a custom menu. You can make any menu that is useful to you. The opening chapter picture, for example, shows a possible menu for diamond inventory. However, remember that you will need to do some programming to create application programs for your menus.

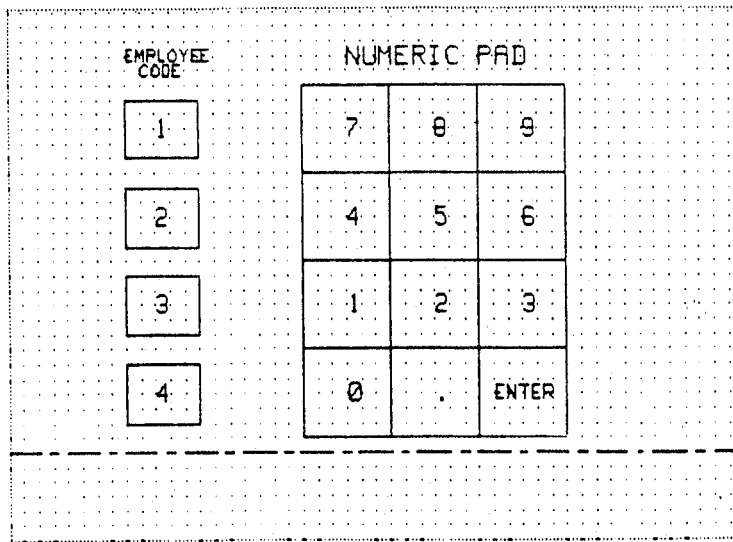
NOTE: To do the examples in this chapter, you must be familiar with entering and editing a program on your computer.

Drawing Your Menu with the DRAW Program

Before you can define and interpret your menu, you must draw it, as described here. These procedures assume you understand the features of the DRAW program (refer to the example in Chapter 3).

1. Following steps 1 through 6 in Chapter 3, load and run the DRAW program.
2. Now create the following drawing using the procedures you learned in Chapter 3. To make this drawing, turn on the snap/grid mode, and set a grid of 50. The numerals and NUMERIC PAD all have a character size of 9. ENTER has a character size of 6, and EMPLOYEE CODE has a character size of 5.

Drawing for
Payroll Menu



Frame ends here on
HP-86/87 computers

3. Now store the drawing by digitizing the **SAVE PIC** softkey. Then remove the program disc and insert your storage disc. Finally, type **PAYROLL** as the file name for your drawing and press **CONTINUE** (HP Series 200) or **END LINE** (HP-86/87).
4. Next, prepare to plot your drawing as a menu. First be sure your plotter is connected and turned on. Load a pen in the first pen stall. Then load your plotter with A3/B-size* paper. (If you have an HP 7580/7585 plotter, load the paper vertically and set the REMOTE mode. If you have an HP 7470 plotter, you must use A4/A-size* paper; the program will draw sections of the menu, which you will then need to cut and tape together to form a menu.)

* A3-size paper measures 297 by 420 mm; B-size paper measures 11 by 17 in. A4-size paper measures 210 by 297 mm; A-size paper measures 8.5 by 11 in.

5. Digitize the PLOT softkey. (If you have an HP-86/87 computer, type your plotter model number and press **END LINE**.) Then, on both computers, answer YES in response to each question to indicate that you

- are plotting on paper,
- want a menu plot,
- want a frame around the plot,
- want the softkeys outlined, and
- want to label the softkeys.

NOTE: If you have an HP Series 200 computer, respond to the questions by digitizing the appropriate menu softkey. If you have an HP-86/87 computer, respond by pressing the designated keyboard function key.

6. Now enter the labels for the first five softkeys, as shown here. You will be asked to enter them one row at a time, two rows per softkey. Press **CONTINUE** (HP Series 200) or **END LINE** (HP-86/87) after each row to enter the label. When you have entered all of the rows shown, keep pressing **CONTINUE** or **END LINE** slowly through each of the remaining softkeys until you are asked whether you have any changes to make. If you do, enter Y and then enter the number of the softkey label you want to change. Then reenter each row for the softkey. If you do not have any changes, simply enter N.

	Softkey 1	Softkey 2	Softkey 3	Softkey 4	Softkey 5
Row 1	EMP	HRS	PAY	WAGE	END
Row 2	CODE	WRKD	RATE		

Softkey
Labels for
Payroll Menu

NOTE: Each time you plot this menu, you will need to enter the softkey labels as described here.

- Finally, when asked to position paper on the plotter, be sure it is set up properly, and press **CONTINUE**. Your menu will look like the following illustration when it has been plotted.

END CODE	HRF HRVC	DAY DATE	HRDC	END																
-------------	-------------	-------------	------	-----	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

EMPLOYEE CODE		NUMERIC PAD		
1		7	8	9
2		4	5	6
3		1	2	3
4		0	.	ENTER

Plotted
Payroll Menu

- Digitize the **END** softkey. Then press the keyboard function key designated **QUIT**; this will stop the program. Proceed to the next section to define the menu areas.

Defining the Menu Areas with the **MENUMAKER** Program

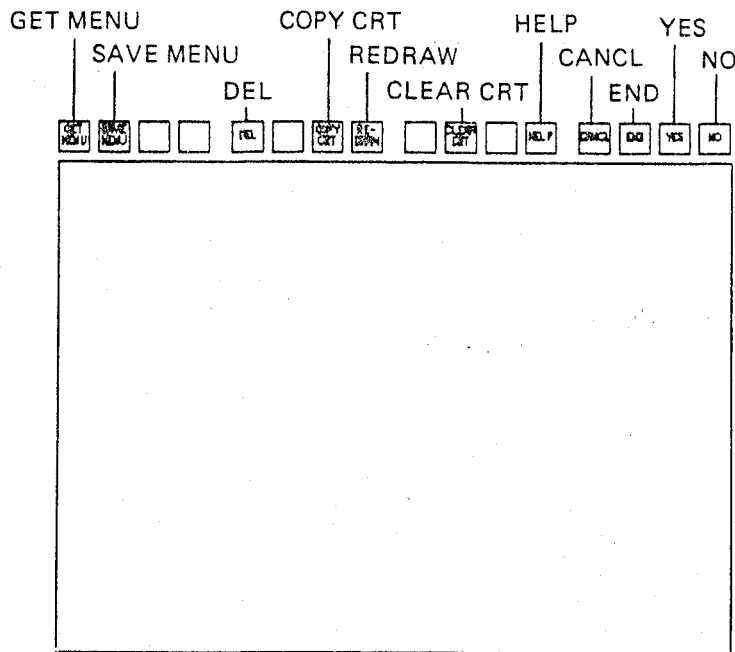
Now define the areas on your **PAYROLL** drawing that will perform menu functions. Assuming your system is still connected and turned on from the last section, follow the steps listed next.

- Be sure your working copy of the **DRAW** disc is in the primary disc drive of your computer. Place the **PAYROLL** menu (drawn in the last section) on the tablet's platen.

2. Type this command, followed by **EXECUTE** (HP Series 200) or **END LINE** (HP-86/87): `LOAD "MENUMAKER"`

If you have an HP-86/87 computer, wait for the light on the disc drive to turn off. Then type this command, followed by **END LINE**: `LOADBIN "GKEYB"`

3. After the light on the disc drive turns off, press **RUN** on your computer keyboard. Then if you have an HP Series 200 computer, skip to step 5a.
4. When prompted on an HP-86/87 computer, press the keyboard function key corresponding to your computer model number.
5. Read the paragraph in this step that applies to your computer.
 - a. If you have an HP Series 200 computer, the following "menu" will appear on your CRT. Note that the tablet's softkeys are labeled on the CRT, since you have your own menu (with different softkeys) placed on the platen. These softkeys function similarly to those on the DRAW and EDITOR menus. For example, to obtain a copy of the CRT on your system printer, digitize the seventh softkey on the platen. This corresponds to the seventh softkey on the CRT, which is labeled **COPY CRT**. (Remember that the softkeys labeled on the PAYROLL menu are not yet functional. You still need to add subroutines using the DRIVER program before the PAYROLL menu will actually operate like a menu.)
 - b. If you have an HP-86/87 computer, a frame will appear around the CRT. Note that the softkeys on the tablet still have specific functions that are not related to the new softkeys labeled on your PAYROLL menu. These functions are not labeled on the CRT. However, you can refer to the following menu to see what the functions are. You can use these functions in the same way that you did with the DRAW and EDITOR menus. For example, to obtain a copy of the CRT on your system printer, digitize the seventh softkey on the platen, labeled **COPY CRT** in the illustration. (Remember that the softkeys labeled on the PAYROLL menu are not yet functional. You still need to add subroutines using the DRIVER program before the PAYROLL menu will actually operate like a menu.)



CRT Menu for Menumaker.

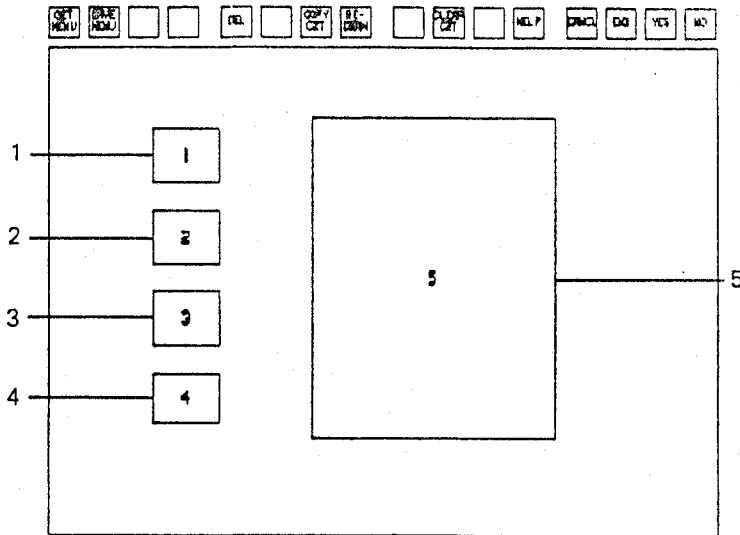
On the HP Series 200 computer, you will see this menu on the CRT. The softkey labels describe the functions that the tablet's softkeys can now perform. On the HP-86/87 computers, you will not see the softkey labels on the CRT. However, the softkeys on the tablet will perform the functions shown here.

- Now digitize two diagonal corners of the first EMPLOYEE CODE box on your PAYROLL menu. A blank box, labeled with the number 1, should appear on the CRT. Then digitize two corners of each of the other three EMPLOYEE CODE boxes. Finally, digitize two diagonal corners of the entire NUMERIC PAD box. When you have finished, the CRT should look like the following illustration.

NOTE: It is very important that you define the boxes in the order shown. The subroutines that you'll add to the DRIVER program in the next section depend on the boxes being defined in this order. If the boxes are in a different order, the modified program won't run.

If you make a mistake and a box that you don't want appears on the CRT, digitize the fifth softkey on the platen (this corresponds to the fifth softkey shown in the previous illustration, labeled DEL). Then digitize the center of the box that you want to delete. The box will then blink (HP Series 200) or turn to a dotted line type (HP-86/87). If this is the box you want to delete, digitize the YES softkey. If not, digitize CANCL or NO. CANCL will stop the delete operation. NO will cause the program to find the next nearest box so you can decide whether to delete it. Once you have deleted a box, digitize REDRAW so that the boxes will be redrawn with new numbers assigned to them in sequence. You can also use CLEAR CRT to start over.

The Defined
Menu Areas of
the PAYROLL Menu



7. **Digitize the second softkey, SAVE MENU.** Then remove the program disc and insert your storage disc. When asked to enter the file name for your menu, type MPAYROLL and press **CONTINUE** (HP Series 200) or **END LINE** (HP-86/87). (The M denotes that this is the version of the PAYROLL drawing whose menu areas have been defined by the **MENUMAKER** program.)
8. To terminate the **MENUMAKER** program, digitize the fourteenth softkey, **END**. Next a set of instructions appears on the CRT, asking you to press one of the keyboard function keys, as described next.
 - a. Press the function key designated **COPY CRT**. When you have positioned your paper to the top of form, press the function key designated **COPY**. This will give you a printed copy of the menu areas that you defined in this example, along with numbers that represent the order in which you defined the menu areas. Your copy will look similar to the one shown in the last illustration.

Keep track of these numbers. When you add subroutines to the **DRIVER** program, you will need to know the order in which the program will assign the subroutines to the menu areas. If you do not have a printer, you will have to note the order in which you define the menu areas.

- b. Finally, press the function key designated QUIT. You now have a data base that will work with the DRIVER program to turn your PAYROLL menu into a functioning menu.

Interpreting the Softkeys and Menu Areas with the DRIVER Program

The final step is to create a program that utilizes your menu's softkeys and functional areas. To complete the PAYROLL example, follow the steps listed in one of the following sections: either the section for owners of HP Series 200 computers, or the section for owners of HP-86/87 computers. Remember that you will need to provide your own subroutines when customizing other menus.

Program Modifications for HP Series 200 Computers

Follow these steps if you have an HP Series 200 computer. This section assumes that your system is still connected and turned on. Your program will not work until all of the modifications have been made. Therefore, don't press RUN until instructed in step 9.

1. Be sure your working copy of the DRAW disc is in the primary disc drive of your computer.
2. Type this command, followed by EXECUTE: LOAD "DRIVER"
3. After the light on the disc drive turns off, obtain a listing of the DRIVER program. It might be easiest to print a listing on your printer, so that you'll have a copy for reference. If you do not have a printer, you can list the program on the CRT, a few lines at a time.
4. Look through the first few lines of the program to find the list of common variables, as shown in the following listing. Enter the shaded line (line 91). Then look for the common variables listed at the beginning of the Menu_pick routine, as shown in the second listing below. Enter the shaded line (line 1091).

NOTE: The line numbers in your version of the 9111 System Tools might not correspond exactly to the line numbers shown here. They are included only for reference. The program lines should be the same as those shown.

```

10      | DRIVER
20      |
30      |
40      |
50      OPTION BASE 1
60      COM /Internals/ Z(0:20)
70      COM /Addresses/ Tab1t,Plotr
80      COM /Menudb/ Menu(0:500,6)
90      COM /Screen/ Prev_xpt,Prev_ypt
91      COM /My_stuff/ Employee_code,Hours_worked,Rate_of_pay
100     DIM File$(80)
110     |
.
.
.
1070 Menu_pick:|
1080 SUB Menu_pick(X,Y,Sfk)
1090     COM /Menudb/ Menu(*)
1091     COM /My_stuff/ Employee_code,Hours_worked,Rate_of_pay
1100     |

```

- Now look through the listing for the `Menu_pick` subroutine (shown here at line 1070). This is the section where you can add functions for each softkey.

For the PAYROLL menu, you will add functions to the first five softkeys, as shown by the shaded lines. Softkey 1 asks you to digitize an employee code. Softkeys 2 and 3 ask you to digitize the hours worked and the pay rate from the number pad; then they call the `Number_pad` subroutine. (You will add this subroutine to the end of the program in step 7.) Softkey 4 computes the wage for the employee, and softkey 5 terminates the program. Softkeys 6 through 16 generate an error tone, because they are not used in the PAYROLL menu.

Now change or add the shaded lines. Also, delete lines 1380 through 1680.

```

1070 Menu_pick:|
1080 SUB Menu_pick(X,Y,Sfk)
1090 COM /Menu/b/ Menu(*)
1091 COM /My_stuff/ Employee_code,Hours_worked,Rate_of_pay
1100 |
1110 IF Sfk=0 THEN Platen_picked
1120 |
1130 | *****
1140 | * This section of code handles the selection of a tablet softkey. *
1150 | * Replace the 'DISP ...' statements with calls or functions of your *
1160 | * own (e.g. Get_pic, Plot_drawing, etc. *
1170 | *****
1180 |
1190 CALL Tones(1)
1200 SELECT Sfk
1210 CASE 1
1220 CALL Tones(1)
1230 DISP "CHOOSE AN EMPLOYEE CODE."
1240 CASE 2
1250 CALL Tones(1)
1260 DISP "ENTER THE NUMBER OF HOURS WORKED."
1261 CALL Number_pad(1)
1270 CASE 3
1280 CALL Tones(1)
1290 DISP "ENTER THE RATE OF PAY."
1291 CALL Number_pad(0)
1300 CASE 4
1310 CALL Tones(1)
1320 CALL Clear_screen
1321 GRAPHICS OFF
1322 Wage=Hours_worked*Rate_of_pay
1323 PRINT " EMPLOYEE CODE: ";Employee_code
1324 PRINT " HOURS WORKED: ";Hours_worked
1325 PRINT " RATE OF PAY: ";Rate_of_pay
1326 PRINT "TOTAL EARNINGS: ";Wage
1327 WAIT 10
1328 CALL Clear_screen
1329 GRAPHICS ON
1330 CASE 5
1340 CALL Tones(1)
1350 CALL Clear_screen
1351 GRAPHICS OFF
1352 PRINT "PROGRAM TERMINATED."
1353 STDP
1360 CASE ELSE
1361 | Send the error tone
1370 CALL Tones(2)
1690 END SELECT
1700 SUBEXIT
1710 |
1720 Platen_picked:|

```

6. Now look through the listing for the `Box_found` subroutine (shown here at line 1940). This is the section where you can add functions for each menu area.

Remember that the `MENUMAKER` program assigned numbers to each menu area as you defined the areas; these numbers correspond to the `CASE #` labels in the following listing. Each of the first four `PAYROLL` menu areas produces an acknowledgment tone and sets the employee code. The fifth menu area, along with the rest of the platen, produces an error tone. This is because the fifth menu area can only be accessed through softkey 2 (`HRS WRKD`) and softkey 3 (`PAY RATE`). This menu area is interpreted by the subroutine `Number_pad`, which you will add in the next step.

Now change or add the shaded lines.

```
1940 Box_found:!  
1950     SELECT Box  
1960     CASE 1  
1970     CALL Tones(3)  
1980     Employee_code=1  
1990     CASE 2  
2000     CALL Tones(3)  
2010     Employee_code=2  
2020     CASE 3  
2030     CALL Tones(3)  
2040     Employee_code=3  
2041     CASE 4  
2042     CALL Tones(3)  
2043     Employee_code=4  
2044     CASE ELSE  
2045     CALL Tones(2)  
2050     END SELECT  
2060 SUBEND  
2070 !
```

7. The following listing is the `Number_pad` subroutine, which interprets menu area #5. Notice that boundaries are checked to see if the digitized point lies within menu area #5. Next, there is an algorithm that assigns a number, depending on which portion of the menu area has been digitized. This number is saved in a string, and linked with any other numbers until the `ENTER` box on the menu area has been digitized. Finally, the number is put into the appropriate common variable (depending on which softkey called this subroutine). Now add these program lines to the end of your program.

```

4040 Number_pad: |
4050 |
4060 | *****
4070 | * This subroutine is used to interpret a digitized point on the *
4080 | * numeric keypad. The parameter 'Want_the_hours' indicates whether *
4090 | * the number interpreted is for the 'Hours_worked' or 'Rate_of_pay' *
4100 | * common variable. This subroutine is exited when the 'ENTER' key *
4110 | * of the numeric keypad is digitized. *
4120 | *****
4130 |
4140 SUB Number_pad(Want_the_hours)
4150 COM /Menuddb/ Menu(*)
4160 COM /My_stuff/ Employee_code,Hours_worked,Rate_of_pay
4170 DIM Number$(20),Keypad$(12)
4180 |
4190 Number$=""
4200 Keypad$="O.E123456789"
4210 |
4220 Get_a_number:|
4230 | Get a point from the platen
4240 CALL Get_point(X,Y,Sfk)
4250 |
4260 | Check to see if the point is in the numeric keypad
4270 |
4280 IF X<Menu(5,1) OR X>Menu(5,3) OR Y<Menu(5,2) OR Y>Menu(5,4) THEN
4290 | Send error tone
4300 CALL Tones(2)
4310 GOTO Get_a_number
4320 ELSE
4330 CALL Tones(3)
4340 X1=(X-Menu(5,1)) DIV ((Menu(5,3)-Menu(5,1))/3)+1
4350 Y1=(Y-Menu(5,2)) DIV ((Menu(5,4)-Menu(5,2))/4)
4360 Pos=Y1*3+X1
4370 IF Pos=3 THEN
4380 Value=VAL(Number$)
4390 IF Want_the_hours THEN
4400 Hours_worked=Value
4410 ELSE
4420 Rate_of_pay=Value
4430 END IF
4440 CALL Clear_screen
4450 ELSE
4460 Number$=Number$&Keypad$(Pos;1)
4470 DISP Number$
4480 GOTO Get_a_number
4490 END IF
4500 END IF
4510 SUBEND

```

8. Finally, save all the changes you've made. Make sure your storage disc is in the primary disc drive. Then type this command, followed by **EXECUTE: STORE "DPAYROLL"**.

(The D denotes that this is the version of the PAYROLL drawing whose menu areas have been interpreted by the DRIVER program.) In the future, this is the program that you will load and run when you want to use the PAYROLL menu.

9. For now, your program is already loaded, so just press **RUN** on your keyboard. When asked for the name of your menu file, type MPAYROLL and press **CONTINUE**. When asked whether you want an outline of the menu on the screen, type Y and press **CONTINUE**. Then follow these steps to use the menu.

- a. Digitize the EMP CODE softkey.
- b. Digitize one of the four employee codes shown on the menu, for example 1.
- c. Digitize the HRS WRKD softkey.
- d. Digitize the numbers on the numeric pad corresponding to the number of hours the employee worked, for example 38.5. Then digitize the ENTER section of the numeric pad.
- e. Digitize the PAY RATE softkey.
- f. Digitize the numbers on the numeric pad corresponding to the rate of pay the employee earns, for example 11.25 (for \$11.25/hour). Then digitize the ENTER section of the numeric pad.
- g. Digitize the WAGE softkey. The CRT will display the employee code, the hours worked, the rate of pay, and the computed wages earned, as shown here.

```
EMPLOYEE CODE: 1
HOURS WORKED: 38.5
RATE OF PAY: 11.25
TOTAL EARNINGS: 433.125
```

- h. After 10 seconds, the menu will reappear on the CRT, and you can repeat steps a through g if you wish. Digitize the **END** softkey when you want to quit.

Program Modifications for HP-86/87 Computers

Follow these steps if you have an HP-86/87 computer. This section assumes that your system is still connected and turned on. Your program will not work until all of the modifications have been made. Therefore, don't press RUN until instructed in step 8.

1. Be sure your working copy of the DRAW disc is in the primary disc drive of your computer.
2. Type this command, followed by **END LINE: LOAD "DRIVER"**

Wait for the light on the disc drive to turn off. Then type this command, followed by **END LINE: LOADBIN "GKEYB"**

3. After the light on the disc drive turns off, obtain a listing of the DRIVER program. It might be easiest to print a listing on your printer, so that you'll have a copy for reference. If you do not have a printer, you can list the program on the CRT, a few lines at a time.
4. Now look through the listing for the softkey subroutines (shown here at line 970). This is the section where you can add functions for each softkey.

NOTE: The line numbers in your version of the 9111 System Tools might not correspond exactly to the line numbers shown here. They are included only for reference. The program lines should be the same as those shown.

For the PAYROLL menu, you will add functions to the first five softkeys, as shown by the shaded lines. Softkey 1 asks you to digitize an employee code. Softkeys 2 and 3 ask you to digitize the hours worked and the pay rate from the number pad; then they call the `Number_pad` subroutine. (You will add this subroutine to the end of the program in step 6.) Softkey 4 computes the wage for the employee, and softkey 5 terminates the program. Softkeys 6 through 16 generate an error tone, because they are not used in the PAYROLL menu.

Now change or add the shaded lines. Also, delete lines 1280 through 1780.

```

980 DN Sfk GOSUB K1 ,K2 ,K3 ,K4 ,K5 ,Ke ,Ke ,Ke ,Ke ,Ke ,Ke ,Ke ,Ke ,Ke ,Ke
990 GOTO Track_cursor
1000 |
1010 K1:
1020 PRINT USING "K" ; T1$
1030 CLEAR @ DISP "CHOOSE AN EMPLOYEE CODE." @ WAIT 2000
1040 RETURN
1050 |
1060 K2:
1070 PRINT USING "K" ; T1$
1080 CLEAR @ DISP "ENTER THE NUMBER OF HOURS WORKED." @ WAIT 2000
1085 Want_the_hours*1 @ GOSUB Number_pad
1090 RETURN
1100 |
1110 K3:
1120 PRINT USING "K" ; T1$
1130 CLEAR @ DISP "ENTER THE RATE OF PAY." @ WAIT 2000
1135 Want_the_hours=0 @ GOSUB Number_pad
1140 RETURN
1150 |
1160 K4:
1170 PRINT USING "K" ; T1$
1180 CLEAR @ Wage*Hours_worked*Rate_of_pay
1181 DISP " EMPLOYEE CODE: ";Employee_code
1182 DISP "  HOURS WORKED: ";Hours_worked
1183 DISP "  RATE OF PAY: ";Rate_of_pay
1184 DISP "TOTAL EARNINGS: ";Wage @ WAIT 10000
1190 RETURN
1200 |
1210 K5:
1220 PRINT USING "K" ; T1$
1230 CLEAR @ DISP "PROGRAM TERMINATED."
1240 END
1250 |
1260 Ke:
1270 PRINT USING "K" ; T2$
1790 RETURN
1800 |

```

5. Now look through the listing for the `Box_found` subroutine (shown here at line 2000). This is the section where you can add functions for each menu area.

Remember that the `MENUMAKER` program assigned numbers to each menu area as you defined the areas; these numbers correspond to the `B#` labels in the following listing. Each of the first four `PAYROLL` menu areas produces an acknowledgment tone and sets the employee code. The code. The fifth menu area, along with the rest of the platen, produces an error tone. This is because the fifth menu area can only be accessed through softkey 2 (`HRS WRKD`) and softkey 3 (`PAY RATE`). This menu area is interpreted by the subroutine `Number_pad`, which you will add in the next step.

Now change or add the shaded lines.

```
2000 Box_found:
2005 PRINT USING "K" ; T3
2010 !
2020 ! Use an ON Box GOTO B1,B2... for as many items as you have (see how the
2030 ! softkeys were managed above).
2040 !
2050 ON Box GOSUB B1 ,B2 ,B3 ,B4 ,Be
2060 GOTO Track_cursor
2070 !
2080 B1:
2090 ! First send a tone to indicate key picked, platen picked or whatever
2100 Employee_code=1
2110 RETURN
2120 !
2130 B2:
2140 ! First send a tone to indicate key picked, platen picked or whatever
2150 Employee_code=2
2160 RETURN
2170 !
2180 B3:
2190 ! First send a tone to indicate key picked, platen picked or whatever
2200 Employee_code=3
2201 RETURN
2202 !
2203 B4:
2204 Employee_code=4
2205 RETURN
2206 !
2207 Be:
2208 PRINT USING "K" ; T3
2210 RETURN
2220 !
```

6. The following listing is the Number_pad subroutine, which interprets menu area #5. Notice that boundaries are checked to see if the digitized point lies within menu area #5. Next, there is an algorithm that assigns a number, depending on which portion of the menu area has been digitized. This number is saved in a string, and concatenated with any other numbers until the ENTER box on the menu area has been digitized. Finally, the number is put into the appropriate variable (depending on which softkey called this subroutine).

Now add these program lines to the end of your program. In line 2380, type Number_pad_error as one word.

```

2300 Number_pad:
2310 Number$="" @ Keypad$="0.E123456789"
2320 !
2330 Get_a_number:
2340 GOSUB Get_point
2350 !
2360 ! Check to see if the point is in the numeric key pad
2370 !
2380 IF X<Menu(5,0) OR X>Menu(5,2) OR Y<Menu(5,1) OR Y>Menu(5,3) THEN Number_pad
_error
2390 PRINT USING "K" ; T3$
2400 X1=(X-Menu(5,0)) DIV ((Menu(5,2)-Menu(5,0))/3)+1
2410 Y1=(Y-Menu(5,1)) DIV ((Menu(5,3)-Menu(5,1))/4)
2420 P=Y1*3+X1
2430 IF P=3 THEN Enter_the_number
2440   Number$=Number$&Keypad$[P,P]
2450   CLEAR @ DISP Number$ @ WAIT 1000
2460   GOTO Get_a_number
2470 Enter_the_number:
2480   Value=VAL (Number$)
2490   IF Want_the_hours THEN Hours_worked=Value ELSE Rate_of_pay=Value
2500   CLEAR @ DISP Number$;" ENTERED" @ WAIT 1000 @ RETURN
2510   !
2520 Number_pad_error:
2530 PRINT USING "K" ; T2$ @ GOTO Get_a_number

```

7. Finally, save all the changes you've made. Make sure your storage disc is in the primary disc drive. Then type this command, followed by **END LINE: STORE "DPAYROLL"**. (The D denotes that this is the version of the PAYROLL drawing whose menu areas have been interpreted by the DRIVER program.) In the future, this is the program that you will load and run when you want to use the PAYROLL menu.

Also type this command, followed by **END LINE**:
STOREBIN "GKEYB". Since you must always load this
program when you load DPAYROLL, it will be more
convenient for it to be stored on your storage disc, as
well as on the DRAW disc.

8. For now, your program is already loaded, so just press **RUN** on your keyboard. When asked for your computer model number, press the appropriate keyboard function key. Then, when asked for the name of your menu file, type MPAYROLL and press **END LINE**. Finally, when asked whether you want an outline of the menu on the screen, press the keyboard function key designated YES. Then follow these steps to use the menu.
 - a. Digitize the EMP CODE softkey.
 - b. When the menu reappears on the CRT, digitize one of the four employee codes shown on the menu, for example 1.
 - c. Digitize the HRS WRKD softkey.
 - d. When the menu reappears on the CRT, digitize the numbers on the numeric pad corresponding to the number of hours the employee worked, for example 38.5. Then digitize the ENTER section of the numeric pad.
 - e. Digitize the PAY RATE softkey.
 - f. When the menu reappears on the CRT, digitize the numbers on the numeric pad corresponding to the rate of pay the employee earns, for example 11.25 (for \$11.25/hour). Then digitize the ENTER section of the numeric pad.
 - g. Digitize the WAGE softkey. The CRT will display the employee code, the hours worked, the rate of pay, and the computed wages earned, as shown here.

```
EMPLOYEE CODE: 1
HOURS WORKED: 38.5
RATE OF PAY: 11.25
TOTAL EARNINGS: 433.125
```

- h. After 10 seconds, the menu will reappear on the CRT, and you can repeat steps a through g if you wish. Digitize the **END** softkey when you want to quit.

Appendix A
DATA STRUCTURES OF THE PROGRAMS

How to Use this Appendix

This appendix describes the main data structures and variables of each of the 9111A system tools programs. All variables are not listed, because some are self-explanatory in the programs. The information in this appendix assumes that you are familiar with programming and editing in BASIC. To understand the information in this appendix, we suggest you obtain listings of the programs and use them in conjunction with this appendix.

The data structures for HP Series 200 computers and HP-86/87 computers are similar. However, some of the variable names are different. These are noted by putting the appropriate model numbers in parentheses: for example, Label (HP Series 200) or Lbl (HP-86/87). Also, arrays in the HP Series 200 are option base 1, whereas they are option base 0 in the HP-86/87. For this reason, two formats are presented when the arrays are first described -- one for HP Series 200, and one for HP-86/87. Thereafter the formats are represented as an asterisk. For example, Vertex(0:Vsize,3) (HP Series 200) and Vertex(Vsize,2) (HP-86/87) both become Vertex(*) in subsequent references. You must substitute the correct format for your computer.

All arrays and strings are dimensioned at the beginning of each program. Data structures are set up in the subroutine named Initial (except in the DRAWMENU and EDITORMENU programs). **NOTE:** If you increase the size of an array or string, be sure that your computer has enough extra memory to support this increase.

For HP Series 200 computers only, each program contains a Z(*) array. This array holds information about the CRT, tablet, and plotter. This is the only data structure common to all programs. Therefore, it is described in a separate section at the end of this appendix.

DRAW Program

DRAW Program Variables

The main DRAW program tracks the cursor on the CRT and branches to the appropriate subroutines whenever a point or softkey is digitized. The main variables are described in the following table.

Variable	Description
Chrsize	Current character size; default is 4
Color	Current pen number; default is 1
Display_grid	Flag indicates whether grid is displayed on the CRT (1) or not (0)
Dper	Percent of drawing space used; set to 0
Drawing_mode	Indicates drawing mode: rectangle; arc; circle; single-point or freehand line
Edge(*)	Array containing all of the edge information for a drawing; it is a linked list of pointers to the vertices in Vertex(*). Refer to the description under DRAW Program Data Structures.
Esize	Number of rows in Edge(*). For HP Series 200, set to 200; for HP-86/87, set to 100.
Fill	Flag indicates area-fill on (1) or off (0) for circles and rectangles
Grid_size	Distance between grid points in X direction on CRT; default is 6.9
Label(*) (HP Series 200) Lbl(*) (HP-86/87)	Array containing linked list of all of the label information for a drawing. Refer to the description under DRAW Program Data Structures.
Label\$ (HP Series 200) Lbl\$ (HP-86/87)	String containing all of the characters for a drawing. Refer to the description under DRAW Program Data Structures.
Lbsize (HP-86/87)	Number of characters in Lbl\$ (86/87)
Linetype (HP Series 200) Line_type (HP-86/87)	Current line type; default is 1

Variable	Description
Lsize	Number of rows in Label(*) (HP Series 200) or Lbl(*) (HP-86/87). For HP Series 200, set to 100; for HP-86/87, set to 50.
Per	Percent of label space used; set to 0
Plotr	Select code and address of plotter; default is 705. For HP-86A computer, default is 605.
Prev_xpt (HP Series 200 only)	Previous X coordinate; used for cursor tracking by Get_point subroutine
Prev_ypt (HP Series 200 only)	Previous Y coordinate; used for cursor tracking by Get_point subroutine
Printr (HP-86/87 only)	Select code and address of printer; default is 701
Size (HP Series 200 only)	Number of characters in Label\$ (HP Series 200); set to 1000
Snap_grid	Flag indicates whether to snap points to grid points (1) or not (0)
Tablt	Select code and address of tablet; default is 706. For HP-86A computer, default is 606.
Vertex(*)	Array containing all of the vertex information for a drawing. Refer to the description under EDITOR Program Data Structures.
Vsize	Number of rows in Vertex(*); set to 2000
Z(*) (HP Series 200 only)	Contains information about the CRT, tablet, and plotter for device-dependent subroutines. This array is common to all of the HP Series 200/9111A system tools programs. Refer to the description under Z(0:20) Data Structure (HP Series 200 Only) at the end of this appendix.

DRAW Program Data Structures

The DRAW program includes four main data structures, which are described alphabetically in this section.

Edge(0:Esize,6) (HP Series 200) **Edge(Esize,5)** (HP-86/87)

This data structure consists of edge information for each shape in the drawing. Edge(*) is a linked list of pointers to the vertices in Vertex(*) that define the edges. Esize is the number of rows in Edge(*); Esize is set to 200 (HP Series 200) or 100 (HP-86/87). The number of edges can be increased or decreased by changing the Edge(*) dimension at the beginning of the program, and then redefining Esize in the Initial subroutine. The array contents follow.

Row 0

Column 1: Next available row in Edge(*)

Column 2: Last row used in Edge(*)

Column 3: Number of rows used in Edge(*)

Column 4: Unused

Column 5: Unused

Column 6: Unused

All other rows for each edge

Column 1: Number representing edge type

- 1 = rectangle
- 2 = circle
- 3 = arc
- 4 = line drawn in freehand mode
- 5 = line drawn in single-point mode

Column 2: Pointer to Vertex(*)

- First endpoint of a diagonal comprising a rectangle
- Center point of circle or arc
- First endpoint of a line drawn in freehand or single-point mode

Column 3: Pointer to Vertex(*)

- Second endpoint of a diagonal comprising a rectangle
- Point on the circumference of a circle
- First endpoint of an arc when drawn in a counterclockwise manner
- Second endpoint of a line drawn in freehand or single-point mode

Column 4: Line type of the edge

Column 5: ● Pointer to the second endpoint of an arc when drawn in a counterclockwise manner

- If the row is unused, this column contains a pointer to the next free row in Edge(*).

If the row is unused, note that Edge(Esize,5) = -1 (HP Series 200) or Edge(Esize,4) = -1 (HP-86/87).

Column 6: Color of the edge

- Absolute value of the number indicates the pen number
- If the number is a negative value, this indicates the object is area-filled

Edge(*)

	Edge Type	Pointer 1	Pointer 2	Line Type	Pointer 3/Free Pointer	Color
0	6	5	5	0	0	0
1	5	PTR To An Endpoint	PTR To An Endpoint	1	2	1
2	4	PTR To An Endpoint	PTR To An Endpoint	1	3	2
3	3	PTR To Center Point	PTR To 1st Endpoint	3	PTR To 2nd Endpoint	3
4	2	PTR To Center Point	PTR To Circum Point	5	5	1
5	1	PTR To Endpt of Diagonal	PTR To Endpt of Diagonal	6	6	4
6	0	0	0	0	7	0
7	0	0	0	0	8	0
8	0	0	0	0	9	0
Esize	0	0	0	0	-1	0

Label(0:Lsize,6) (HP Series 200) Lbl(Lsize,5) (HP-86/87)

This data structure contains a linked list of information for all labels in a drawing. Lsize is the number of rows in the matrix; Lsize is set to 100 for Label(*) (HP Series 200) or 50 for Lbl(*) (HP-86/87). The number of labels can be increased or decreased by changing the Label(*) (HP Series 200) or Lbl(*) (HP-86/87) dimension and then redefining Lsize in the Initial subroutine. The array contents follow.

Row 0

Column 1: Next available row in Label(*) (HP Series 200) or Lbl(*) (HP-86/87)

Column 2: Last row used in Label(*) (HP Series 200) or Lbl(*) (HP-86/87)

Column 3: Next available space in Label\$ (HP Series 200) or Lbl\$ (HP-86/87)

Column 4: Unused

Column 5: Number of rows used in Label(*) (HP Series 200) or Lbl(*) (HP-86/87)

Column 6: Unused

All other rows

Column 1: X-coordinate of the beginning location of the label

Column 2: Y-coordinate of the beginning location of the label

Column 3: Length of the label

Column 4: Starting position of the label in Label\$ (HP Series 200) or Lbl\$ (HP-86/87)

Column 5: Color (pen number) of the label

Column 6: Character size of the label

Label(*)
 (HP Series
 200) or Lbl(*)
 (HP-86/87)

	X	Y	Length Of Label	Starting Position in Label\$ (Series 200) Or Lbl\$ (86/87)	Pen Color	Character Size
0	4	3	9	0	3	0
1	X Value	Y Value	5	1	3	33
2	X Value	Y Value	2	6	2	58
3	X Value	Y Value	1	8	4	23
4	0	0	0	0	0	0

Lsize	0	0	0	0	0	0
-------	---	---	---	---	---	---

Label\$[Size] (HP Series 200) Lbl\$[Lbsize] (HP-86/87)

This string variable contains all of the characters for all of the labels in a drawing. For HP Series 200, Size is the number of characters in Label\$, and is set to 1000. For HP-86/87, Lbsize is the number of characters in Lbl\$, and is set to 500. The number of characters can be increased or decreased by changing the Label\$ or Lbl\$ dimension at the beginning of the program, and then redefining Size or Lbsize in the Initial subroutine.

9	1	1	1	A	H	P	1		
---	---	---	---	---	---	---	---	--	--



Size (Series 200)
 Lbsize (86/87)

Label\$
 (HP Series
 200) or Lbl\$
 (HP-86/87)

Vertex(0:Vsize,3) (HP Series 200) Vertex(Vsize,2) (HP-86/87)

This data structure contains a linked list of all edge-defining vertices for a drawing. Vsize is the number of rows in Vertex(*), and is set to 2000. The number of vertices can be increased or decreased by changing the Vertex(*) dimension at the beginning of the program, and then redefining Vsize in the Initial subroutine. The array contents follow.

Row 0

Column 1: Next available row in Vertex(*)

Column 2: Last row used in Vertex(*)

Column 3: Number of rows used in Vertex(*). Note that:
Vertex(Vsize,3) = -1 (HP Series 200) or
Vertex(Vsize,2) = -1 (HP-86/87).

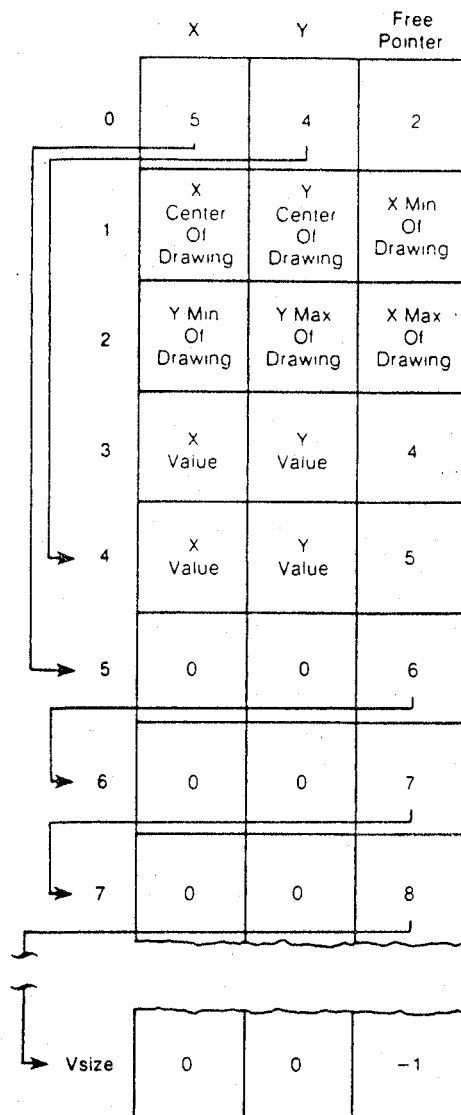
All other rows

Column 1: X-coordinate of vertex

Column 2: Y-coordinate of vertex

Column 3: Pointer to the next free row in Vertex(*)

Vertex(*)



DRAWMENU Program

DRAWMENU Program Variables

The DRAWMENU program plots the DRAW menu on the system plotter. The main variables are described in the following table.

Variable	Description
Plotr	Select code and address of plotter; default is 705. For HP-86A computer, default is 605.
Tablt (HP Series 200 only)	Select code and address of tablet; default is 706.
Z(*) (HP Series 200 only)	Contains information about the CRT, tablet, and plotter for device-dependent subroutines. This array is common to all of the HP Series 200/9111A system tools programs. Refer to the description under Z(0:20) Data Structure (HP Series 200 Only) at the end of this appendix.

DRAWMENU Program Data Structures

The DRAWMENU program uses only the Z(*) array, which is described in a separate section at the end of this appendix.

EDITOR Program

EDITOR Program Variables

The main EDITOR program tracks the cursor on the CRT and branches to the appropriate subroutine whenever a point or softkey is digitized. The main variables are described in the following table.

Variable	Description
Angle	Global rotation factor in degrees for objects and labels; default is 0
Color	Current pen number; default is 1
Display_grid	Flag indicates whether grid is displayed on the CRT (1) or not (0)
Dper	Percent of drawing space used; set to 0
Drawing_mode	Indicates the number of the menu object selected
Edge(*)	Array containing all of the edge information for a drawing; it is a linked list of pointers to the vertices in Vertex(*). Refer to the description under EDITOR Program Data Structures.
Edge_big(*)	Array containing all of the edge information for each object in the menu. Refer to the description under EDITOR Program Data Structures.
Esize	Number of rows in Edge(*); set to 100
Fac	Scale factor for the entire drawing; default is 1
Grid_size	Distance between grid points in X direction on CRT, relative to a scale factor of 1; default is 6.9
Label(*) (HP Series 200) Lbl(*) (HP-86/87)	Array containing linked list of information for all labels placed in the drawing via the LABEL 9111 softkey. Refer to the description under EDITOR Program Data Structures.
Label_big(*) (HP Series 200) Lbl_big(*) (HP-86/87)	Array containing all of the labels for all of the objects in the menu. Refer to the description under EDITOR Program Data Structures.

Variable	Description
Label_big\$ (HP Series 200) Lbl_big\$ (HP-86/87)	String containing all of the characters for all of the objects in the menu, plus plus all other labels in the drawing. Refer to the description under EDITOR Program Data Structures.
Linetype (HP Series 200) Line_type (HP-86/87)	Current line type; default is 1
Link(*)	Array containing the links for the vertices of each object in Vertex_big(*). Refer to the description under EDITOR Program Data Structures.
Lsize	Number of rows in Label(*) (HP Series 200) or Lbl(*) (HP-86/87). For HP Series 200, set to 100; for HP-86/87, set to 50.
Nobj	Number of items in Object(*)
Object(*)	Array containing starting location of menu object in Edge_big(*), Label_big(*) (HP Series 200) or Lbl_big(*) (HP-86/87), and Vertex_big(*). Refer to the description under EDITOR Program Data Structures.
Per	Percent of label space used. Set to 0 if there are no menu objects; otherwise, adjusts for labels in objects.
Picture(*)	Linked list of pointers into Object(*); contains information about each object in the drawing. Refer to the description under EDITOR Program Data Structures.
Plotr	Select code and address of plotter; default is 705. For HP-86A computer, default is 605.
Prev_xpt (HP Series 200 only)	Previous X coordinate; used for cursor tracking by Get_point subroutine
Prev_ypt (HP Series 200 only)	Previous Y coordinate; used for cursor tracking by Get_point subroutine
Printr (HP-86/87 only)	Select code and address of printer; default is 701

Variable	Description
Psize	Number of rows in Picture(*); set to 100 (HP Series 200) or 50 (HP-86/87). Psize is also used by Status_big(*) and Tran(*).
Scale (HP Series 200) Scle (HP-86/87)	Global scale factor for all labels and objects placed in the drawing; default is 1
Snap_grid	Flag indicates whether to snap points to grid points (1) or not (0)
Status(*) (HP Series 200) Stats(*) (HP-86/87)	Matrix of concatenated transformations for a single object. Refer to the description under EDITOR Program Data Structures.
Status_big(*)	Matrix of 3 x 3 concatenated transformations for each object in the drawing. Refer to the description under EDITOR Program Data Structures.
Strend	Pointer to the last character of the menu object labels inserted in Label_big\$
Strsize	Number of characters in Label_big\$ (HP Series 200) of Lbl_big\$ (HP-86/87); set to 1000
Tablt	Select code and address of tablet; default is 706. For HP-86A computer, default is 606.
Tran(*)	Contains scale and rotation factor for each object in the drawing. Refer to the description under EDITOR Program Data Structures.
Vertex(*)	Array containing all of the vertex information for a drawing. Refer to the description under EDITOR Program Data Structures.
Vertex_big(*)	Array containing all of the vertex information for each object in the menu. Refer to the description under EDITOR Program Data Structures.

Variable	Description
Vertex_index	Pointer to the last row used in Vertex_big(*)
Vsize	Number of rows in Vertex(*); set to 500 (HP Series 200) or 450 (HP-86/87)
Xmax	Maximum X-coordinate for row 1 of the menu
Xmaxc	Maximum X-coordinate of the CRT screen
Xmaxl	Maximum X-coordinate for row 2 of the menu if there are more than ten menu objects
Xmin	Minimum X-coordinate for row 1 of the menu
Xminc	Minimum X-coordinate of the CRT screen
Xminl	Minimum X-coordinate for row 2 of the menu if there are more than ten menu objects
Ymax	Maximum Y-coordinate for the menu
Ymaxc	Maximum Y-coordinate of the CRT screen
Ymin	Minimum Y-coordinate for the menu
Yminc	Minimum Y-coordinate of the CRT screen
Z(*) (HP Series 200 only)	Contains information about the CRT, tablet, and plotter for device-dependent subroutines. This array is common to all of the HP Series 200/9111A system tools programs. Refer to the description under Z(0:20) Data Structures (HP Series 200 Only) at the end of this appendix.

EDITOR Program Data Structures

The EDITOR program includes 13 main data structures, which are described alphabetically in this section.

Edge(0:Esize,6) (HP Series 200) Edge(Esize,5) (HP-86/87)

This data structure is a linked list of pointers to the vertices in Vertex(*) that comprise the endpoints of lines. Esize is the number of rows in Edge(*); Esize is set to 100. The number of edges can be increased or decreased by changing the Edge(*) dimension at the beginning of the program, and then redefining Esize in the Initial subroutine. The array contents follow.

Row 0

Column 1: Next available row in Edge(*)

Column 2: Last row used in Edge(*)

Column 3: Number of rows used in Edge(*)

Column 4: Unused

Column 5: Unused

Column 6: Unused

All other rows

Column 1: Contains the number 5 if this row is used; 0 if unused

Column 2: Pointer to Vertex(*) containing first endpoint of a line drawn in single-point mode

Column 3: Pointer to Vertex(*) containing second endpoint of line

Column 4: Line type of the line

Column 5: Pointer to the next free row in Edge(*). Note that Edge(Esize,5) = -1 (HP Series 200) or that Edge(Esize,4) = -1 (HP-86/87).

Column 6: Color of the line

Edge(*)

	Free/Used	Pointer 1	Pointer 2	Line Type	Free Pointer	Color
0	4	3	3	0	0	0
1	5	PTR To Endpt	PTR To Endpt	5	2	1
2	5	PTR To Endpt	PTR To Endpt	1	3	4
3	5	PTR To Endpt	PTR To Endpt	2	4	4
4	0	0	0	0	5	0
5	0	0	0	0	6	0
6	0	0	0	0	7	0
7	0	0	0	0	8	0
Esized	0	0	0	0	-1	0

Edge_big(0:200,6) (HP Series 200) Edge_big(100,5) (HP-86/87)

This data structure consists of edge information for each object in the menu. Edge_big(*) contains pointers to the vertices in Vertex_big(*) that comprise the edges for each object in the menu. The number of edges can be increased or decreased by changing the Edge(*) dimension at the beginning of the program. The array contents follow.

Row 0

Column 1: Unused

Column 2: Last row used in Edge_big(*)

Column 3: Unused

Column 4: Unused

Column 5: Unused

Column 6: Unused

First row of each new object

Column 1: Number of rows used for this object

Column 2: Last row used in Edge_big(*) for this object

Column 3: Unused

Column 4: Unused

Column 5: Unused

Column 6: Unused

All other rows of each object

Column 1: Number representing edge type

1 = rectangle

2 = circle

3 = arc

4 = line drawn in freehand mode

5 = line drawn in single-point mode

Column 2: Pointer to Vertex_big(*)

- First endpoint of a diagonal comprising a rectangle
- Center point of circle or arc
- First endpoint of a line drawn in freehand or single-point mode

Column 3: Pointer to Vertex(*)

- Second endpoint of a diagonal comprising a rectangle
- Point on the circumference of a circle
- First endpoint of an arc when drawn in a counterclockwise manner
- Second endpoint of a line drawn in freehand or single-point mode

Column 4: Line type of the edge

Column 5: • Pointer to Vertex_big(*) of the second endpoint of an arc when drawn in a counterclockwise manner

- If the row is unused, this column contains a pointer to the next free row in Edge_big(*)

Column 6: Color of the edge

- Absolute value of the number indicates the pen number
- If the number is a negative value, this indicates the object is area-filled

Columns Contain Same
Information As Edge(*)
In DRAW Program

0		Last Row Used				
1						
2						
3						
4						
5						
6						
7						
8						
9						

Edge(*) In DRAW Program For One Object In Menu

Edge(*) In DRAW Program For Another Object In Menu

Edge(*) In DRAW Program, For Another Object In Menu

Label(0:Lsize,7) (HP Series 200) Lbl(Lsize,6) (HP-86/87)

This data structure contains a linked list of information for all labels placed in the drawing via the LABEL 9111 softkey.

Lsize is the number of rows in the matrix; Lsize is set to 100. The number of labels can be increased or decreased by changing the Label(*) (HP Series 200) or Lbl(*) (HP-86/87) dimension and then redefining Lsize in the Initial subroutine. The array contents follow.

Row 0

Column 1: Next available row in Label(*) (HP Series 200) or Lbl(*) (HP-86/87)

Column 2: Last row used in Label(*) (HP Series 200) or Lbl(*) (HP-86/87)

Column 3: Next available space in Label_big\$ (HP Series 200) or Lbl_big\$ (HP-86/87)

Column 4: Unused

Column 5: Number of rows used in Label(*) (HP Series 200) or Lbl(*) (86/87)

Column 6: Unused

Column 7: Unused

All other rows

Column 1: X-coordinate of the beginning location of the label

Column 2: Y-coordinate of the beginning location of the label

Column 3: Length of the label

Column 4: Starting position in Label_big\$ (HP Series 200) or Lbl_big\$ (HP-86/87) for the label

Column 5: Color (pen number) of the label

Column 6: Character size of the label

Column 7: Angle of rotation of the label

Label(*)
 (HP Series
 200) or Lbl(*)
 (HP-86/87)

	x	y	Length Of Label	Starting Position In Label_big\$ (Series 200) Or Lbl_big\$ (86/87)	Color	Character Size	Angle Of Rotation
0	4	3	9	0	3	0	0
1	X Value	Y Value	5	1	2	33	0
2	X Value	Y Value	2	6	1	58	45
3	X Value	Y Value	1	8	1	23	90
4	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0
Lsize	0	0	0	0	0	0	0

Label_big(0:200,6) (HP Series 200) Lbl_big(50,5) (HP-86/87)

This data structure contains a linked list of information for all of the labels in each object. The number of rows can be increased or decreased by changing the dimension of Label_big(*) (HP Series 200) or Lbl_big(*) (HP-86/87) at the beginning of the program. The array contents follow.

Row 0

Column 1: Unused

Column 2: Last row used in Label_big(*) (HP Series 200) or Lbl_big(*) (HP-86/87)

Column 3: Next available space in Label_big\$ (HP Series 200) or Lbl_big\$ (HP-86/87)

Column 4: Unused

Column 5: Unused

Column 6: Unused

First row of each new object

Column 1: Number of rows used for this object

Column 2: Last row used in Label_big(*) (HP Series 200) or
Lbl_big(*) (HP-86/87) for this object

Column 3: Unused

Column 4: Unused

Column 5: Unused

Column 6: Unused

All other rows for each object

Column 1: X-coordinate of the beginning location of the label

Column 2: Y-coordinate of the beginning location of the label

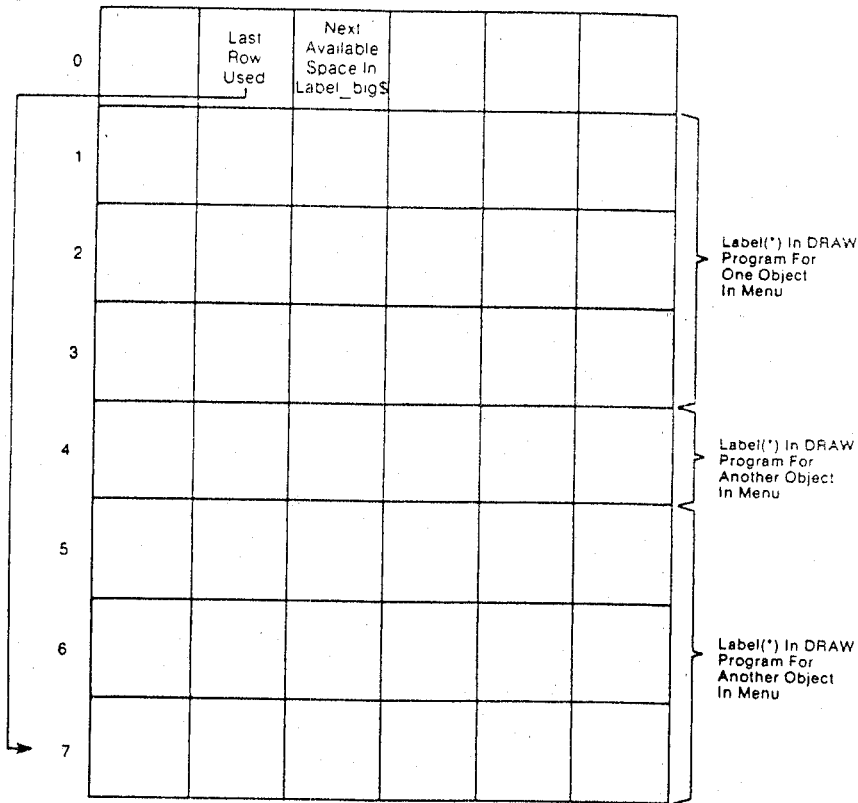
Column 3: Length of the label

Column 4: Starting position in Label_big\$ (HP Series 200) or
Lbl_big\$ (HP-86/87) for the label

Column 5: Color (pen number) of the label

Column 6: Character size of the label

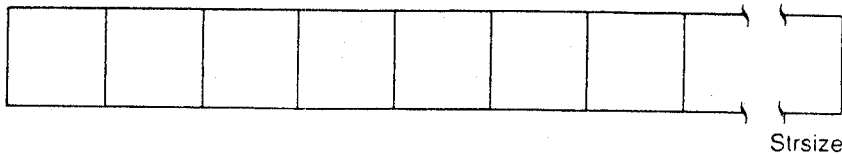
Columns Contain Same Information as Label(*) In DRAW Program



Label_big(*)
 (HP Series 200) or
 Lbl_big(*)
 (HP-86/87)

Label_big\$[Strsize] (HP Series 200) Lbl_big\$[Strsize] (HP-86/87)

This string variable contains all of the labels for all objects in the menu, plus the labels added to the drawing. Strsize is the number of characters in Label_big\$ (HP Series 200) or Lbl_big\$ (HP-86/87); Strsize is set to 1000. The number of characters can be increased or decreased by changing the Label_big\$ or Lbl_big\$ dimension at the beginning of the program, and then redefining Strsize in the Initial subroutine.



Label_big\$
 (HP Series 200) or
 Lbl_big\$
 (HP-86/87)

Link(0:450) (HP Series 200) Link(300) (HP-86/87)

This array contains the links for the vertices of each object in Vertex_big(*). To increase or decrease the number of rows, change the Link(*) dimension at the beginning of the program. The vector contents follow.

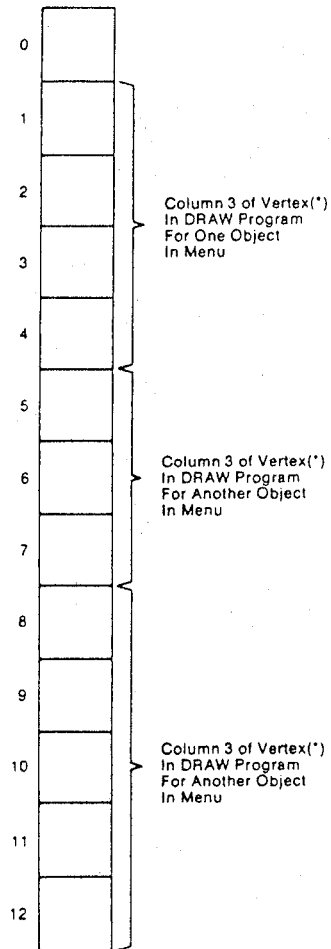
Row 0

Column 1: Number of rows used in Vertex(*)

All other rows

Column 1: Pointer to the next free row in Vertex(*)

Link(*)



Object(0:20,4) (HP Series 200) Object(20,3) (HP-86/87)

This data structure is a linked list of pointers into Edge_big(*), Label_big(*) (HP Series 200) or Lbl_big(*) (HP-86/87), and Vertex_big(*) for each object in the menu. Each row corresponds to a separate object or menu element created using the DRAW program. To increase or decrease the number of rows, change the Object(*) dimension at the beginning of the program. The array contents follow.

Row 0

Column 1: Unused

Column 2: Last row used in Object(*)

Column 3: Unused

Column 4: Unused

All other rows

Column 1: First row in Edge_big(*) for the object

Column 2: First row in Vertex_big(*) for the object

Column 3: Free column for programmer

Column 4: First row in Label_big(*) for the object

	PTR To 1st Location In Edge_big(*)	PTR To 1st Location In Vertex_big(*)	Free Pointer	PTR To 1st Location In Label_big(*) (Series 200) Or Lbl_big(*) (86/87)
0	0	3	0	0
1	1	1	0	1
2	3	5	0	4
3	7	8	0	5

Object(*)

Picture(0:Psize,6) (HP Series 200) Picture(Psize,5) (HP-86/87)

This data structure is a linked list of pointers into Object(*) containing information about each object in the drawing. Psize is the number of rows in Picture(*), and is set to 100 (HP Series 200) or 50 (HP-86/87). The number of rows can be increased or decreased by changing the Object(*) dimension at the beginning of the program, and then redefining Psize in the Initial subroutine. If you change Psize, you must also change the dimensions of Status_big(*) and Tran(*) at the beginning of the program. The array contents follow.

Row 0

Column 1: Next available row in Picture(*)

Column 2: Last row used in Picture(*)

Column 3: Unused

Column 4: Unused

Column 5: Unused

Column 6: Number of rows used in Picture(*)

All other rows

Column 1: Object number

Column 2: Pointer to next free row in Picture(*). Note that
Picture(Psize,2) = -1 (HP Series 200) or
Picture(Psize,1) = -1 (HP-86/87).

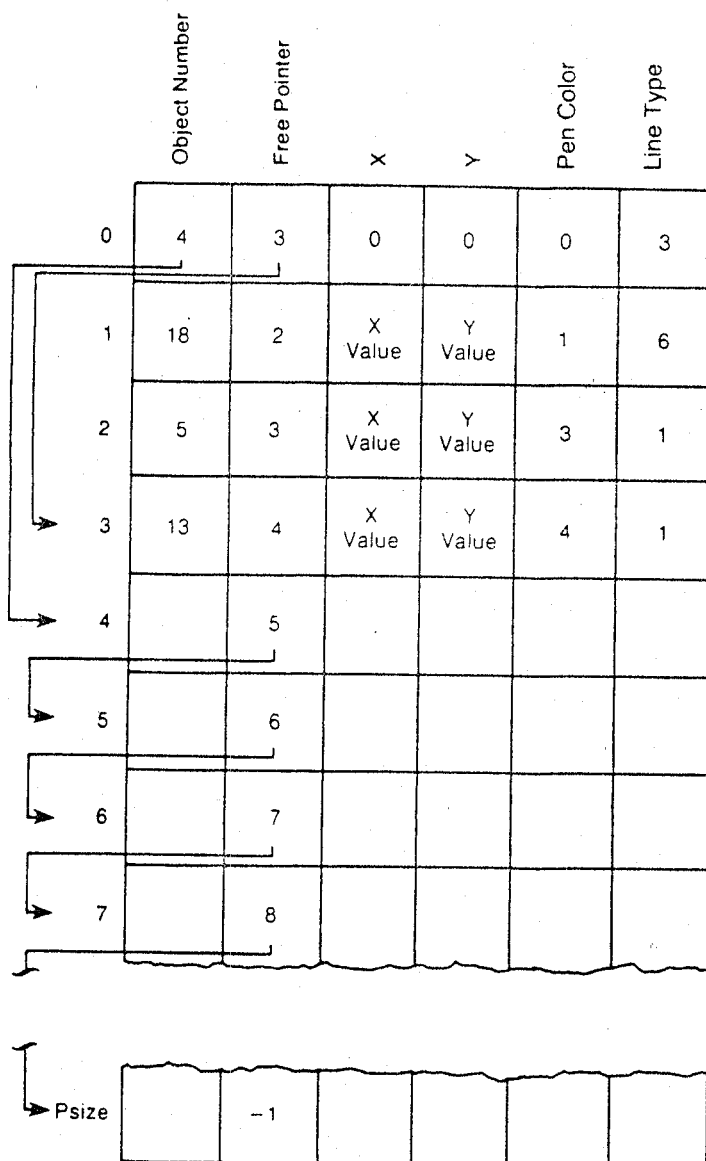
Column 3: X-coordinate of placement point of object

Column 4: Y-coordinate of placement point of object

Column 5: Color (pen number) of the object

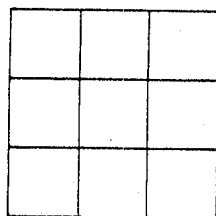
Column 6: Line type of the object

Picture(*)



Status(3,3) (HP Series 200) Stats(2,2) (HP-86/87)

This is a matrix of concatenated transformations for a single object.

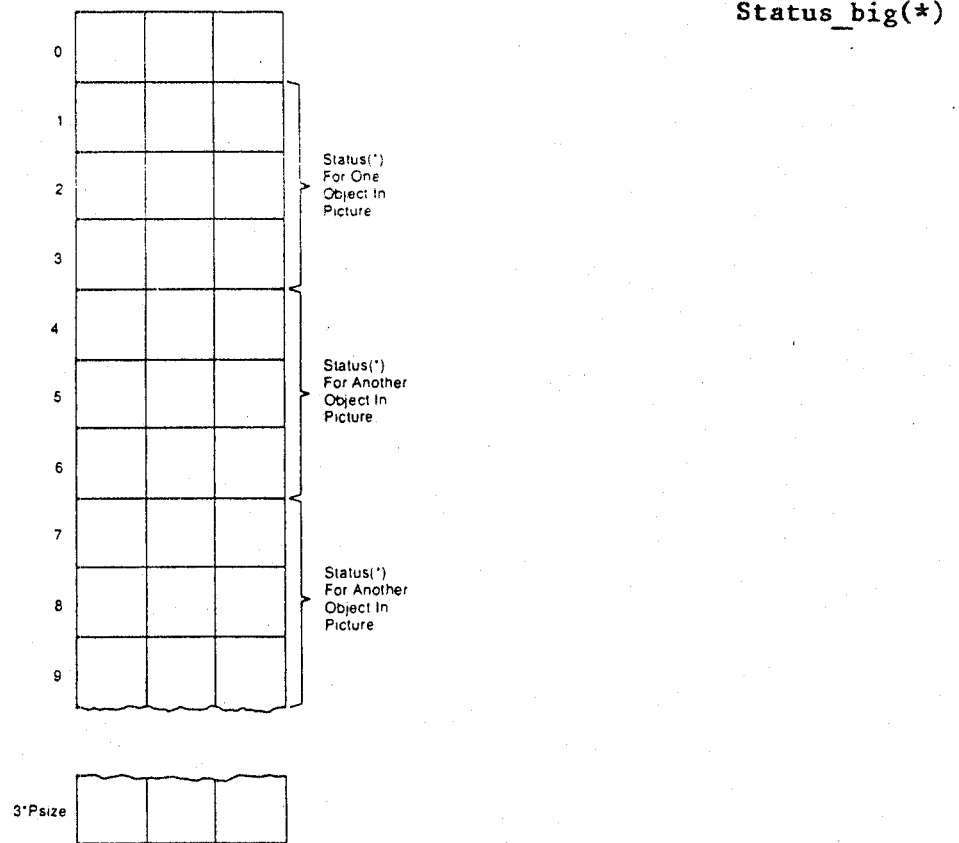


Transformation Matrix For A Single Object

Status(*)
 (HP Series 200) or
 Stats(*)
 (HP-86/87)

Status_big(0:3*Psize,3) (HP Series 200)
Status_big(3*Psize,2) (HP-86/87)

This data structure contains a 3 x 3 transformation matrix for each object in the drawing. Psize is the number of rows in Picture(*), and is set to 100 (HP Series 200) or 50 (HP-86/87). If you change the size of Picture(*) and Psize, you must also change the dimension of Status_big(*) at the beginning of the program.



Tran(0:Psize,2) (HP Series 200) Tran(Psize,1) (HP-86/87)

This data structure contains the angle of rotation and the scale factor for the labels in an object. There is a one-to-one correspondence between the rows in Picture(*) and the rows in Tran(*). Psize is the number of rows in Picture(*), and is set to 100 (HP Series 200) or 50 (HP-86/87). If you change the size of Picture(*) and Psize, you must also change the dimension of Tran(*) at the beginning of the program. The array contents follow.

All rows

Column 1: Angle of rotation

Column 2: Scale factor

	Angle Of Rotation	Scale Factor
0	0	0
1	45	1
2	0	2
3	90	5
4	0	0
5	0	0
6	0	0
7	0	0

Tran(*)

Psize	0	0
-------	---	---

Vertex(0:Vsize,3) (HP Series 200) Vertex(Vsize,2) (HP-86/87)

This data structure contains a linked list of all edge-defining vertices for the lines in the drawing. Vsize is the number of rows in Vertex(*), and is set to 500 (HP Series 200) or 400 (HP-86/87). The number of vertices can be increased or decreased by changing the Vertex dimension at the beginning of the program, and then redefining Vsize in the Initial subroutine. The array contents follow.

Row 0

Column 1: Next available row in Vertex(*)

Column 2: Last row used in Vertex(*)

Column 3: Number of rows used in Vertex(*)

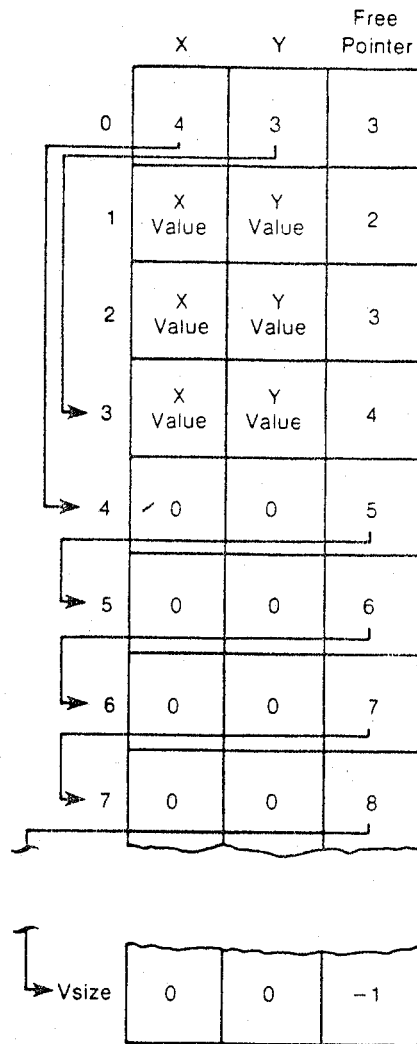
All other rows

Column 1: X-coordinate of vertex

Column 2: Y-coordinate of vertex

Column 3: Pointer to the next free row in Vertex(*). Note that Vertex(Vsize,3) = -1 (HP Series 200) or Vertex(Vsize,2) = -1 (HP-86/87).

Vertex(*)



Vertex_big(0:450,3) (HP Series 200) Vertex_big(300,2) (HP-86/87)

This data structure contains all of the edge-defining vertices for all of the objects in your menu. To increase or decrease the number of rows, change the Vertex_big(*) dimension at the beginning of the program. The array contents follow. Note that the second and third rows of each object contain X,Y-coordinate minimum, maximum, and centering information.

Row 0

Column 1: Unused

Column 2: Last row used in Vertex_big(*)

Column 3: Unused

First row of each new object

Column 1: Number of rows used for this object

Column 2: Last row used in Vertex_big(*) for this object

Column 3: Unused

All other rows of each object

Column 1: X-coordinate of vertex

Column 2: Y-coordinate of vertex

Column 3: 1 (used as homogenous coordinate of matrix operations)

Columns 1&2 Contain Same Information As Vertex(*) In the DRAW Program

0	0	Last Row Used	1	
1			1	Vertex(*) In DRAW Program For One Object In Menu
2			1	
3			1	
4			1	
5			1	Vertex(*) In DRAW Program For Another Object In Menu
6			1	
7			1	
8			1	Vertex(*) In DRAW Program For Another Object In Menu
9			1	
10			1	
11			1	
12			1	

EDITORMENU Program

EDITORMENU Program Variables

The main EDITORMENU program sets up the object area of the menu for the EDITOR program and plots it on an HP-IB plotter.

Variable	Description
Edge_big(*) (HP Series 200) E(*) (HP-86/87)	Array containing all of the edge information for the menu; it is a linked list of pointers to the vertices in Vertex_big(*). Refer to the description under EDITORMENU Program Data Structures.
Label_big(*) (HP Series 200) L(*) (HP-86/87)	Array containing linked list of all of the label information for a menu. Refer to the description under EDITORMENU Program Data Structures.
Label_big\$ (HP Series 200) L\$ (HP-86/87)	String containing all of the characters for a menu. Refer to the description under EDITORMENU Program Data Structures.
Length1	Length of first row in menu
Length2	Length of second row in menu
Nobj	Number of objects in menu
Object(*)	Array containing starting location of menu object in Edge_big(*) (HP Series 200) or E(*) (HP-86/87), Label_big(*) (HP Series 200) or L(*) (HP-86/87), and Vertex_big(*) (HP Series 200) or V(*) (HP-86/87). Refer to the description under EDITORMENU Program Data Structures.
Plotr	Select code and address of plotter; default is 705. For HP-86A computer, default is 605.
Prev_xpt (HP Series 200 only)	Previous X coordinate; used for cursor tracking by Get_point subroutine
Prev_ypt (HP Series 200 only)	Previous Y coordinate; used for cursor tracking by Get_point subroutine

Variable	Description
Printr (HP-86/87 only)	Select code and address of printer; default is 701
Tablt	Select code and address of tablet; default is 706. For HP-86A computer, default is 606.
Vertex_big(*) (HP Series 200) V(*) (HP-86/87)	Array containing all of the vertex information for a menu. Refer to the description under EDITORMENU Program Data Structures.
Xmax1	Maximum X-coordinate for row 1 of menu objects
Xmax2	Maximum X-coordinate for row 2 of menu objects if there are more than 10 menu objects
Xmin1	Minimum X-coordinate for row 1 of menu objects
Xmin2	Minimum X-coordinate for row 2 of menu objects if there are more than 10 menu objects
Z(*) (HP Series 200 only)	Contains information about the CRT, tablet, and plotter for device-dependent subroutines. This array is common to all of the HP Series 200/9111A system tools programs. Refer to the description under Z(0:20) Data Structure (HP Series 200 Only) at the end of this appendix.

EDITORMENU Program Data Structures

The EDITORMENU program includes five main data structures. They are described alphabetically in this section.

Edge_big(0:200,6) (HP Series 200) **E(100,5)** (HP-86/87)

This data structure consists of edge information for each object in the menu. **Edge_big(*)** (HP Series 200) or **E(*)** (HP-86/87) is a linked list of pointers to the vertices in **Vertex_big(*)** (HP Series 200) or **V(*)** (HP-86/87) that define the edges. The number of edges can be increased or decreased by changing the **Edge_big(*)** (HP Series 200) or **E(*)** (HP-86/87) dimension at the beginning of the program. The array contents follow.

Row 0

Column 1: Next available row in **Edge_big(*)** (HP Series 200) or **E(*)** (HP-86/87)

Column 2: Last row used in **Edge_big(*)** (HP Series 200) or **E(*)** (HP-86/87)

Column 3: Number of rows used in **Edge_big(*)** (HP Series 200) or **E(*)** (HP-86/87)

Column 4: Unused

Column 5: Unused

Column 6: Unused

All other rows for each edge

Column 1: Number representing edge type

- 1 = rectangle
- 2 = circle
- 3 = arc
- 4 = line drawn in freehand mode
- 5 = line drawn in single-point mode

Column 2: Pointer to **Vertex_big(*)** (HP Series 200) or **V(*)** (HP-86/87)

- First endpoint of a diagonal comprising a rectangle
- Center point of circle or arc
- First endpoint of a line drawn in freehand or single-point mode

Column 3: Pointer to Vertex_big(*) (HP Series 200) or V(*) (HP-86/87)

- Second endpoint of a diagonal comprising a rectangle
- Point on the circumference of a circle
- First endpoint of the arc when drawn in a counterclockwise manner
- Second endpoint of a line drawn in freehand or single-point mode

Column 4: Line type of the edge

Column 5: • Pointer to the second endpoint of the arc when drawn in a counterclockwise manner

- If the row is unused, this column contains a pointer to the next free row in Edge_big(*) (HP Series 200) or E(*) (HP-86/87). Note that if the row is unused, Edge_big(100,5) = -1 (HP Series 200) or E(100,4) = -1 (HP-86/87).

Column 6: Color of the edge

- Absolute value of the number indicates the pen number
- If the number is a negative value, this indicates the object is area-filled

Edge_big(*)
(HP Series
200) or E(*)
(HP-86/87)

Columns Contain Same
Information As Edge(*)
In DRAW Program

0		Last Row Used					
1							Edge(*) In DRAW Program For One Object In Menu
2							
3							
4							Edge(*) In DRAW Program For Another Object In Menu
5							
6							
7							Edge(*) In DRAW Program For Another Object In Menu
8							
9							

Label_big(0:200,6) (HP Series 200) L(200,5) (HP-86/87)

This data structure contains a linked list of information for all labels in a menu. The number of labels can be increased or decreased by changing the Label_big(*) (HP Series 200) or L(*) (HP-86/87) dimension at the beginning of the program. The array contents follow.

Row 0

Column 1: Next available row in Label_big(*) (HP Series 200) or L(*) (HP-86/87)

Column 2: Last row used in Label_big(*) (HP Series 200) or L(*) (HP-86/87)

Column 3: Next available space in Label_big\$ (HP Series 200) or L\$ (HP-86/87)

Column 4: Unused

Column 5: Number of rows used in Label_big(*) (HP Series 200) or L(*) (HP-86/87)

Column 6: Unused

All other rows

Column 1: X-coordinate of the beginning location of the label

Column 2: Y-coordinate of the beginning location of the label

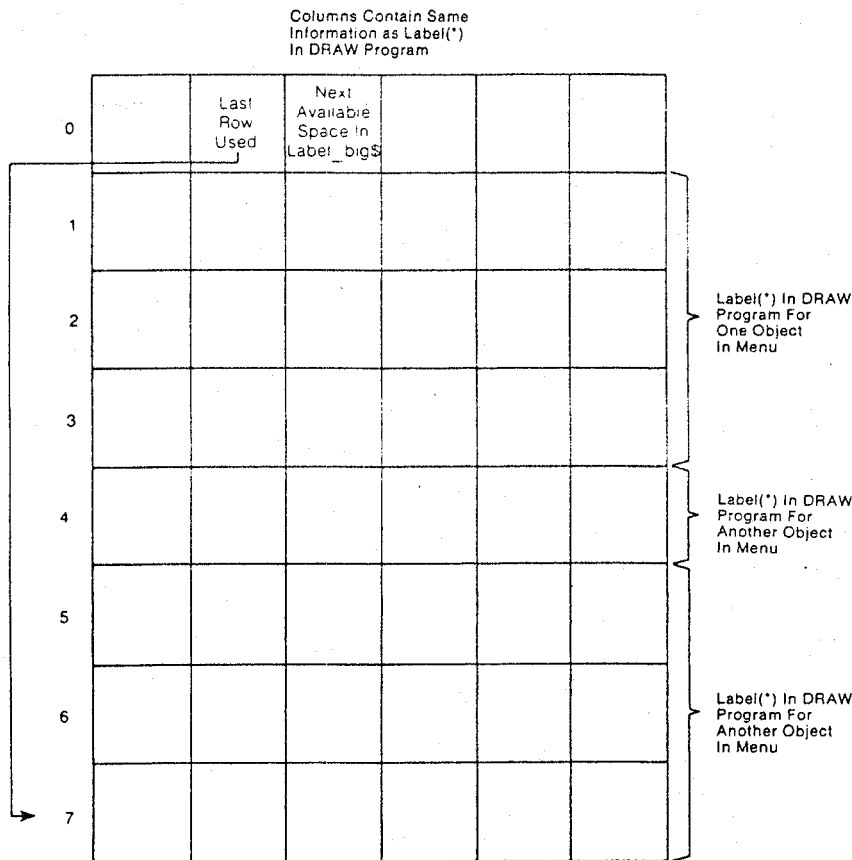
Column 3: Length of the label

Column 4: Starting position in Label_big\$ (HP Series 200) or L\$ (HP-86/87) for the label

Column 5: Color (pen number) of the label

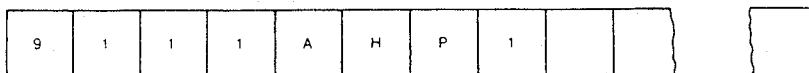
Column 6: Character size of the label

Label_big(*)
 (HP Series
 200) or L(*)
 (HP-86/87)



Label_big\$[1000] (HP Series 200) L\$[1000] (HP-86/87)

This string variable contains all of the characters for all of the labels in the menu. The number of characters can be increased or decreased by changing the Label_big\$ (HP Series 200) or L\$ (HP-86/87) dimension at the beginning of the program.



Label_big\$
 (HP Series
 200) or L\$
 (HP-86/87)

Object(0:20,4) (HP Series 200) Object(20,3) (HP-86/87)

This data structure is a linked list of pointers into Edge_big(*) (HP Series 200) or E(*) (HP-86/87), Label_big(*) (HP Series 200) or L(*) (HP-86/87), and Vertex_big(*) (HP Series 200) or V(*) (HP-86/87). Each row corresponds to a separate object or menu element created using the DRAW program. To increase or decrease the number of rows, change the Object(*) dimension at the beginning of the program. The array contents follow.

Row 0

Column 1: Unused

Column 2: Last row used in Object(*)

Column 3: Unused

Column 4: Unused

All other rows

Column 1: First row in Edge_big(*) (HP Series 200) or E(*) (HP-86/87) for the object

Column 2: First row in Vertex_big(*) (HP Series 200) or V(*) (HP-86/87) for the object

Column 3: Free column for programmer

Column 4: First row in Label_big(*) (HP Series 200) or L(*) (HP-86/87) for the object

Object(*)

	PTR To 1st Location In Edge_big(*) (Series 200) Or L(*) (86/87)	PTR To 1st Location In Vertex_big(*) (Series 200) Or V(*) (86/87)	Free Pointer	PTR To 1st Location In Label_big(*) (Series 200) Or L(*) (86/87)
0	0	3	0	0
1	1	1	0	1
2	3	5	0	4
3	7	8	0	5

Vertex_big(0:1500,3) (HP Series 200) V(1500,2) (HP-86/87)

This data structure is a linked list of all edge-defining vertices for a menu. The number of vertices can be increased or decreased by changing the Vertex_big(*) (HP Series 200) or V(*) (HP-86/87) dimension at the beginning of the program. The array contents follow.

Row 0

Column 1: Next available row in Vertex_big(*) (HP Series 200) or V(*) (HP-86/87)

Column 2: Last row used in Vertex_big(*) (HP Series 200) or V(*) (HP-86/87)

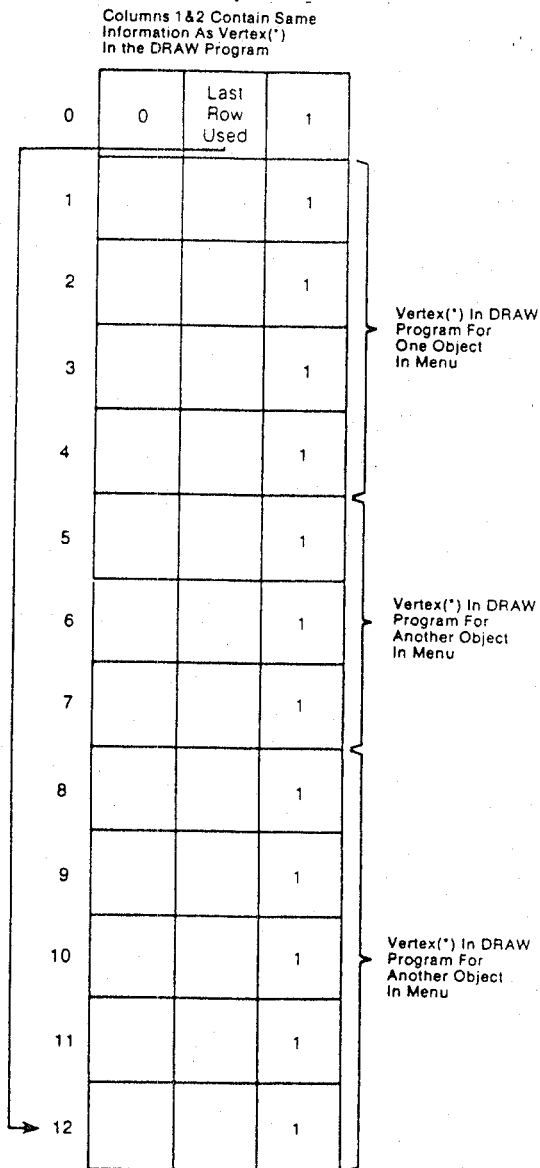
Column 3: Number of rows used in Vertex_big(*) (HP Series 200) or V(*) (HP-86/87).

All other rows

Column 1: X-coordinate of vertex

Column 2: Y-coordinate of vertex

Column 3: Pointer to the next free row in Vertex_big(*) (HP Series 200) or V(*) (HP-86/87)



Vertex_big(*)
(HP Series
200) or V(*)
(HP-86/87)

MENUMAKER Program

MENUMAKER Program Variables

The main MENUMAKER program tracks the cursor on the CRT and branches to the appropriate subroutine whenever a point or softkey is digitized. The main variables are described in the following table.

Variable	Description
First	Indicates whether or not the first corner of the menu box has been entered
Menu(*)	An array containing vertex and box-order information for a particular menu. Refer to the description under MENUMAKER Program Data Structures.
Msize (HP Series 200) Menu_size (HP-86/87)	Number of rows in Menu(*); set to 500
Order	Count of total number of menu boxes created
Plotr	Select code and address of plotter; default is 705. For HP-86A computer, default is 605.
Prev_xpt (HP Series 200 only)	Previous X-coordinate; used for cursor tracking by Get_point subroutine
Prev_ypt (HP Series 200 only)	Previous Y-coordinate; used for cursor tracking by Get_point subroutine
Printr (HP-86/87 only)	Select code and address of printer; default is 701
Tablt	Select code and address of tablet; default is 706. For HP-86A computer, default is 606.
Xa	X-coordinate of lower-left corner of menu box
Xb	X-coordinate of upper-right corner of menu box
Xl	X-coordinate of first point of menu box digitized

Variable	Description
Ya	Y-coordinate of lower-left corner of menu box
Yb	Y-coordinate of upper-right corner of menu box
Y1	Y-coordinate of first point of menu box digitized
Z(*) (HP Series 200 only)	Contains information about the CRT, tablet, and plotter for device-dependent subroutines. This array is common to all of the HP Series 200/9111A system tools programs. Refer to the description under Z(0:20) Data Structure (HP Series 200 Only) at the end of this appendix.

MENUMAKER Program Data Structures

The MENUMAKER program contains one main data structure, described next.

Menu(0:Msize,6) (HP Series 200) Menu(Menu_size,5) (HP-86/87)

This data structure contains vertex and box-order information for a particular menu. Msize (HP Series 200) and Menu_size (HP-86/87) are the number of rows in Menu(*); they are set to 500. The number of rows can be increased or decreased by changing the Menu(*) dimension at the beginning of the program, and then redefining Msize (HP Series 200) or Menu_size (HP-86/87) in the Initial subroutine. The array contents follow.

Row 0

Column 1: Next available row in Menu(*)

Column 2: Last row used in Menu(*)

Column 3: Unused

Column 4: Unused

Column 5: Unused

Column 6: Unused

All other rows

Column 1: Minimum X-coordinate of menu box

Column 2: Minimum Y-coordinate of menu box

Column 3: Maximum X-coordinate of menu box

Column 4: Minimum Y-coordinate of menu box

Column 5: Identification number for box order

Column 6: Link field

Menu(*)

	Min X	Min Y	Max X	Max Y	Order	Link
0	4	3	0	0	0	1
1	X Value	Y Value	X Value	Y Value	1	2
2	X Value	Y Value	X Value	Y Value	2	3
3	X Value	Y Value	X Value	Y Value	3	4
4	0	0	0	0	0	5

Msize (Series 200) Or Menu_size (86/87)	0	0	0	0	0	0
--	---	---	---	---	---	---

DRIVER Program

DRIVER Program Variables

The main DRIVER program tracks the cursor on the CRT and branches to the appropriate subroutine whenever a point or softkey is digitized. The main variables are described in the following table.

Variable	Description
Menu(*)	An array containing vertex and box-order information for a particular menu. Refer to the description under DRIVER Program Data Structures.
Plotr	Select code and address of plotter; default is 705. For HP-86A computer, default is 605.
Prev_xpt (HP Series 200 only)	Previous X-coordinate; used for cursor tracking by Get_point subroutine
Prev_ypt (HP Series 200 only)	Previous Y-coordinate; used for cursor tracking by Get_point subroutine
Printr (HP-86/87 only)	Select code and address of printer; default is 701
Tablt	Select code and address of tablet; default is 706. For HP-86A computer, default is 606.
Z(*) (HP Series 200 only)	Contains information about the CRT, tablet, and plotter for device-dependent subroutines. This array is common to all of the HP Series 200/9111A system tools programs. Refer to the description under Z(0:20) Data Structure (HP Series 200 Only) at the end of this appendix.

DRIVER Program Data Structures

The DRIVER program contains one main data structure, described next.

Menu(0:500,6) (HP Series 200) Menu(500,5) (HP-86/87)

This data structure contains vertex and box-order information for a particular menu. The number of rows can be increased or decreased by changing the Menu(*) dimension at the beginning of the program. The array contents follow.

Row 0

Column 1: Next available row in Menu(*)

Column 2: Last row used in Menu(*)

Column 3: Number of rows used in Menu(*)

Column 4: Unused

Column 5: Unused

Column 6: Unused

All other rows

Column 1: Minimum X-coordinate of menu box

Column 2: Minimum Y-coordinate of menu box

Column 3: Maximum X-coordinate of menu box

Column 4: Minimum Y-coordinate of menu box

Column 5: Identification number for box order

Column 6: Unused

Menu(*)

	Min X	Min Y	Max X	Max Y	Order	
0	4	3	3	0	0	0
1	X Value	Y Value	X Value	Y Value	1	0
2	X Value	Y Value	X Value	Y Value	2	0
3	X Value	Y Value	X Value	Y Value	3	0
4	0	0	0	0	4	0

500	0	0	0	0	0	0
-----	---	---	---	---	---	---

The diagram illustrates a grid of data points. The first grid has columns labeled Min X, Min Y, Max X, Max Y, and Order. The rows are indexed 0 to 4. Row 0 contains values 4, 3, 3, 0, 0, 0. Rows 1, 2, and 3 contain 'X Value' and 'Y Value' in the first four columns, and their respective indices and 0 in the last two columns. Row 4 contains 0, 0, 0, 0, 4, 0. A second grid below it, starting at index 500, contains 0, 0, 0, 0, 0, 0. Arrows indicate a path from (0,4) to (1,3), (2,3), (3,3), and (4,0).

Z(0:20) Data Structure (HP Series 200 Only) §§first††

This data structure contains information about the CRT, tablet, and plotter for device-dependent subroutines on the HP Series 200 computers. The array contents follow.

Element 0

Plotter type, where:

- 0 = CRT
- 1 = 7470, 7475, 9872 (any plotter with the mechanical origin in the lower-left corner of the page)
- 2 = 7580, 7585 (any plotter with the mechanical origin in the center of the page)

Elements 1 through 12

These rows contain minimum and maximum X,Y-coordinates as follows.

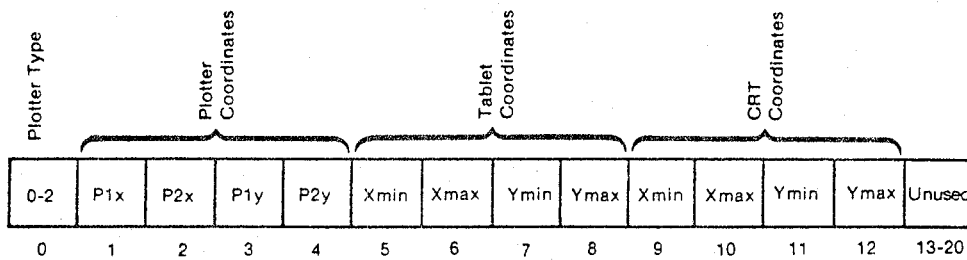
Elements 1 through 4 are defined by the Find_plotter and Plotr_limit subroutines, and contain X,Y-coordinates of P1 and P2 on the plotter.

Elements 5 through 8 are defined by the Tablt_limit subroutine, and contain X,Y-coordinates of the tablet's active digitizing area.

Elements 9 through 12 are defined by the Define_crt subroutine, and contain X,Y-coordinates of the CRT's default graphics area.

Elements 13 through 20

Unused



Z(*)
(HP Series
200 Only)

--NOTES--

Appendix B
DESCRIPTIONS OF SOFTKEYS AND MENU AREAS

In this appendix you will find descriptions of what happens each time you digitize any of the softkeys and menu areas. The softkeys are listed in the first section, in the order in which they appear on the menus. The menu areas are listed in the second section, separately for each type of menu.

Softkey Descriptions

Unless otherwise noted, the following softkeys appear on both the DRAW menu and the EDITOR menus. When you digitize a softkey, you will hear a tone that depends on the action being performed. You might hear an acknowledgment tone, a query tone, a completion tone, or an error tone.

When you digitize the **GET PIC** softkey, you will be asked for the name of the file to be retrieved. Be sure you have the correct storage disc in the primary disc drive. When prompted, enter the file name. The picture will then be drawn on the CRT so that you can redraw, add, or erase portions of it. The modes and conditions (e.g., snap/grid, line type, color) that were in effect when you saved the drawing will be reestablished.

GET PIC

NOTE: You can only retrieve drawings that were created with the program that you are currently using. For example, if you are using the DRAW program, you can only retrieve drawings that you created on the DRAW program; in this case, you cannot retrieve drawings that you created with the EDITOR program. If you have forgotten the names of your files, you can press **PAUSE**, enter **CAT**, and press **EXECUTE** for the HP Series 200 computers or **END LINE** for the HP-86/87 computers. This will give you a listing of your files. However, you need to note which program you used to create each drawing. If it is an EDITOR file, also note which menu was used for each drawing. (In the back of this guide, you will find a form for making these notations.) When you are ready to return to the program, press **CONTINUE**.

When you digitize the **SAVE PIC** softkey, you will be asked for the name of the file to be stored. Be sure you have the correct storage disc in the primary disc drive. Then enter the file name. The file name can have up to 10 characters. When the file has been saved, the picture will remain on the CRT so that you can redraw, add, or erase portions of it. If you make a change, remember to save the file again.

SAVE
PIC

Also note which program (**EDITOR** or **DRAW**) you are using when you save the drawing. This is because you can only recall drawings using the program with which they were created and saved. If you're using the **EDITOR** program, you also need to note which menu was used to create the drawing (for example, **LOGIC**, the menu supplied with the system tools). In the back of this guide, you will find a form that you can use for these notations.

After you digitize the **LABEL 9111** softkey, digitize the characters and numbers that you need from the character set and number pad of the menu. Next digitize the point in the drawing where you want the center of the left side of the first character to be placed. Your label will then be drawn for you. If you are using the **DRAW** program, you can change the label size any time before you place the label in the drawing; just digitize one of the character size menu boxes. If you are using the **EDITOR** program, the character size depends upon the current scale for the drawing. In both cases, the default character size is 4. To delete labels, use the **DEL OTHER** softkey.

LABEL
9111

This softkey is only available on the **DRAW** menu. After you digitize the **LABEL KEYBD** softkey, enter the characters and numbers that you need from the keyboard of your computer. Next digitize the point in the drawing where you want the center of the left side of the first character to be placed. Your label will then be drawn for you. You can change the label size any time before you place the label in the drawing; just digitize one of the character size menu boxes. The default character size is 4. To delete labels, use the **DEL OTHER** softkey.

LABEL
KEYBD

This softkey is only available on the EDITOR menus. Digitize **DRAW LINE** when you want to specify the single-point digitizing mode. With this mode, digitize the first endpoint of the line, followed by the second endpoint. The program then draws a line between the two endpoints. If you want to continue drawing a line from the second endpoint, simply digitize another endpoint. If you want to start a new line, you can either redigitize the last endpoint to signal the end of that line, or you can redigitize **DRAW LINE** to signal the start of a new line. To delete a line, use the **DEL LINE** softkey.

DRAW
LINE

NOTE: On the HP-86/87 computers, the first time you draw a line, the CRT might not respond very quickly. This is because of the way the computer executes the program. When you digitize the first endpoint of the first line, the cursor on the CRT will disappear momentarily. Hold the stylus to the platen until the cursor reappears. Then proceed with the second endpoint. Please have patience; the CRT will respond more quickly with subsequent lines.

After you press **DEL LINE**, you need to indicate which line you want to delete (erase). Do this by digitizing two endpoints on the line. (A query tone will prompt you.) A line can be one drawn with the **DRAW LINE** softkey (EDITOR menu), or a single-point mode line (DRAW menu), or a freehand mode line (DRAW menu). You do not have to digitize the exact endpoints; the program will search for the line nearest the endpoints that you have specified. When the program has found the line, the line will blink (HP Series 200) or turn to a dotted line type (HP-86/87). If you want to erase the line, digitize the **YES** softkey; the line will then disappear from the CRT. If you do not want to erase the line after all, digitize the **CANCL** softkey; the line will then remain on the CRT. If the program found the wrong line, digitize the **NO** softkey; the line will remain on the CRT and you will have to digitize two endpoints again to restart the delete process.

DEL
LINE

NOTE: You cannot delete parts of a line drawn with the **DRAW LINE** softkey (EDITOR menu) or the single-point mode (DRAW menu); you can only delete the whole line from endpoint to endpoint. However, you can delete portions of freehand lines (DRAW menu). Also, you might occasionally find that you've drawn lines that overlap and look like one line. The computer recognizes each separate line, so they must be deleted separately, even though they appear to be one line.

Use **DEL OTHER** to delete any part of your drawing except lines; that is, you can delete circles, arcs, rectangles, objects, or labels (all are referred to in this paragraph as shapes). **NOTE:** These shapes must have been drawn with the drawing modes of the menu (for example, the rectangle mode). If you drew a shape using freehand or single-point lines, you must delete them with the **DEL LINE** softkey.

DEL
OTHER

After digitizing **DEL OTHER**, digitize the center of the circle, arc, or rectangle; or digitize the reference point of the object; or digitize the first character of the label. (A query tone will prompt you.) You do not have to digitize the exact points; the program will search for the shape nearest the point that you have specified. When the program has found the shape, the shape will blink (HP Series 200) or turn to a dotted line type (HP-86/87). If you want to erase it, digitize the **YES** softkey; the shape will disappear from the CRT. If you do not want to erase it after all, digitize the **CANCL** softkey; the shape will remain on the CRT. If the program found the wrong shape, digitize the **NO** softkey; the shape will remain on the CRT and the next nearest one will blink or change line type. Then digitize **YES**, **CANCL**, or **NO** again.

NOTE: On the HP-86/87 computers, it is difficult to see the dotted line type on labels. Therefore, watch for the label to be erased and redrawn in order to determine whether the program found the correct label.

This softkey allows you to copy the CRT to your system printer. After digitizing **COPY CRT**, make sure your printer is connected properly and turned on. Also be sure that the address is 701, and your paper is positioned to the top of form. When prompted, press the keyboard function key designated **COPY**. If you do not want to copy the CRT after all, press the keyboard function key designated **CANCEL**.

COPY
CRT

NOTE: If your printer is not connected properly, is not turned on, or has a different address, **do not** press the **COPY** function key. If you do, your program will lock up and you will lose the drawing you've been working on. To prevent this, use **SAVE PIC** to save your drawing. Next, turn on the printer, press **RESET** on the keyboard, and start over with loading and running the program. Then use **GET PIC** to retrieve the drawing before printing it.

This softkey is most useful when you have been deleting items from your drawing or moving objects in your drawing. Sometimes portions of the drawing appear to have been erased, when in reality they are still part of the drawing. Simply digitize the **REDRAW** softkey to have the program redraw your drawing on the CRT. You can then see the drawing as it currently exists.

RE-
DRAW

This softkey allows you to copy your drawing on your system plotter. After digitizing **PLOT**, you will be asked to answer a few questions, described in the following paragraphs. If you have an HP Series 200 computer, answer by digitizing **YES**, **NO**, or **CANCL**. If you have an HP-86/87 computer, answer by pressing the keyboard function key designated **YES**, **NO**, or **CANCEL**. **NOTE:** While a drawing or menu is being plotted, do not use the keyboard or tablet. This could halt the program and result in loss of data.

PLOT

- a. If you have an HP-86/87 computer, you will first be asked to enter the plotter model number from the keyboard. If you have an HP Series 200 computer, the program finds the plotter model number automatically.

NOTE: If your plotter is not connected or turned on, do not proceed. If you do, the program might halt and drawing data might be lost. To prevent this, enter 0 (zero) for your plotter number if you have an HP-86/87 computer; for an HP Series 200 computer, digitize **CANCL**. Then use **SAVE PIC** to save your drawing. Now you can turn on the plotter, press **RESET** on the keyboard, and start over with loading and running the program. Then use **GET PIC** to retrieve the drawing before plotting it.

- b. Next, the program asks whether you are plotting on paper or transparency film. If you choose paper, the plotter will move at a normal velocity. Be sure to use paper pens. If you choose transparency film, the plotter will move more slowly to ensure dense, even ink on the plot. In this case, be sure to use transparency pens and film. If you are using the **DRAW** program, a second question asks whether you want a menu plot. If you are going to use this drawing with the **MENUMAKER** and **DRIVER** programs to define your own menu areas, you should answer **YES**. If not, answer **NO**. (If you are using the **EDITOR** program, you will not be asked this question.) The last question asks whether you want a frame around your plot.

- c. Now, if you decided not to draw a menu plot, it is time to be sure your plotter is set up. You can use any size of paper that your plotter will allow. You can also change the size of the plot by setting P1 and P2 from the front panel. If you have an HP 7580/7585 plotter, be sure it is in the REMOTE mode. Also, if you are loading your paper horizontally in an HP 7580/85 plotter, press the ENTER and ROTATE buttons so that the plot will be oriented properly on the paper.
- d. If you decided to draw a menu plot, you need to answer a few more questions. First, you will be asked whether you want the softkeys outlined. Your answer depends on whether your menu uses the softkeys. Next, you will be asked whether you want to label the softkeys. If you do, the program will give you the opportunity to specify the labels, one row at a time. (Have patience here; if you try to enter a row before the CRT prompt asks for it, you might halt the program and lose data.)

After you have specified the labels, or if you chose not to label the softkeys, you should check again that your plotter is set up properly. If you have an HP 7580/7585 plotter, be sure your A3/B-size* paper is loaded vertically and the plotter is in the REMOTE mode. If you have an HP 7470 plotter, the menu will be drawn in sections on A4/A-size* paper, which you will then have to cut and tape together. All other plotters require A3/B-size* paper for menus. If you try to change the settings of P1 and P2, the program will not plot the drawing. In this case, start over by resetting your plotter to the default P1 and P2 for A3/B-size paper (or for A4/A-size paper if you have an HP 7470 plotter).

Digitize the CLEAR CRT softkey when you want to clear the CRT and the data base so that you can start a new drawing. As a precaution, you will be asked whether you want to delete your current drawing. If you answer NO or CANCL, you can return to the drawing and use the SAVE PIC softkey to store the drawing. If you answer YES, your current drawing will be completely erased. If you have an HP Series 200 computer, answer by digitizing YES, NO, or CANCL. If you have an HP-86/87 computer, answer by pressing the keyboard function key designated YES, NO, or CANCEL.

CLEAR CRT

* A3-size paper measures 297 by 420 mm; B-size paper measures 11 by 17 in. A4-size paper measures 210 by 297 mm; A-size paper measures 8.5 by 11 in.

When you digitize the STAT softkey, the program responds by listing a status report of your current drawing. The status reports for the DRAW and EDITOR programs are shown below, with their default values.

STAT

CURRENT STATUS OF DRAWING

The Status
Report for the
DRAW Program

COLOR = PEN 1
LINE TYPE = SOLID LINE
CHARACTER SIZE = 4
DRAWING MODE = SINGLE POINT MODE
SNAP GRID MODE = OFF
GRID SIZE = 20
AREA FILL = OFF

PERCENT OF DRAWING SPACE USED = 0
PERCENT OF LABEL SPACE USED = 0

CURRENT STATUS OF DRAWING

The Status
Report for the
EDITOR Program

MENU ITEM SELECTED = LINE

ANGLE OF ROTATION = 0 DEGREES
GLOBAL SCALE FACTOR = 1.00
SCALE DRAW FACTOR = 1.00

COLOR = PEN 1
LINE TYPE = SOLID LINE

SNAP GRID MODE = OFF
GRID SIZE = 20

PERCENT OF DRAWING SPACE USED = 0
PERCENT OF LABEL SPACE USED = 2

The HELP softkey provides hints about the menu areas and softkeys. The particular hints that you get depend upon what function you are performing when you digitize HELP. For example, if you have digitized LABEL 9111 and don't know what to do next, you can digitize HELP for a brief description.

HELP

Digitize the **CANCL** softkey when you have started an operation that you don't want to complete. For example, if you have digitized the **DEL LINE** softkey but don't want to specify the endpoints of a line to delete, you can digitize the **CANCL** softkey to cancel the delete operation. This softkey can also be used as a response to certain questions asked by the program.

CANCL

Digitize this softkey if you are finished with the program. As a safeguard, the program gives you some options after you have digitized **END**. By pressing the appropriate keyboard function key, you can choose to copy the CRT, save the current drawing, cancel the **END** operation, rerun the program, or quit. If you choose to rerun the program or quit, your current drawing will be completely erased.

END

When you are asked to digitize your response to a question, you can digitize the **YES** softkey.

YES

When you are asked to digitize your response to a question, you can digitize the **NO** softkey.

NO

Menu Area Descriptions

The menu areas of the **DRAW** menu and the **EDITOR** menus are described separately in this section. When you digitize a menu area, you will hear a tone that depends on the action being performed. You might hear an acknowledgment tone, a single tone for a digitized point, or an error tone.

The Draw Menu

The Softkey Area

The softkeys allow you to perform various operations on your drawing. Refer to the previous section, **Softkey Descriptions**, for definitions of specific softkeys.

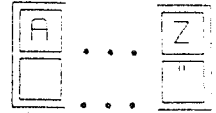
GET
PIC

...

NO

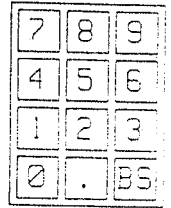
The Character Set Area

If you have first digitized the LABEL 9111 softkey, you can digitize characters from the character set menu area to form labels in a similar way to typing from a keyboard.



The Number Pad Area

Use the number pad in the same way as the character set to digitize labels. You must digitize the LABEL 9111 softkey before you can digitize a number. Use the BS box when you want to backspace.



The Character Size Area

Digitize any of the character size boxes (1 through 9) to change the size of all subsequent labels. The character size will stay in effect until you digitize a new size. The default character size is 4.



The Snap/Grid Area

The grid consists of lines of dots that are spaced equally across the CRT in both horizontal and vertical directions. Each box in the snap/grid menu area allows you to perform specific functions, as described here.

After digitizing the SET GRID box, you must specify the density of the grid as a number between 2 and 100. Use the keyboard to enter the number that represents the grid density that you want.



For example, if you choose a grid density of 40, the digitizing area on the CRT will be divided into 40 equal units in the horizontal direction. The vertical direction will also be divided into equal units, but there will be fewer than 40.

The default grid size is 20. You will **not** see the grid on the CRT if:

- the grid is off (refer to the GRID OFF box), or
- the grid is too dense to be shown on the CRT.

When you digitize the **SNAP ON** box, you set the snap mode. In this mode, each point that you digitize will automatically be placed over the nearest grid dot. This mode is useful if you want to line up labels, lines, or objects in your drawing. The default is for the snap mode to be off.

SNAP
ON

Digitizing the **SNAP OFF** box turns off the snap mode. Refer to the **SNAP ON** box.

SNAP
OFF

If you digitize the **GRID ON** box, the grid will be drawn on the CRT.

GRID
ON

Digitizing the **GRID OFF** box removes the grid from the CRT. If the snap mode is on, it still works even if the grid is not displayed on the CRT.

GRID
OFF

The Color Area

Digitizing any of the pen boxes causes the subsequent portions of the drawing to be plotted with the specified pen number. This pen number will remain in effect until you digitize a different pen number. The default is pen 1. If you have an HP 7470 2-pen plotter, selecting pens 1, 3, 5, and 7 will result in pen 1 being used for the plot; selecting pens 2, 4, 6, and 8 will result in pen 2 being used.

PEN 1	PEN 2	PEN 3	PEN 4
PEN 5	PEN 6	PEN 7	PEN 8

If you digitize the **FILL ON** box, all subsequent circles and rectangles will be filled in solidly using the current pen color. This remains in effect until you digitize the **FILL OFF** box.

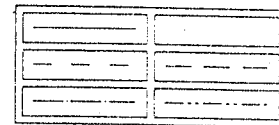
FILL ON

Digitizing the **FILL OFF** box turns off the fill mode. Refer to the **FILL ON** box. The default is for the fill mode to be off.

FILL OFF

The Line Type Area

Digitizing any of the line type boxes causes the subsequent portions of the drawing to be drawn with the specified line type. This line type will remain in effect until you digitize a different line type. The default is a solid line.



The Drawing Mode Area

The default drawing mode is the single-point mode. You can change this mode by digitizing one of the other boxes in this menu area, as described below.

NOTE: On the HP-86/87 computers, the first time you use each drawing mode, the CRT might not respond very quickly. This is because of the way the computer executes the program. Please have patience; the CRT will respond more quickly with subsequent uses of the drawing modes. For example, the first time you draw a circle, there will be a pause before the circle is drawn. Subsequent circles will be drawn more quickly. Likewise, the first time you draw a line, the cursor on the CRT will disappear briefly after you digitize the first endpoint. This pause will be less noticeable with subsequent lines.

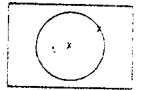
Digitizing the **FREEHAND** box sets the continuous-point digitizing mode. This mode is similar to drawing with a pencil: press down on the stylus, maintain pressure on the stylus as you move it on the platen, and release the stylus when you have finished drawing the shape. Draw slowly enough for the cursor to follow the stylus' movement. If you have an HP Series 200 computer, the line is terminated when you release the stylus. If you have an HP-86/87 computer, you must terminate the line by digitizing the **FREEHAND** box again. To delete freehand lines, use the **DEL LINE** softkey. If you find that the data base fills up too quickly (you'll get a message when it does), increase the Vertex(*) array and the Vsize variable in the DRAW program. (Refer to Appendix A.)

FREE- HAND

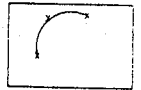
This box sets the single-point digitizing mode. With this mode, the program automatically draws lines between the endpoints that you digitize. To have the program draw a line, simply digitize the first endpoint and then the second endpoint. If you want another line to continue from the second endpoint, digitize a third endpoint, and so on. If you want to start a new line that is not connected to the last endpoint of the previous line, either redigitize the last endpoint or redigitize the single-point box. This signals the tablet that the next point you digitize will be the first endpoint of a new line. To delete single-point lines, use the **DEL LINE** softkey.



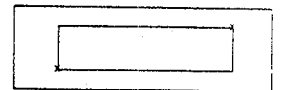
Digitize the circle box when you want the program to draw a circle automatically. Next digitize the center of the circle and then digitize any point on the circumference of the circle. To delete circles drawn with this mode, use the **DEL OTHER** softkey.



If you want the program to draw an arc automatically, digitize the arc box. Next digitize three points to define the arc. The arc will be drawn in a counterclockwise direction through the three points. To delete arcs drawn with this mode, use the **DEL OTHER** softkey.



When you digitize the rectangle box, the program will draw rectangles for you. Digitize any two points that represent diagonal corners of the box (i.e., upper-left and lower-right or upper-right and lower-left). To delete rectangles drawn with this mode, use the **DEL OTHER** softkey.



The EDITOR Menus

The Softkey Area

The softkeys allow you to perform various operations on your drawing. Refer to the previous section, Softkey Descriptions, for definitions of specific softkeys.



The Character Set Area

If you have first digitized the **LABEL 9111** softkey, you can digitize characters from the character set menu area to form labels in a similar way to typing from a keyboard.



The Number Pad Area

Use the number pad in the same way as the character set to digitize labels. You must digitize the LABEL 9111 softkey before you can digitize a number. Use the BS box when you want to backspace.

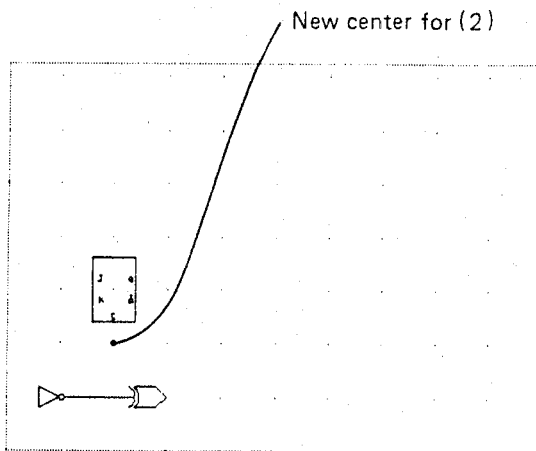
7	8	9
4	5	6
1	2	3
0	.	BS

The Manipulation Area

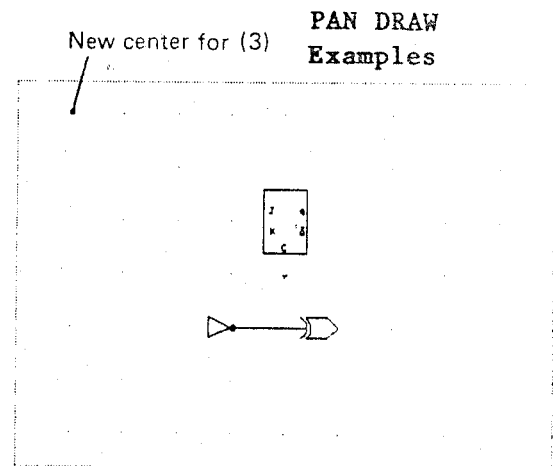
The **PAN DRAW** box is useful if your drawing is larger than the digitizing area of the tablet. Think of PAN DRAW as viewing part of your drawing through a window and moving that window up or down, left or right to view different parts of the drawing.



Draw a portion of a drawing, then digitize **PAN DRAW**. Next digitize a point that represents the new center of your drawing. Your drawing will then be redrawn on the CRT. Depending on where you specified the new center to be, some of your drawing might not be displayed on the CRT. However, when you plot it, you'll find that it's still there.



(1) Digitize **PAN DRAW** and specify the new center as shown. The result appears in (2).



(2) Digitize **PAN DRAW** and specify the new center as shown. The result appears in (3).



(3) When you plot this, the entire drawing will still be drawn, even though the window on the CRT doesn't show the whole drawing.

Digitize the **SCALE DRAW** box if you want to zoom in or out on your current drawing. For example, you can magnify your drawing by specifying a larger scale. This makes it easier to add small details. Then you can scale the drawing back to a smaller size to work on other areas of the drawing. **SCALE DRAW** is especially useful in conjunction with **PAN DRAW**.



To select a scale factor, digitize **SCALE DRAW**. Then use the keyboard to enter a number that represents the scale factor that you want (any number between .1 and 10). Your drawing will next be redrawn with the new scale factor.

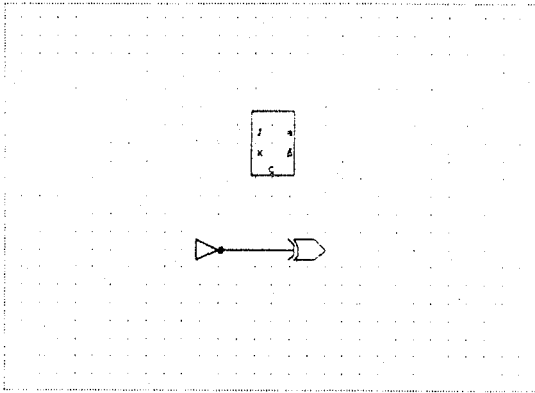
The scale factor is cumulative, based on a default factor of 1. Thus, if you want the drawing to be twice as large as before, select a factor of 2. If you then decide you want the drawing to be eight times as large as the original, select a factor of 4; this will produce a new scale of 8 (4 times the last factor of 2). If you now want to return to a scale of 2, select a factor of 0.25 (0.25 times the last factor of 8 equals 2).

When you change your drawing scale using **SCALE DRAW**, your grid density will remain the same, relative to a scale of 1. Thus, if you scale your drawing by a factor of 2, it will appear that you have only half as many grid dots. But, you actually have the same grid density with relation to the size of the objects and shapes in the drawing.

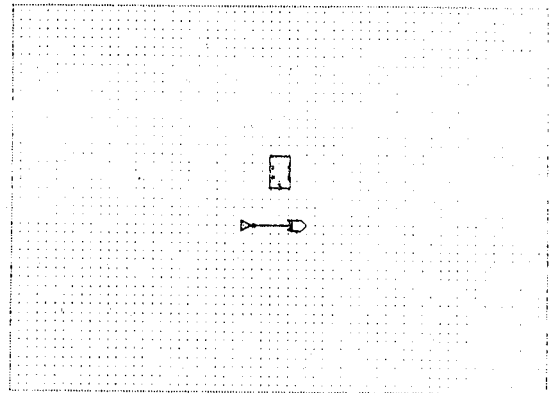
SCALE DRAW

Examples.

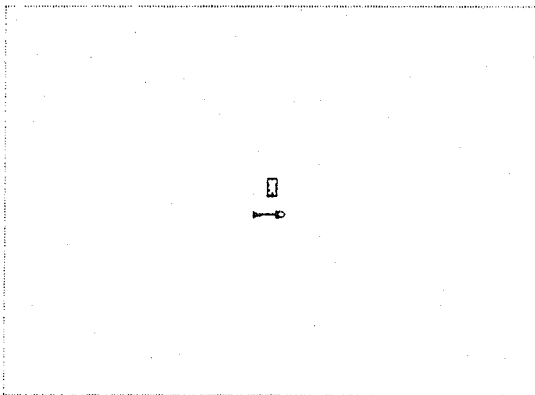
The whole drawing changes scale. Note the changes in grid density, although the grid size in all cases is 30.



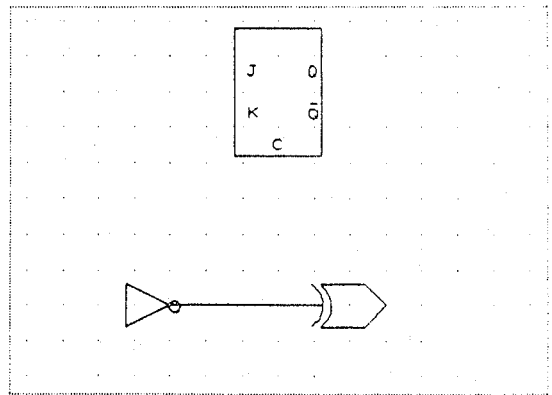
(1) Scale = 1. Digitize **SCALE DRAW**. Then specify a scale factor of 0.5. The result appears in (2).



(2) Scale = 0.5 (1 x 0.5). Now digitize **SCALE DRAW** and specify a factor of 0.5 again. The result appears in (3).



(3) Scale = 0.25 (0.5 x 0.5). Notice that the grid has been turned off because it is too dense to be drawn on the CRT. Now digitize **SCALE DRAW** and specify a factor of 8. The result appears in (4).



(4) Scale = 2 (0.25 x 8). Since the grid was turned off in (3), digitize **GRID ON** to redraw the grid.

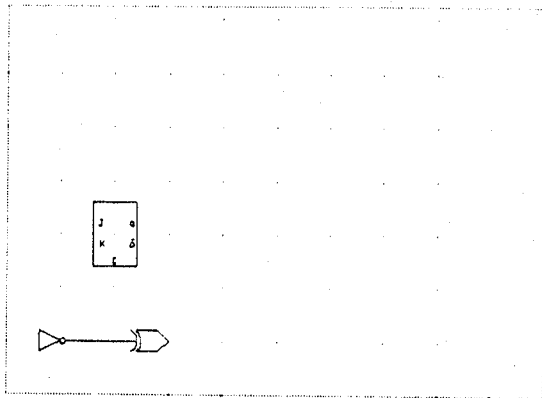
The **NEW SCALE** box applies a new scale to all subsequent objects and labels. This scale stays in effect until you digitize **NEW SCALE** again. Previously placed objects and labels are not affected. Select the new scale in the same manner as for the **SCALE DRAW** box. Also, the scale is cumulative, as described for the **SCALE DRAW** box. However, since **NEW SCALE** does not affect the scale of the current drawing, the density of the grid dots will not change.

NEW
SCALE

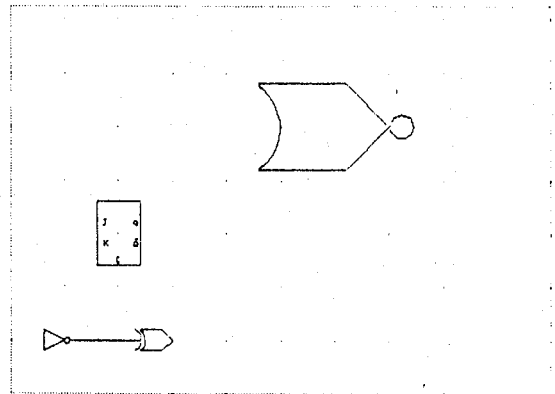
NEW SCALE

Examples.

The current drawing is not affected; only subsequent objects and labels change scale. Note that the grid density does not change.



(1) Digitize **NEW SCALE** and specify a factor of 2.



(2) Place the new object in the drawing. Note that only this object (and subsequent ones) is drawn in the new scale. The cumulative effects of scaling are the same as shown in the **SCALE DRAW** examples, but the grid doesn't change.

The **SCALE OBJECT** box applies a new scale only to a specified object in your drawing. After digitizing **SCALE OBJECT**, you must digitize the reference point of the object to be scaled. When the program finds the object, the object will blink (HP Series 200) or turn to a dotted line type (HP-86/87). If this is the correct object, digitize **YES**. If you do not want to change the scale after all, digitize **CANCL**. If this is not the correct object, digitize **NO**; the program will then search for another object. When you have selected the object to be scaled, select a new scale in the same manner as for the **SCALE DRAW** box. The object will then be redrawn. The new scale applies only to the specified object.

SCALE
OBJECT

After digitizing the **MOVE OBJECT** box, you must digitize the reference point of the object you wish to move. When the program finds the object, the object will blink (HP Series 200) or turn to a dotted line type (HP-86/87). If this is the correct object, digitize **YES**. If you do not want to move this object after all, digitize **CANCL**. If this is not the correct object, digitize **NO**; the program will then search for another object. When you have selected the object to be moved, digitize the point to which you want the object to be moved. The object will then be redrawn in the new location.

MOVE
OBJECT

Digitize the **ROTATE OBJECT** box if you want to change the orientation of an object. Then digitize the reference point of the object you wish to rotate. When the program finds the object, the object will blink (HP Series 200) or turn to a dotted line type (HP-86/87). If this is the correct object, digitize **YES**. If you do not want to rotate this object after all, digitize **CANCL**. If this is not the correct object, digitize **NO**; the program will then search for another object. When you have selected the object to be rotated, select the angle of rotation by digitizing a point on the **COMPASS WHEEL**. (For details on selecting the angle of rotation, refer to the **COMPASS WHEEL** description.)

ROTATE
OBJECT

The object will then be rotated the number of degrees specified, in a counterclockwise direction. The "pivot point" for objects is their reference point (marked on the menu by an X); for labels, it is the center-left side of the first character.

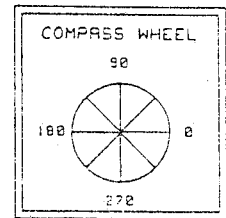
The Object Area

The objects in the menu area will vary from menu to menu. Each object is drawn separately with the **DRAW** program, and placed in an **EDITOR** menu with the **EDITORMENU** program. There may be up to 20 objects. Each object also has a reference point. To place an object in a drawing, first digitize the object box. Then digitize the point where you want to place the object. The object will be drawn so that the reference point is over the point you digitized. If you continue to digitize points, the same object will be placed over each point until you digitize **DRAW LINE**, **LABEL 9111**, or another object. To delete an object, use the **DEL OTHER** softkey.

NOTE: On the HP-86/87 computers, the first time you digitize an object, the CRT might not respond very quickly. This is because of the way the computer executes the program. Please have patience; the CRT will respond more quickly with subsequent objects.

The Compass Wheel

The compass wheel can be used to specify an angle of rotation in two situations: (1) If you want to rotate an object that has already been drawn, you can first select the object using the **ROTATE OBJECT** box (refer to the description of **ROTATE OBJECT**). Then select the new angle as described below. (2) If you want subsequent labels and objects to be rotated (global rotation), you can digitize the **COMPASS WHEEL** box and then select the new angle as described below.

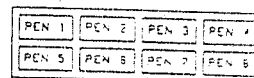


Rotation is counterclockwise, and can be specified in increments of 5 degrees between 0 and 360. Rotation is also additive. That is, each time you rotate the same object or select a new global rotation angle, you must select the additional degrees to be rotated. Thus, when you start a new drawing, the angle is 0 degrees. If you select a global rotation of 30 degrees, all subsequent labels and objects will be rotated 30 degrees (30 + 0). Then, if you want to change the global rotation and select an angle of 65 degrees, all subsequent labels and objects will be rotated 95 degrees (65 + 30). Similarly, if you digitize **ROTATE OBJECT** and then select an angle of 75 degrees for an object that had previously been rotated 5 degrees, the object will now be rotated 80 degrees (75 + 5).

- a. To select the angle of rotation on HP Series 200 computers:
After digitizing **ROTATE OBJECT** (1 above) or **COMPASS WHEEL** (2 above), the CRT will display the current angle of rotation. As you move the stylus around the compass wheel, the CRT will also display the new (additional) angle on the CRT. When you see the desired angle, digitize it by pressing down on the stylus.
- b. To select the angle of rotation on HP-86/87 computers:
After digitizing **ROTATE OBJECT** (1 above) or **COMPASS WHEEL** (2 above), digitize the approximate position on the wheel corresponding to your desired angle. A message on the CRT will then tell you the current angle of rotation, along with the new (additional) angle that you have just selected. Indicate whether this new angle is correct by pressing the appropriate keyboard function key (YES, NO, or CANCEL). If you press NO or CANCEL, start over by digitizing another new angle on the compass wheel.

The Color Area

Digitizing any of the pen boxes causes the subsequent portions of the drawing to be plotted with the specified pen number. This pen number will remain in effect until you digitize a different pen number. The default is pen 1. If you have an HP 7470 2-pen plotter, selecting pens 1, 3, 5, and 7 will result in pen 1 being used for the plot; selecting pens 2, 4, 6, and 8 will result in pen 2 being used.



The Line Type Area

Digitizing any of the line type boxes causes the subsequent portions of the drawing to be drawn with the specified line type. This line type will remain in effect until you digitize a different line type. The default is a solid line.



The Snap/Grid Area

The grid consists of lines of dots that are spaced equally across the CRT in both horizontal and vertical directions. Each box in the snap/grid menu area allows you to perform specific functions, as described below.

After digitizing the **SET GRID** box, you must specify the density of the grid as a number between 2 and 100. Use the keyboard to enter the number that represents the grid density that you want.



For example, if you choose a grid density of 40, the digitizing area on the CRT will be divided into 40 equal units in the horizontal direction. The vertical direction will also be divided into equal units, but there will be fewer than 40.

The default grid size is 20. You will not see the grid on the CRT if:

- the grid is off (refer to the **GRID OFF** box), or
- the grid is too dense to be shown on the CRT.

When you digitize the **SNAP ON** box, you set the snap mode. In this mode, each point that you digitize will automatically be placed over the nearest grid dot. This mode is useful if you want to line up labels, lines, or objects in your drawing. The default is for the snap mode to be off.

SNAP
ON

Digitizing the **SNAP OFF** box turns off the snap mode. Refer to the **SNAP ON** box.

SNAP
OFF

If you digitize the **GRID ON** box, the grid will be drawn on the CRT.

GRID
ON

Digitizing the **GRID OFF** box removes the grid from the CRT. If the snap mode is on, it still works even if the grid is not displayed on the CRT.

GRID
OFF

DISC FILE CATALOG*

Storage Disc Name _____

File Name	Program Used	If EDITOR Used, Name of Menu File
DIAGRAM DLATCH DESK CHAIR EXTENSION STENOCHAIR TABLE TERMINAL TYPEWRITER CABINET DOORCLEAR SHELVES SHELFCLEAR FILE DRAWERCLR OFFICE PAYROLL MPAYROLL DPAYROLL	DRAW EDITOR DRAW DRAW DRAW DRAW DRAW DRAW DRAW DRAW DRAW DRAW DRAW DRAW DRAW EDITORMENU DRAW MENUMAKER DRIVER	LOGIC

*The first page of this form is filled out with the files that you would have if you stored every example in this guide.

DISC FILE CATALOG

Storage Disc Name _____

File Name	Program Used	If EDITOR Used, Name of Menu File