GPS™

Graphics Processing System

Professional Version

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Revisions by Brigitta Hillis, 1982.

Illustrations by Rick Brister and HEDON EAGLE.

Special thanks to Louis Ewens for his help with all phases of the project.

FORWARD

Welcome to GPS* - STONEWARE'S PROFESSIONAL GRAPHICS PROCESSING SYSTEM. GPS is to graphics what WORDSTAR is to text and VISICALC is to numbers.

This is what GPS does:

- it lets you create graphics easier than with a pen and paper
- it edits graphics like you've only seen a word processor edit
- it gives you a choice of "drawing tools"

This is what you DON'T need:

- any programming skills whatsoever

Chapter One will get you started. READ IT CAREFULLY. If you are adventurous, turn to the QUICK REFERENCE CHART and the REFERENCE GUIDE and experiment your way through GPS. If you want structured help, Chapters Two through Nine describe in detail every option of the program, with step-by-step instructions. Currently there are over 50 separate options in GPS. The Appendix deals with the more complex capabilities of GPS.

All illustrations in this manual were created using GPS.

This is what you DO need:

MINIMUM
- 48K APPLE II PLUS
- ONE DISK DRIVE
- ONE MONITOR – COLOR OR B/W
- GAME PADDLES OR JOYSTICK
  or
- APPLE GRAPHICS TABLET
  or
- SYMTEC LIGHT PEN

OPTIONAL
- 16K RAM CARD OR LANGUAGE CARD
- SECOND DISK DRIVE
- HOUSTON INSTRUMENTS HIPLOT DMP 3, 4, 6, 7
- APPLE SILENTYPE OR OTHER GRAPHICS PRINTER

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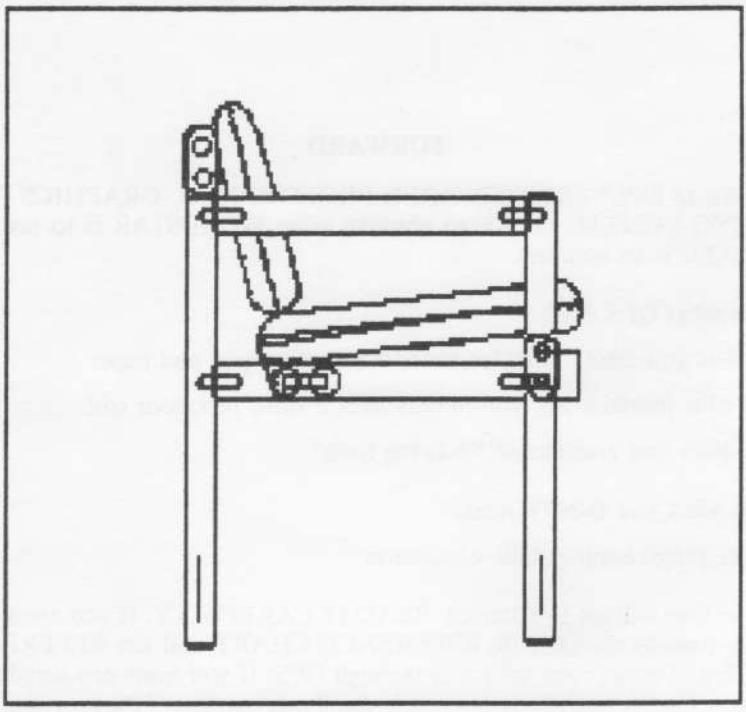

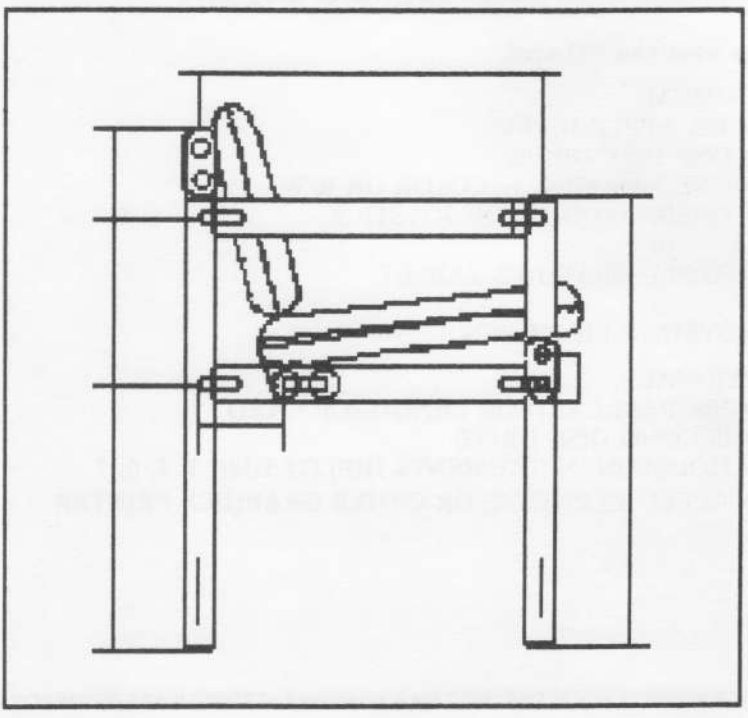

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Chapter One Getting Started

You need a 48K Apple II Plus (or an Apple II with a Language Card or a 16K RAM card), a disk drive, a monitor or television with adapter, and either game paddles or a joystick. The GPS program can use the extra memory provided by a 16K RAM card, if you have one.

1. If you have the Apple Graphics Tablet, place the interface card in any slot other than 0, 1 or 6 of your Apple.
2. If you have a Light Pen, place the interface card in slot 5 of your Apple.
3. If you have a Houston Instruments HIPLOT, place the Centronics parallel interface card as instructed in the HIPLOT manual.
4. If you use a printer, its card must be in slot #1 in the Apple.
5. Turn on the monitor and the printer.
6. Insert the GPS program disk into the disk drive and turn on the computer. If it is already on, type PR#6 and press "Return".

   The GPS program disk will boot properly on a 16 sector system (DOS 3.3). If you have a Language Card and Integer Basic, be sure to load Applesoft from your Systems Master disk before booting the GPS program. The GPS program saves drawings in a 16 sector format, so any disk you use to store drawings should be initialized for 16 sectors. BE SURE to initialize blank diskettes to store your drawings before you start drawing. If you do not understand initializing a blank disk, please reread Chapter 2 in your DOS Manual.

7. The GPS program will appear on your screen.
8. You must now tell the GPS program which "drawing tool" or plotter (if using the HIPLOT) you are using: type
   "T" for Graphics Tablet
   "G" for game paddles/joystick
   "L" for Light Pen
   "P" for HIPLOT
9. There will be a one minute wait, with whirring and clicking while the GPS program is loaded into the computer. Then the noise will stop and the red light will go off on your disk drive.
10. Instructions for using each of the "drawing tools" available for the GPS program follow.
11. Remove the GPS program disk from the disk drive and PUT IT AWAY. You cannot use this disk to store drawings nor can it be copied. To order a backup disk, please return the card provided for that purpose.

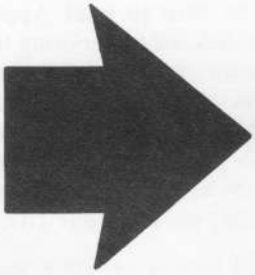
12. READ THE REST OF THIS CHAPTER.

Instructions throughout this manual are written for use with game paddles or joystick. When you read "press the button," you must translate that instruction to suit your "drawing tool." For instance, when using a Graphics Tablet, substitute "press the button" for "press down on the pen." Any differences in the actual use of the program are explained in the sections dealing with each "drawing tool." Therefore, read the section dealing with your "tool" AND "Using the Game Paddles or Joystick."

A WORD ABOUT THE MANUAL

This manual is designed for both reference and tutorial uses. The best way to use it is to read the opening paragraphs on each section while you are sitting in front of your computer and then follow the numbered instructions. These step by step instructions use every option in the GPS program. If you need to refresh your memory later, refer to the Quick Reference Chart in the back. If you need more help, use the Reference Guide which has a brief synopsis of every procedure. More detailed discussion of certain aspects of this program are in the Appendix. A Glossary also has been included for your convenience.

We have made every effort to ensure that the GPS program is easy to use and the manual simple to follow. Whenever it has seemed possible that someone might have a problem, the following symbol alerting you to this possibility has been included. In most all instances, reading the paragraph(s) before attempting the instruction will help you avoid error.



The instructions for the GPS program are sequential. Procedures explained at the end assume you are familiar with the procedures explained at the beginning. It is not necessary to read the entire manual before beginning to use the GPS program—in fact, it was designed so you could begin using it immediately. But we strongly suggest you read an instruction all the way through before attempting the procedure.

If despite all precautions, you find yourself "hung up" and you don't know what to do, it is always possible (and no disgrace) to simply turn the computer off and start again from the beginning. Any drawing that was in the computer's memory will be lost at this point, so we recommend you experiment on our examples rather than on an important project of your own.

Most important of all, have fun. The GPS program will allow you to edit your graphics as easily as you do your text.

USING THE GAME PADDLES OR JOYSTICK

The large knobs on your game paddles or the control stick part of your joystick is your basic drawing instrument to create and modify images. You will use it in much the same way you would use an ordinary pen.

1. Be sure you can see your cursor on the screen.

It is possible to be on the active portion of the screen and still not have the cursor be visible if your cursor is along the outer edges of the active portion. The reason for this will be explained later.

If the cursor is not visible, move the knob(s) until it appears. When using the game paddles, this can take some practice, for example, when trying to make curved lines. This requires learning how to coordinate the two paddle controls. It can be done, as anyone who remembers the old Etch-A-Sketch game from his childhood can attest. If the cursor still does not appear, you are either experiencing problems with the paddles or with their connections to the computer. Turn the computer off and check to make sure the pins are all in place. If all else fails, take it to a service center.

2. DO NOT PRESS THE BUTTON DOWN YET.

Do not press down on the button yet as this will cause the first list of options in the program to be displayed on the bottom of your screen. If you press down again, the next list of options will appear. It is possible in this way to quickly end up in the middle of some option without knowing how you got there. This will not harm the GPS program although it can cause confusion for its user.

If you accidentally press down on the button and a list of options appear, don't worry. Put the paddles down, finish reading this section, and go on to MANIPULATING MENUS.

If there is no list of options displayed, but you are now drawing lines, or dots, or something equally bizarre is going on, move your cursor until it is just off the visible portion of the screen and press down again. This should cause a list of options to appear at the bottom of the screen. If it doesn't, skip ahead to "Indicating You Are Done," correct the error, and return to the beginning of that section.

3. Practice now using the paddles to move your cursor around the screen. Notice that you can only move the cursor off the screen in two directions, to the right and to the bottom and that the cursor will disappear completely when on the menu portion of the screen.

4. You can also type one of the keys on the keyboard. NEVER PRESS RESET. Typing one key when no menus are displayed causes the word "Graphics" and "Stop" to be displayed. Typing a "G" after this display will return you to the GPS program. Typing "S" causes you to stop the GPS program and enter Basic. To run the GPS program again you must follow the original procedure under GETTING STARTED.

5. You will also see the word BACKGROUND on the screen. This feature is discussed in detail in the Appendix.

   You are now ready to start moving around inside the GPS program, using the menus.

USING THE GRAPHICS TABLET

Before you begin, read Chapter 1 of the **Graphics Tablet Operation and Reference Manual** which describes how to install the interface card and align the menu overlay. The GPS program makes no use of the overlay, however, the overlay grid will be useful for reference points. Using the GPS program does not require any other information from that manual.

The Graphics Tablet interface card uses a C800 ROM chip. Other cards which also use a C800 ROM, such as a serial card, may confuse the Apple and prevent the Tablet from working properly. If you have such a card, you may need to remove it temporarily, while using the GPS program.

1. Make sure the pen is within the active surface of the tablet (that part enclosed by the black border—see your Tablet manual if there are any problems).

2. Hold the pen so that the tip is just resting on the Tablet's surface. As you move the pen back and forth across the Tablet's surface you will see a "crosshairs" cursor moving across the screen.

If the cursor is not visible, move your pen more to the center of the tablet and the cursor will now appear. If it does not, you are either experiencing problems with the pen or Tablet itself, or with their connections to the computer. Turn the computer off and check to make sure the card is in place. Check the manual for the Graphics Tablet. If all else fails, take it to a service center.

Be careful not to move the cursor off the active portion of the screen. If you do, then the "Indicating You Are Done" procedure will not be registered by the GPS program. The easiest way to prevent this is to only move the cursor until it is just off the screen, and then press down.

3. Pick the pen up so that its tip is no longer just above the Tablet's surface, and the cursor (crosshairs on the screen) will be stationary where the pen was last in contact with the Tablet. Further movement of the pen will not affect the position of the cursor until the pen's tip is once more just above the Tablet's surface.
4. The cursor will become a dot of light when it is inside a menu at the bottom of your screen.
5. Press down on the pen until you hear a "beep" instead of pressing the button on the game paddles or joystick.

USING THE SYMTEC LIGHT PEN

Using the Symtec Light Pen is similar to using the pen attached to the Graphics Tablet except that the Light Pen is pointed directly at the screen instead of on the Tablet. Also, you either press the button on the pen itself or type "P" on the keyboard.

The resolution of the Light Pen is not as fine as that of a Graphics Tablet. However, where accuracy is not crucial, it should suffice.

1. Place the interface card in slot 5 of your Apple.
2. Set the brightness to "high" on your screen (monitor or t.v.).
3. To eliminate some of the wobble of the pen, keep it as close as you can to the glass screen.
4. When moving the pen, allow it to "settle" before pressing the button. This is particularly important when drawing lines.
5. Press the button on the pen when you want continuous input, are drawing freehand, moving objects, changing size, rotating and duplicating.
6. Type "P" when you want exact input, when drawing lines, indicating you are done, and choosing colors or objects.
7. Pushing the button on the pen can sometimes cause erroneous input. If this happens, type "P" instead.

USING THE HOUSTON INSTRUMENTS HIPLOT

Pictures developed with the GPS program using any of the "drawing tools" can be plotted on the Houston Instruments intelligent series DMP - 3,4,6,7, which is interfaced to the Apple with a Centronics parallel interface card. All objects are drawn as line drawings. No color fill is possible. Also, all objects must fit on the screen when viewed on the display. No objects can be positioned or enlarged so that they are partially or completely off the screen. If an object is off the screen, the plotter program will not function properly.

To plot, type "P" after the copyright notice is displayed and as discussed under GETTING STARTED. You will be asked in what slot in your Apple the parallel interface is connected. Next, name the picture you wish to have plotted. The picture must be saved in GPS format as a PICTURE (see CHAPTER 7). If the plotter does not plot after your picture is loaded from disk, press the reset key on the plotter (NOT the computer).

MANIPULATING MENUS

Before you can use any option, you must learn how to tell the GPS program exactly what it is you wish to do. In computer terminology, a list of options is known as a menu. The GPS program has a Main Menu, eight submenus, with a total of over 50 options. Think of it as a road map with many side streets. To get to a particular place (use an option), you will travel over certain designated roads (through the menus). Choosing an option is quite simple because the GPS program groups them by function then guides you by presenting only a few at a time.

In the following instructions, you will learn how to manipulate the menus to get the option you want. You will also learn how to start working in that option, how to indicate when you are done, and how to switch to a new option. If you have not already done so, turn now to the end of Chapter 10, and look at the Quick Reference Chart. This is our "map" of the GPS program.

Choosing a Menu

Choosing a menu is simple. The meaning of each menu will be explained in detail in the following chapters. Here is how you pick the one you want:

1. Move the cursor so that it just disappears at the bottom of the screen.
2. Press the button.
3. You will see a list of options appear at the bottom of the screen. From now on, this will be referred to as the Main Menu.

DRAW	ERASE	MODIFY
DUPLICATE	DISPLAY	GROUP
INFORMATION		CANCEL

When the cursor disappears completely, and you don't know where you are, you must position it on the screen above the option (or column where the desired option exists) and move the cursor straight down until the desired option lights up. Since completely horizontal and vertical movements of the cursor are easy to control, this method will allow you to pick an option even when you can't see the cursor. Similarly, if you have just chosen an option, you can move the cursor directly to the right or left to choose a different option without much trouble.

3. The dot of light will then disappear.
4. The word DRAW appears in inverse (black letters on white background). The option that first appears in inverse is called the default option.
5. Move the cursor over the word ERASE in the menu.
6. You will hear a click as the cursor moves over the word and you will see ERASE in inverse. You have "chosen" the ERASE menu.
7. Practice moving the cursor back and forth in the main menu until you get the option you want to light up. Notice that only one option at a time will light up. This will be the option that is activated next.

Activating an Option

You will be able to use an option when it is first lit up, and then activated. To do this, you must press the button. In the future we will refer to this two-step procedure (choosing and activating a menu or option), by asking you to "pick a menu".

1. Move the cursor so that it is over the option DRAW. Make sure that DRAW has been chosen and is now lit up.
2. Press down on the button.

It is fairly easy to press down either too hard, or several times in succession when using the button on the joystick or game paddles. Therefore it is worth your while to spend a few minutes practicing pressing down on the button until you can consistently perform one, and only one, operation each time you press down. Each time you press down correctly, you are choosing an option. Just follow the instructions in MANIPULATING MENUS to get back to a blank screen.

3. The Main Menu disappears from the screen.
4. A new menu is displayed called the DRAW menu. The word DRAW appears on the far left and is underlined. Every menu, except for the Main Menu, is identified in this way.

DRAW	FREEHAND	LINE	ERASE
	COLOR	CANCEL	END

5. The FREEHAND option is lit up. This is the default option. If you press down on the button at this point, the screen will clear and you will have activated this option. To choose a different option, simply move your cursor over the one you want, as you did in the Main Menu, but do not press down on the button at this time.

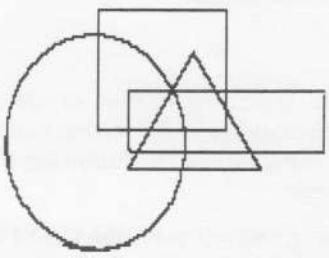
It is easy to press down on the button a second time, after a new menu has appeared (in our example, the DRAW menu), and thereby activate the default option. Look at your screen to be sure the option you want is the one lit up.

Cancelling an Option

If you change your mind, or inadvertently pick the wrong menu, the CANCEL option offers you a way out. Every menu has a CANCEL option. They all work the same way and will not be discussed further (except for the CANCEL option of the DRAW menu which is discussed in Chapter two).

When you pick this option, all menus and options will be cancelled and the picture you are working on will be redisplayed on the screen. If you wish to make another choice, you need only press down on the button to display the Main Menu.

1. You are now in the DRAW menu.
2. Choose the CANCEL option (by moving your cursor over it so it is lit up).
3. Activate the CANCEL option (by pressing down on the button).



4. The DRAW menu has now disappeared and your picture is displayed on the screen. Because you have not drawn anything yet, you have no picture and the screen is blank.
5. Press the button again.
6. The Main Menu has reappeared.
7. Practice picking other menus and then cancelling them to return to your picture (blank screen).

Indicating You Are Done

When you are finished with an option (such as a drawing), you must indicate to the GPS program that you are done before you can choose a different option. The procedure for doing this is described below. This procedure is used in all operations and should be fully understood before moving on. In the future, we will refer to this procedure by asking you to "indicate you are done".

1. Pick (choose and activate) the DRAW menu.
2. Pick the FREEHAND option of the DRAW menu.
3. The menu has now disappeared and the screen is blank. You are now "in" the FREEHAND option.
4. Move the cursor so it is visible on the screen and press down on the button at the same time. A white line will appear on the screen which traces your "pen's" motion across the "page" surface exactly. You are now doing freehand drawing.
5. Move the cursor so it is just off the visible portion of the screen, and then press the button.
6. Your drawing is still visible on the screen, but now the DRAW menu has been displayed as well. At this point, you could pick another option if you wanted.
7. With your drawing on the screen, practice moving between the menus, activating an option, cancelling an option, and indicating you are done, until you feel you have control.

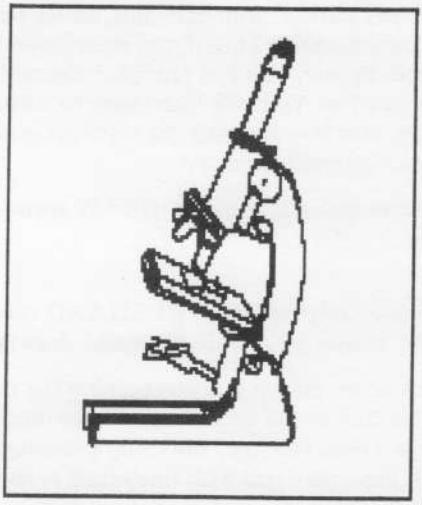
If ever some unknown option or strange menu is displayed at the bottom of the screen, you can now solve the problem using one of the following procedures (or a combination):

a) Pick (choose and activate) the CANCEL option to display your picture (or a blank screen, if you haven't drawn anything). Press the button again and the Main Menu is displayed.

b) Indicate you are done. (Move the cursor so it is just off the screen and press the button). If no menu is displayed, move the cursor so it is on the screen and press down again. This will usually cause a menu to be displayed. If it is not the Main Menu go back and follow direction a) above.

c) If neither procedures a) nor b) succeeds in getting you back to the Main Menu, turn the computer off and start over again. This will erase whatever drawings or modifications you were working on, so try your other choices before using this one.

d) Occasionally if you repeatedly press down on the button and the GPS program does not have a chance to keep up with you, the system will "hang up". You will recognize this because you will not get a response when you press down on the button. The only way out is to turn the computer off and start again.



You now know how to use your drawing tool and manipulate the menus. The rest of this manual will deal with each menu and each option separately. Read every chapter to be sure you understand what is available to you. Experiment as you go.

Chapter Two The Draw Menu

Now comes the fun. You are ready to start using the program to create and modify images in an almost unlimited manner.

The DRAW menu allows you to do freehand drawings. You can automatically create straight lines between any two points of your choosing, or switch from one option to another so both functions can be combined in one drawing. You may erase any part of your drawing, either temporarily while you take a look at it, or permanently. Thus if you erase something and then decide that you liked it better before, you can redisplay the entire drawing as it was before you erased any of it. You will learn how to change the colors of the lines you are drawing, and how to order the GPS program to save something you have drawn in its internal memory.

To begin, pick (choose and activate) the DRAW menu.

FREEHAND

We have already seen briefly how the FREEHAND option works. This option, quite naturally, allows you to do freehand drawings.

As long as you press down on the button (keeping the cursor on the screen), any movement of the cursor will cause a corresponding line to be displayed on the screen. To end a line, you need only stop pressing down. You can then reposition the cursor anywhere you wish (including at the endpoint of the line you just stopped drawing) and begin drawing again.

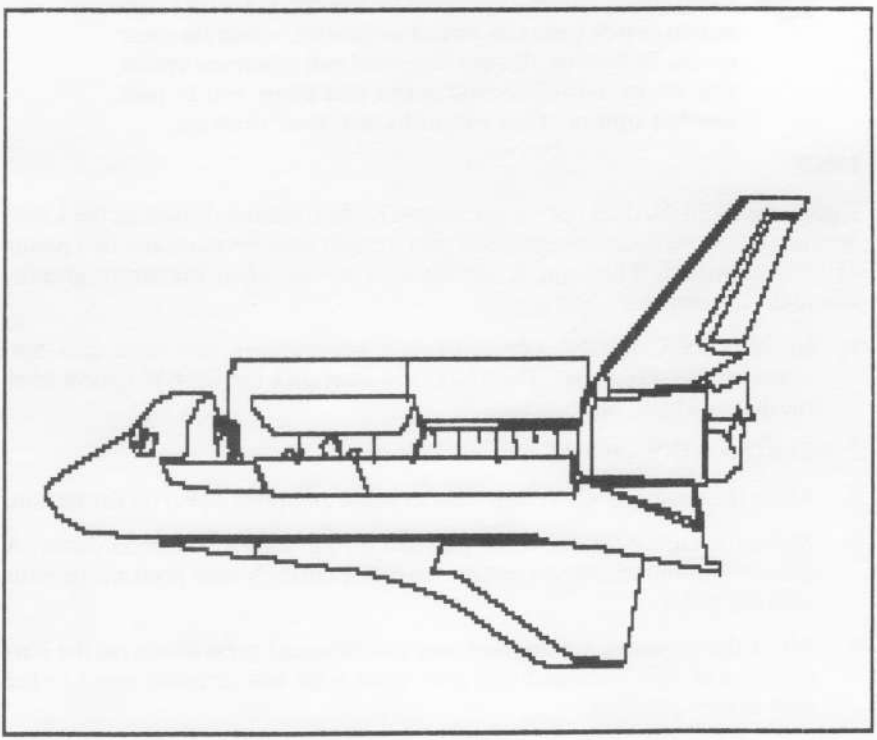
Your drawing is saved in the computer's internal memory until you tell the computer to no longer store it. However, it has not yet been saved to disk (Ch.7,DUPLICATE). This means you can even stop drawing, pick another option within the FREEHAND menu, (except for CANCEL as will be explained shortly), and your drawing will still be available. The value of this will become evident as you proceed.

1. Pick the FREEHAND option of the DRAW menu. This is the default option so you need only press down on the button again.
2. Then without pressing down, move the cursor to where you wish to begin drawing.
3. Press down and draw.
4. To begin drawing in a new area of the screen (with no connecting line), stop pressing down, reposition the cursor, press down, and begin drawing again.

The amount of drawing you can do at one time is determined by the amount of memory the computer has available. The INFORMATION menu, (Ch.8), allows you to find out how much memory the computer has left, or how much a particular object has used. A computer with 48K of memory allows you to draw up to 2000 lines. A freehand drawing, even a freehand line, is actually made up of many small lines. Therefore, it is possible to run out of memory if your drawing is very detailed or you decide to color it in FREEHAND (a capability explained later).

The slower you draw, the more memory you use. If you draw very, very slowly, even a simple object can exhaust your memory. If this happens, a message appears on the screen. You have several choices at this point: erase part of the drawing, create a layered drawing, or erase it all and start over. For now, pick the CANCEL option (explained next), and erase the whole screen.

5. Practice drawing freehand for awhile. When you have done enough, or used up your memory, proceed to the next section.



CANCEL

The CANCEL option tells the GPS program you want to "cancel" the last option you chose and redisplay your picture. After the picture is redisplayed, pressing the button again with the cursor visible will cause the drawing to disappear and the Main Menu to be displayed once more. In all the other menus it is possible to get back to the Main Menu without picking the CANCEL option. However, in the DRAW menu, you must choose either the CANCEL or the END option to return to the Main Menu.

The CANCEL option in the DRAW menu has one other function as well. It acts as an eraser. When you choose the CANCEL option after a drawing, it will be erased permanently. If you have already run out of memory and used the CANCEL option to erase your drawings, you have some familiarity with this function.

1. Your monitor is now displaying whatever you have drawn on it.
2. Pick (choose and activate) the CANCEL option.
3. What you have drawn on the screen is erased. If you press down once more on the button, the main menu will appear.

Remember, you do not have to use the CANCEL option to switch from one option to another within the same menu. Indicating you are done will end whatever option you are in, redisplay your menu and allow you to pick another option. This will not erase your drawing.

LINE

Just as the FREEHAND option allows you to do freehand drawings, the LINE option allows you to automatically create straight lines between any two points of your choosing. This option can be very useful when preparing graphs, schematics, blueprints, etc.

1. In using the CANCEL option to clear your screen, you have also cancelled the DRAW menu. Therefore, you must pick the DRAW option from the Main Menu again.
2. Pick the LINE option.
3. Move the cursor to where you wish to begin and press down on the button.
4. Move the cursor to any other position on the screen and press down. A line will automatically be drawn from the cursor's new position to your starting point.
5. Move the cursor to yet another new position and press down on the button. A new line is created that goes from your last stopping point to the new cursor position.
6. Each time you press down on the button and cause a line to form, you also create a new starting point for the next line.

This makes it very easy to make geometric objects such as triangles, rectangles, etc. Unconnected lines or objects like asterisks or tic tac toe boards can also be easily made.

8. To create unconnected lines, simply make a line and then indicate you are done. Now pick the LINE option again and make another line. In this way you can easily make whatever sort of design you wish.

9. Practice combining freehand and line drawings. To do this, just pick one of the options and do some drawing.

10. Indicate you are done. Pick the other option and do some drawing. As long as you do not pick the CANCEL option, your drawing will not be erased when you change options.

You will notice that while any completely vertical or horizontal line will appear as one continuous straight line, any diagonal line will appear as a series of very small lines in step form. This will produce a somewhat ragged or fuzzy looking line. This is discussed further in Chapter Five under DISPLAY/ZOOM.

ERASE

You now know how to use the CANCEL option to completely erase what you have drawn. The ERASE option permits you to selectively erase part of what you have drawn and then redraw it, leaving the rest of your picture unchanged. This is very useful when you wish to remove a few lines in a line drawing, or alter only a portion of a freehand drawing.

Erasing Line Drawings

You can erase any line (or number of lines) you have drawn, using the ERASE option. Just as the GPS program drew lines between your two reference points, it will now erase lines between those same points. However, you cannot erase part of a line.

1. You should now have a series of line and freehand drawings displayed on your monitor. Erase them by using the CANCEL option and then pick the LINE option of the DRAW menu to create some line drawings.

In the future, instead of resorting to lengthy directions such as "pick the LINE option of the DRAW menu", this procedure will be referred to as "pick the DRAW/LINE option". In such an instruction the first item mentioned will always be found within the Main Menu. Subsequent items will be the options you must pick and in the order that you must pick them.

2. After creating a few line drawings, indicate you are done.

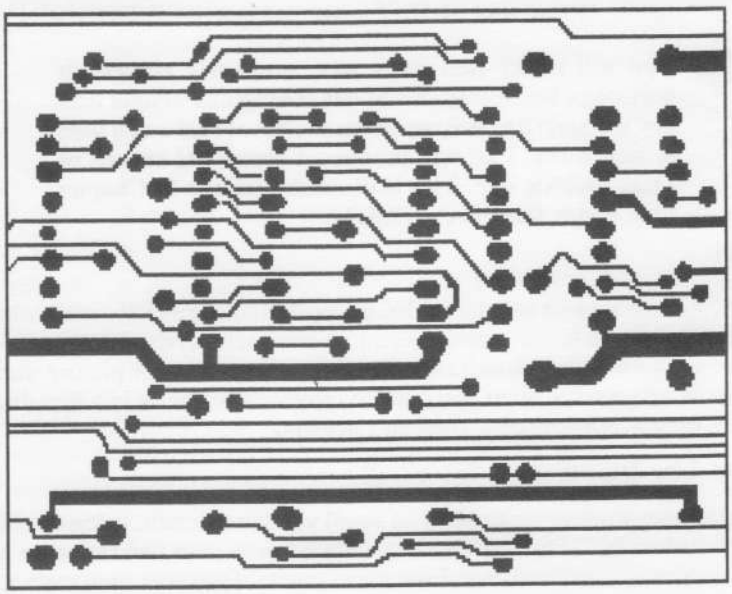
3. Pick the ERASE option.

4. Move the cursor so that it is over the spot where two lines join in one of the line drawings.

5. Press down. If you have found the endpoint, you will hear a beep. If you are not quite on the endpoint, and there is no beep, keep the button pressed down and move the cursor back and forth (as if you were actually erasing) in the area of the assumed endpoint, until you do hear the beep.

6. Move the cursor to the other endpoint and press down.
7. When you have identified the second endpoint, you will hear another beep and the line(s) drawn between those two endpoints will be erased.

Once you have erased part of a drawing, you have the additional option of changing your mind and restoring the erased section, or making the erasure permanent.



Restoring A Line Drawing

1. After erasing a line, let go of the button and then press again.
2. Your drawing will be redisplayed in its complete form. You now can leave the drawing as it is, or erase part of it again.
3. Use this option to practice erasing lines.

Making Your Erasure Permanent

1. Use the DRAW/LINE option to make a triangle.
2. Indicate you are done.
3. Pick the DRAW/ERASE option and erase one leg of the triangle (as explained above).
4. This time, however, indicate you are done.
5. The triangle will be displayed on the screen with one leg missing. It is permanent and cannot be restored.
6. Find two new endpoints and erase another leg and then indicate you are done. In this manner erase the entire triangle.

You may find after erasing that some of the endpoints do not disappear from the screen. They will disappear after you have left the DRAW menu.

Erasing Freehand Drawings

A freehand drawing, even of a line, is composed of many small lines. Thus there are many endpoints from which to choose. This means that you can put the cursor along almost any point in the drawing and have a good chance of finding an endpoint. This enables you to erase any portion of your drawing.

1. Pick the DRAW/CANCEL option to erase the screen.
2. Use the DRAW/FREEHAND option to create a freehand drawing.
3. Indicate you are done.
4. Pick the DRAW/ERASE option and move the cursor to some point on your drawing from which you would like to begin erasing and press down.
5. If you have found an endpoint, you will hear a beep. Remember to keep the button depressed while you move the cursor slightly back and forth, as if erasing something.
6. Once you hear the beep, you have the first endpoint. Now move your cursor to a different point on the drawing and press down again.
7. If you have found an endpoint, your drawing between those two points will be erased.
8. Practice erasing and restoring, then erasing and making it permanent, until you have control.

The computer erases drawings in the order in which they were drawn. If your initial reference point is at a place in the drawing created after the point you chose as your final endpoint, the drawing may be erased in a way you didn't expect. Since this can be tricky, especially with complex drawings, a little practice may be necessary to master this procedure.

COLOR

The COLOR option allows you to change the color of your lines. If you have a black and white monitor, this option has limited value. Even with a color monitor, there are some limitations when making different colored lines. A more effective option is to color in areas, or to change the color of the background—both are explained under the COLOR option of the MODIFY menu (Ch.6).

However, this option is useful when you wish to color in only part of an area, create highlights in a drawing, or make a graph or chart using different colors.

1. Pick the DRAW/COLOR option.

2. Two rows of four boxes will appear on your screen. Whether you have a color set or black and white, some of the boxes will appear to be the same color. The reason for this is explained in the Appendix (More on Colors).

3. Move the cursor until it is inside the box of the color you wish to use.

4. Press the button. The color you have chosen will now appear in a box at the bottom of the screen.

5. Indicate you are done. You have now chosen a new color with which to draw. Anything you draw, whether in FREEHAND or LINE, will be drawn in that new color.

6. Try drawing in FREEHAND in color. When you are finished, indicate you are done.

7. Now pick the LINE option and do some line drawings. You will notice that these drawings continue in whatever color you chose for your freehand drawing.

Changing Colors

You can change colors, or create new colors. To change a color, repeat the above procedure but move your cursor into a different box and choose that color.

Although you can change colors, it is not possible at this point to do a drawing in more than one color at a time. If you have a drawing in red and then switch to green, when your drawing is redisplayed the half you have already done will also be in green. However, in the END option you will learn how to make multi-colored drawings.

8. Indicate you are done, choose the COLOR option and proceed as above, but this time choose a different color.

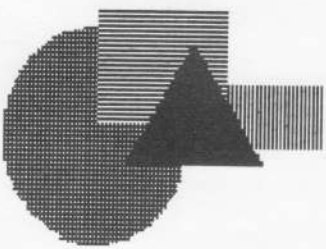
Because the eye cannot see black lines on a black screen, if you draw in black you will not be able to see the image. However, if you save the drawing and then change the line or background color, you will see that the drawing is definitely there. (Both of these procedures are explained under the COLOR option of the MODIFY menu).

Mixing Colors

In addition to the colors you see in the boxes, you can create new colors by mixing any two boxes together. However, you cannot mix more than two colors. If you try, the box will appear at the bottom of the screen solidly filled with your third color choice was. You can now add a color to this if you wish, however.

No color is chosen until you indicate you are done. So you can experiment picking or mixing new colors until you have the color you want. Then indicate you are done and begin drawing with it.

1. Pick the DRAW/COLOR option and move the cursor so that it is inside one of the colored boxes and press down.
2. A box with that color inside it will appear on the bottom of the screen. Move the cursor so that it is inside a different colored box and press down.
3. The box at the bottom of the screen is now a combination of those two colors. You have, in effect, created a new color.
4. You can repeat steps 1-3 indefinitely.
5. When you are satisfied with your chosen color, indicate you are done. Anything you draw from now on will be in this color, until you choose another.
6. You can also draw an object and color it in using the DRAW/COLOR/FREEHAND option, but there is a good chance this procedure will exhaust the computer's memory. If this happens, simply pick the CANCEL option and your drawing is erased or use the DRAW/ERASE option to erase some lines.



END

The END option is simple to perform yet it enables you to do several things. It orders the GPS program to classify what has been drawn since entering the DRAW menu as an object. It then saves this object in its internal memory. The implications and practical results of this option are far reaching. You can now save your drawing and use options from other menus to change it. Basically, the END option makes the rest of the program possible.

1. Use the CANCEL option to clear the screen.
2. Pick one of the DRAW options, either FREEHAND or LINE, and draw something.

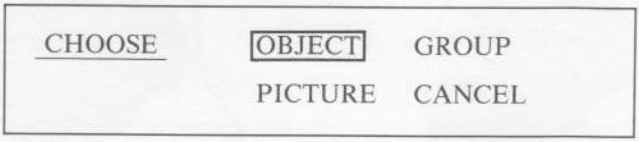
3. Indicate you are done.
4. Pick the END option.
5. Your drawing is now saved as an object in the computer's memory.
6. Press down on the button and pick the CANCEL option of the DRAW menu. Your "object" remains on the screen.
7. Pick the COLOR option to choose a different color.
8. Use the FREEHAND or LINE option to create a new drawing.

You will notice that your old drawing will not change color. An object (a drawing which has been identified as an object through use of the END option) can only be one color. But each time you draw a new object, you can make it a new color. The next section of the manual goes into the concept of objects, groups and pictures in detail.

Chapter Three The Choose Menu

The CHOOSE menu will appear automatically when you use most other menus (see Quick Reference Chart), although it is not listed as an option in the Main Menu. Properly identifying the drawing you wish to work with is one of the basic procedures of the GPS program, and you will use it time and again.

The CHOOSE menu gives you four options:



CANCEL

You are already familiar with the CANCEL option. It "cancels" your choice and causes the picture to be redisplayed. Pressing the button now causes the Main Menu to appear.

PICTURE

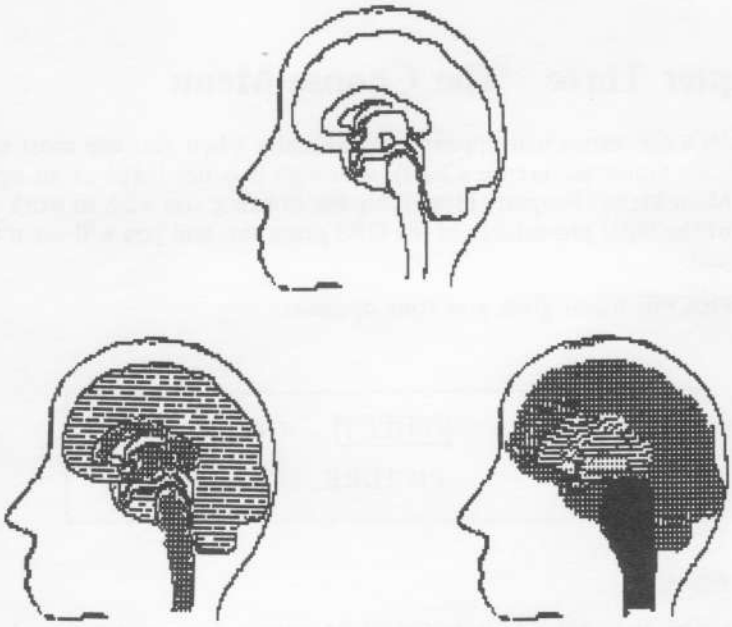
The differences between the three remaining categories are straightforward. To the GPS program, a "picture" is the sum total of all the objects you have drawn so far. So a picture can be anything from a single dot to a series of lines to a complete reproduction of the Mona Lisa. Or if you have drawn all of these, then your picture consists of a single dot, AND a series of lines, AND a complete reproduction of the Mona Lisa.

Any time you use ERASE/PICTURE, you will be erasing all of the objects in the computer's internal memory. At this point, the picture will almost always be identical with what is displayed on your monitor, but this is not always so as you will see shortly.

OBJECT

An object is anything which has been identified as an object by using the END option. It is the basic building block of the GPS program.

An object can be as simple as a single dot, or as complex as an exact likeness of someone in your family. In fact, you can use the FREEHAND option to draw portraits of every member in your family, and if you wait until they are all done before you use the END option, they will all be classified as one object. On the other hand, if you were to use the END option after each portrait was completed, your picture would consist of as many objects as you had portraits. Thus an object may be identical to a picture, or a picture may be made up of many objects.



1. Clear your screen (ERASE/PICTURE).
2. Use the DRAW/FREEHAND option to draw a circle, a rectangle, and a triangle.
3. Pick the DRAW/END option.
4. Press down on the button to return to the Main Menu.
5. Pick ERASE.
6. The CHOOSE menu is now displayed. If you were to pick PICTURE now, all three objects would be erased. Thus they constitute the "picture".
7. Pick OBJECT instead.
8. All three objects will flash (if your cursor is visible on the screen). This is the computer's way of asking you, "Is this the object you wish to erase?" It is clear that the computer considers all three geometric shapes as one "object". In this instance, the object and picture are the same.

If the "object" is not flashing, check to be sure the cursor is visible. If it is and the object if still not flashing, place the cursor inside one of the solids and press down on the button.

9. You may answer "yes" or "no". To answer yes, move the cursor so that it is visible on the screen and press down. (You will learn how to say "no" later.)
10. All three shapes will disappear from the screen. The "object" has been erased.
11. Draw the circle again and pick the END option. Then draw the triangle and rectangle, and pick the END option a second time.
12. You now have a picture with two objects: one is a circle, and the other is a rectangle and triangle.
13. Pick the ERASE/OBJECT option.

Because the CHOOSE menu is displayed automatically and you do not have to pick it, it is not listed in the above instruction. Only those options which you must pick will be listed. In this case the CHOOSE menu is understood.

14. Both the rectangle and the triangle will flash, showing that the GPS program considers them one object. The rectangle/triangle flashes instead of the circle because the GPS program always flashes either the last object created, or the last object acted on.
15. If nothing is flashing and your cursor is visible, simply move the cursor so that it is inside either the rectangle or the triangle and press down. They will now flash.
16. Say "yes" and both will disappear. The object (triangle/rectangle) has been erased.
17. Pick ERASE/PICTURE.
18. The circle has now been erased and will disappear. Because the circle was both an object and constituted the entire picture, you can choose either the PICTURE or the OBJECT option to erase it.

The PICTURE option of the CHOOSE menu one time allowed you to erase many objects at once, and another time erased a single object. A "picture" is the total of all the objects drawn.

An object, on the other hand, is a drawing designated as an object through use of the END option. It can be a single element like a circle, or can be composed of many elements like the family portraits.

Any portion of a drawing you may wish to modify later should be drawn as an object. Remember that an object can only be in one color. So any portion of your drawing which you want to color in separately should also be drawn as an object.

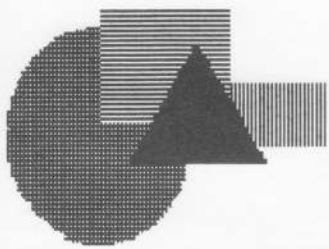
7. Neither object will flash and you will return to the Main Menu. You have two chances to say no before returning to the Main Menu, except when your picture consists of superimposed objects or groups.
8. In this way you can pick any object or group you wish.
9. The CHOOSE function will be discussed further in MODIFY/ROTATION and DISPLAY/ZOOM.

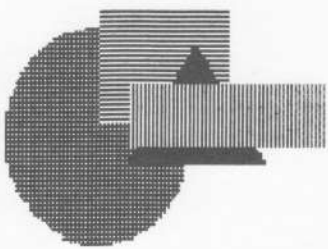
CHOOSING A SUPERIMPOSED OBJECT OR GROUP

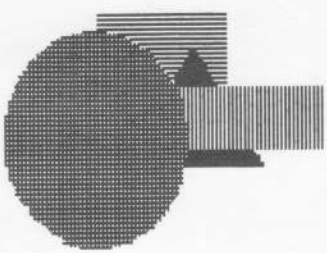
Choosing a superimposed object (or group) is similar to choosing between two objects. In practice, it can be tricky, especially if there are several objects lying on top of each other.

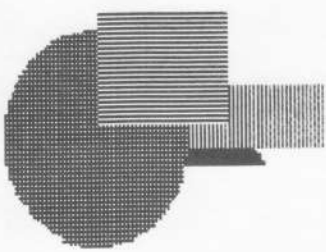
In the previous section you saw that if you say no twice in a row, the GPS program returns you to the Main Menu. In the case of overlapping or superimposed objects, you may say "no" many times in a row. In the following examples, only objects are used, but the procedure works when choosing a superimposed group as well.

1. Use ERASE/PICTURE to clear the screen.
2. Use DRAW/FREEHAND/END to create four distinct shapes, each one on top of the last. Remember to use the END option after each drawing or you will only create an object with four elements in it.









3. Use ERASE/OBJECT and the last object you drew will flash.
4. Say no.
5. Move the cursor inside all four objects and press the button.
6. The first object you drew will flash. Say no again.
7. The second object will flash. Say no.
8. Continue to repeat this sequence until the last object is flashing. Say yes.
9. You now have three objects on the screen. Erase each object in order until the screen is blank.

If you make a mistake and say no to the last object as well, you will be returned to the Main Menu. Start over again.

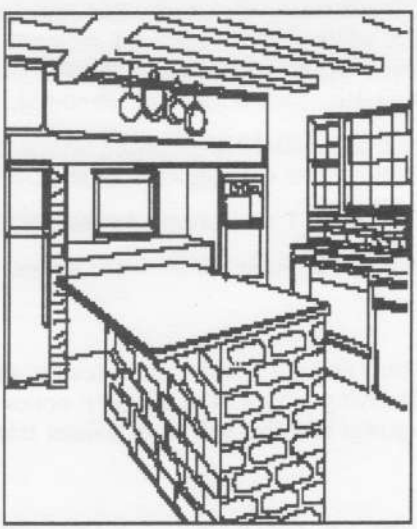
If the objects are not completely overlapping, it might be possible to move the cursor inside three of the objects but not the fourth. In this case the fourth object will never flash unless you move the cursor inside of it the first time you indicate what object you wish to choose.

Chapter Four The Erase Menu

You have learned to use the ERASE option in the DRAW menu to erase all or part of your drawing. You also know how to use DRAW/CANCEL to erase. When you pick ERASE from the Main Menu, you are given the CHOOSE menu which functions exactly as it did in the last chapter. When you use the ERASE option from the Main Menu, you permanently erase your drawing from the computer's memory.

ERASE	OBJECT	GROUP
	PICTURE	CANCEL

1. Use the ERASE/PICTURE option to clear your screen.
2. Pick the DRAW/FREEHAND/END (or DRAW/LINE/END) option to create some drawings.
3. Pick ERASE from the Main Menu.
4. The CHOOSE menu will appear. Pick OBJECT.
5. The last object you drew will flash. If you say yes, it will be erased. If you say no, you must move the cursor inside the object you wish to erase. It will now flash, and when you say yes it will be erased.



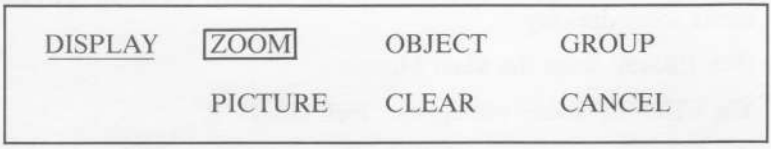
Chapter Five The Display Menu

The DISPLAY option of the Main Menu is used to display images on the screen. You may use it to selectively display an object, group or the entire picture.

This ability to select elements in a picture is very useful. For example, if you want to change one object by adding or erasing existing lines, you might find the surrounding objects in the picture distracting. Using DISPLAY/OBJECT, you can display only the object you wish to work on, modify it, and then redisplay the whole picture.

This option allows you to erase what is on the screen without erasing anything from the computer's internal memory. With it you can also "zoom" in on a portion of your drawing and magnify it four or sixteen times. All of these capabilities will now be discussed in the individual options of the menu.

But first you must pick the DISPLAY option of the Main Menu. The DISPLAY menu will now appear on the screen.



OBJECT

DISPLAY/OBJECT will selectively display the object of your choice. Other objects in the picture will be saved in internal memory. Thus if your picture consists of two objects, DISPLAY/OBJECT displays one of them. When you use DISPLAY/PICTURE, both objects are displayed.

1. Use DRAW/FREEHAND/END to create several objects. Remember to use the END option after drawing each object.
2. Pick DISPLAY/OBJECT and say yes to the flashing object.
3. The object you chose appears alone on the screen.

GROUP

This functions like the OBJECT option but instead of displaying objects, you are selecting and displaying groups. The GROUP option of the Main Menu is needed to create a group and this will be explained later.

PICTURE

After using DISPLAY/OBJECT or DISPLAY/GROUP, choose DISPLAY/PICTURE if you want to have the entire picture redisplayed.

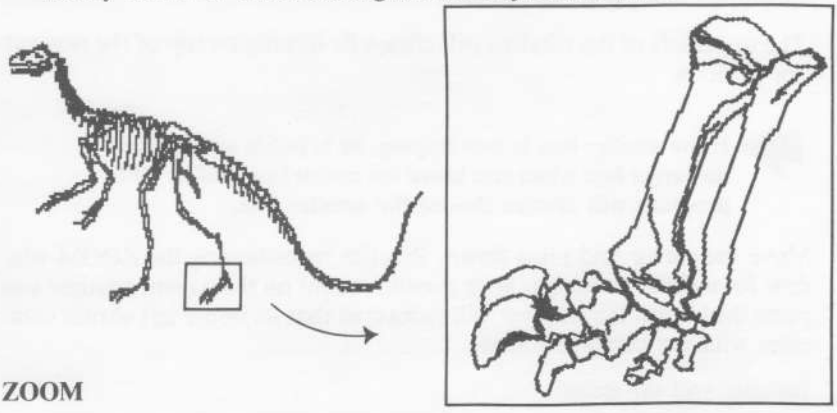
CLEAR

With this option you can temporarily clear or "erase" what is on the screen without erasing anything from internal memory.

This is a very useful function. If you want to draw an object without the distraction of the whole picture on the screen, use the CLEAR option to temporarily clear the screen, draw your object, keep it or erase it, and then redisplay your picture. It also enables you to temporarily erase the screen, so you can display an object, group or picture which you have saved on disk by itself.

In short, CLEAR acts like a temporary ERASE.

1. Use DISPLAY/CLEAR to temporarily erase the screen if you have drawings displayed. If not, create some.
2. Press the button, whether the cursor is on or off screen.
3. The Main Menu is displayed. Pick DISPLAY/PICTURE and your drawing will appear again. This can also be done with a single object or group.
4. If you wish, repeat the above, but after clearing the screen draw a new object. When you display the picture, it will include this object as well. As your picture gets more and more complex, the CLEAR option becomes a handy means of concentrating on one object at a time.



ZOOM

ZOOM is named for the zoom camera. It has two "lenses", which magnify by four and sixteen. Of course, these are not really lenses but boxes or windows which cover 1/4 and 1/16 of the screen's total area.

When you pick one of the windows, whatever is inside enlarges to fill the entire screen. Because the smaller window covers 1/16 of the screen, anything inside of it is enlarged 16 times when that window becomes the entire screen. The same logic applies to the window which initially covers 1/4 of the screen.

Choosing the Zoom Lens

1. Use ERASE/PICTURE to clear the screen. Draw something.
2. Pick the DISPLAY/ZOOM option.
3. Two boxes appear on the upper left of your screen, one inside the other. These are the two zoom windows or "lenses". The smaller one magnifies whatever is inside 16 times and the larger one four times.

4. To indicate which window and magnification you want, move your cursor inside the smaller box and press the button.
5. The larger box now disappears from the screen. The computer has confirmed your choice of the smaller box.
6. Indicate you are done.
7. What was inside the smaller window has been magnified 16 times.
8. Press the button and the Main Menu appears.
9. Pick DISPLAY/ZOOM again.
10. Both windows return to their original position.
11. Move the cursor so that it is inside the larger window but outside the smaller one, and press the button.
12. The smaller window disappears confirming your choice of the larger one.

Positioning the Zoom Lens

1. You have now chosen the larger window after completing instruction #11 above. Move your cursor around the portion of your drawing you want magnified and press the button.
2. The upper left of the window will always lie directly on top of the new cursor position.

If the smaller box is overlapping, or is inside or touching the larger box when you move the cursor inside of it, GPS program will always choose the smaller box.

3. Move the cursor and press down. Practice repositioning the ZOOM window for awhile. As long as your cursor remains on the screen, anytime you press the button the window will redraw so that its upper left corner coincides with the cursor position.
4. Indicate you are done.
5. Press the button and the Main Menu will reappear.
6. Pick DISPLAY/ZOOM.
7. The small ZOOM window reappears in the upper left corner of the screen, while the larger ZOOM window appears where it was last positioned. Once again you may choose either window, but this time do not do so. Signify that you do not wish to use either window (and therefore do not wish to use the ZOOM option), by moving the cursor on the screen but not touching or inside either window and press down.
8. The windows are gone and your picture is redisplayed in its original size. Pick DISPLAY/ZOOM again.
9. Both windows are now back in their original positions. In effect, you have not only learned how to position the windows, but also how to return them to their original position. This will be useful as you will see in the next series of instructions.

You will remain in ZOOM until you reenter the ZOOM option and refuse to pick either ZOOM window.

Using the Zoom Option

1. Draw an object small enough to fit inside the smaller ZOOM window.
2. Pick the DISPLAY/ZOOM option.
3. Choose the larger window.
4. Move the window so it totally surrounds the object you have drawn.
5. Indicate you are done.
6. Your drawing is now four times larger than before. If your drawing is made up of many lines, it may take some time (15 seconds) before the picture redisplays in its zoomed form.

It may seem that you have changed the position of your object when it enlarges. But the position of an object inside the window determines its enlarged position on the screen.

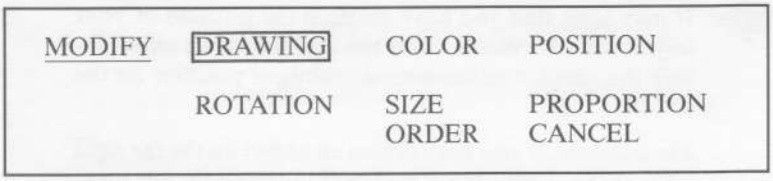
For example, if you have drawn an object on the far right edge of the screen, but it is almost touching the left hand edge of the window, when you enlarge the picture the object will appear enlarged, and on the far left hand edge of the screen. A little practice with positioning the zoom windows will clear up any confusion.

7. Pick DISPLAY/ZOOM again.
8. The large window will appear on the screen where you had last positioned it, but your drawing will now be in its original size.
9. Choose the smaller window. The larger one will vanish from the screen.
10. Position the smaller window so it completely surrounds the object and press the button.
11. Your object will appear 16 times larger than before.
12. Repeat the above instructions, but this time instead of completely surrounding your object with one of the windows, practice positioning the windows so only a part of the object is zoomed.

Chapter Six The Modify Menu

The MODIFY option of the Main Menu contains the heart and soul of the GPS program. Until now you have been learning the basic steps, and while it is possible to have fun with them, there is a limit to how much you can do. Mastering the MODIFY menu is like learning how to really dance. You can take your basic steps and combine them to create what you want.

The MODIFY options allow you to change the color not just of your lines, but of the background as well. You can fill the inside area of any object with color, or change the position, size, proportion, or rotation of your drawing. With the MODIFY options you can even change the order in which your drawings lie on top of each other. This is the MODIFY menu:



DRAWING

This option allows you to go back after you have finished a drawing and work on it again. It puts you back in the DRAW menu as if you had never chosen the END option, but with one important difference. In the MODIFY/DRAWING option, the CANCEL option does not erase your drawing: it acts exactly like the END option.

When you use the MODIFY/DRAWING option consider making a duplicate of the object you want to modify so that if you don't like the changes you make you still have a copy of the original picture. You will learn how to do this in the DUPLICATE menu. In the meantime, if you wish to restore your object as it was before you started modifying it, simply erase any new lines, and redraw the old ones you have erased.

1. Use the DRAW/LINE/END option to create a drawing.
2. Pick the MODIFY/DRAWING option.
3. Pick the object you wish to modify. No object will flash automatically in this option. You must move the cursor inside of the object you want and press the button. Now it will flash. Say yes.
4. If there are any other drawings on the screen which overlap the chosen object, it will automatically be redrawn so the chosen object is on top of all others.
5. The DRAW menu will also be displayed. Except for the exceptions noted above, proceed exactly as you would in the DRAW menu.

You will remain in ZOOM until you reenter the ZOOM option and refuse to pick either ZOOM window.

Using the Zoom Option

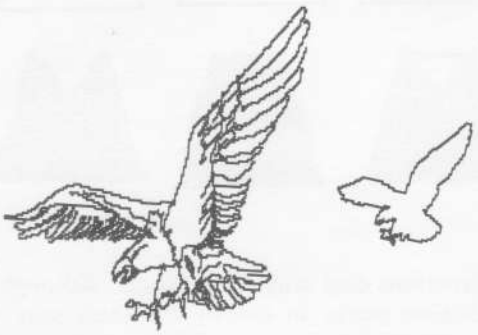
1. Draw an object small enough to fit inside the smaller ZOOM window.
2. Pick the DISPLAY/ZOOM option.
3. Choose the larger window.
4. Move the window so it totally surrounds the object you have drawn.
5. Indicate you are done.
6. Your drawing is now four times larger than before. If your drawing is made up of many lines, it may take some time (15 seconds) before the picture redisplays in its zoomed form.

It may seem that you have changed the position of your object when it enlarges. But the position of an object inside the window determines its enlarged position on the screen.

For example, if you have drawn an object on the far right edge of the screen, but it is almost touching the left hand edge of the window, when you enlarge the picture the object will appear enlarged, and on the far left hand edge of the screen. A little practice with positioning the zoom windows will clear up any confusion.

7. Pick DISPLAY/ZOOM again.
8. The large window will appear on the screen where you had last positioned it, but your drawing will now be in its original size.
9. Choose the smaller window. The larger one will vanish from the screen.
10. Position the smaller window so it completely surrounds the object and press the button.
11. Your object will appear 16 times larger than before.
12. Repeat the above instructions, but this time instead of completely surrounding your object with one of the windows, practice positioning the windows so only a part of the object is zoomed.

6. After you have made your modifications, pick the END option. Your object is displayed in its original place. If it was originally under other drawings, it will be so again. It will now include your modifications. The original object cannot be restored unless you have saved it on disk although it can of course be redrawn.



COLOR

The COLOR option of the MODIFY menu is similar to the COLOR option of the DRAW menu. The main difference is that this option permits you to change the color of the background and the area inside an object, as well as changing the color of its lines. There are four options in the COLOR menu:

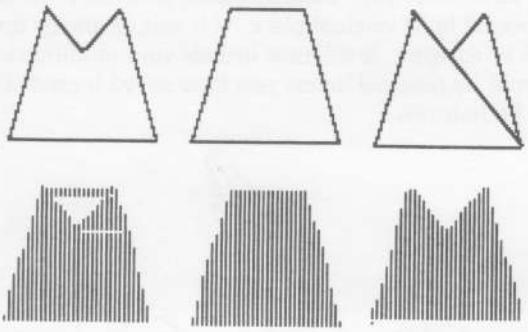
COLOR	AREA	LINE
	BACKGROUND	CANCEL

Area

This option fills in the area of a drawing (object, group or picture) with the color of your choosing. The area to be colored must be completely contained by a line. If there are gaps or holes in the boundary of the area, or if the boundary overlaps itself, the AREA option of the COLOR menu may work in unpredictable ways.

The AREA option will always work correctly for convex objects (circle, triangle, rectangle, etc.) but may not work correctly for concave objects (a crescent moon). A more detailed discussion of why this occurs and exactly how the AREA option works is found in the Appendix.

When working with concave objects, you will enjoy greater success if you make the tips of your object round instead of pointed. Often, this is enough to allow the object to be colored in without difficulty. If you still have trouble, you may have to redraw your concave object as several convex objects, and use the GROUP option (explained later) to join them together. Now you can use the MODIFY/COLOR/AREA/GROUP to color in the entire group at once.



The following instructions deal only with objects, although the MODIFY/COLOR/AREA option works in exactly the same way with groups or pictures.

1. Create a convex object which completely encloses an area on the screen.
2. Pick the MODIFY/COLOR option.
3. The COLOR menu appears. Pick AREA.
4. Pick the CHOOSE/OBJECT option and choose the convex object you have just created.
5. Choose a color exactly as you did within the DRAW menu, including mixing colors.
6. The object will reappear with its interior filled with the chosen color. Its outer line, however, will be erased.
7. You can keep changing the interior color indefinitely.

If you use the GROUP option, the internal area of every object in the group will be colored in. But if your group, for example, is a square, and each of its four sides is an object, when the MODIFY/COLOR/GROUP option is used the square itself will not be colored in, but each object in the group (the lines) will be. In other words, you will have a square with colored lines and a non-colored interior. Similarly, when you use the MODIFY/COLOR/PICTURE option, every object in the picture will be colored in. Depending on how you have drawn your objects, this may result in lines being colored, or enclosed areas being colored, or both.

Line

The LINE option is almost identical to the DRAW/COLOR/LINE option except that it changes the color of lines already drawn, while DRAW/COLOR/LINE changes the color you are working with. When using the LINE option, all the lines of the drawing you have selected change to the same color at one time. However, if your drawing is made up of several objects,

you can make the lines of each object a different color. You may also use this option to change the color of every line in a group, or every line in a picture simultaneously. If you want to change a drawing which has its area colored in back to a line drawing, you can do it with this option.

Once again, the following instructions apply equally to objects, groups or pictures.

1. Create a drawing.
2. Pick MODIFY/COLOR/LINE.
3. CHOOSE the drawing you will work on.
4. Pick the colors as with the AREA option and proceed.

Background

This option changes the color of the background against which your drawing appears. It functions in exactly the same way as the above two options.

You can also use this option to clear the screen after you have loaded a drawing FROM DISK/APPLE format, when you want to reuse the screen.

DO NOT confuse this option with the Background feature discussed in Chapter 10.

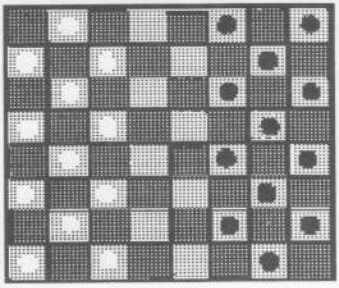
POSITION

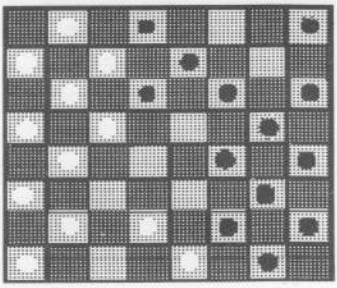
This option allows you to easily reposition any drawing and can save a lot of redrawing. If you have drawn a schematic, for example, and reversed the position of a transistor and a diode, use this option to reposition the two objects instead of redrawing.

1. Create a drawing.
2. Pick the MODIFY/POSITION option.
3. CHOOSE the drawing you wish to reposition.
4. Move the cursor so it touches the drawing you chose. Press the button.
5. You just created your reference point. When you move the cursor to a new position, the reference point will redraw so it lies directly over the new cursor position. In effect, when you pick a reference point, you are saying "I want this spot to be repositioned to wherever I move the cursor."
6. Move the cursor to a new position and press down.
7. The drawing momentarily dissolves and is then redrawn so your reference point coincides exactly with the new cursor position.

It is possible to have trouble here if you do not press the button enough times to register in the computer. Depending on the situation, you first must press the button to make the drawing you want flash, press it to say yes, press it again to create a reference point, move the cursor and press down one last time to indicate you are done.

The way to avoid trouble is to visually check the screen to make sure the drawing you have selected is flashing or has stopped flashing.





8. Move the cursor again and press down.
9. You can move the drawing anywhere on the screen, even making it overlap another drawing. You can also move the cursor to the edge of the screen so that part of your drawing disappears. This does not mean it has been erased. Repositioning the cursor more to the center of the screen will bring the drawing back.
10. Indicate you are done, and repeat the above instructions with a different reference point anywhere on the screen. If you pick a reference point one inch to the right of your drawing, when you move the cursor to reposition the drawing, it will be exactly one inch to the left of the new cursor position.
11. If you keep the pen pressed down when establishing a new cursor position you can keep the object on the screen at all times and slide it around. Try this.

Once you reposition an object or group, it will remain in the new position whenever the picture is displayed. Thus you can create new pictures simply by repositioning the elements in the old picture. Theoretically, you could draw hundreds of lines, identifying each as an object, and use MODIFY/POSITION/OBJECT to reposition them until you create a perfect self portrait.

ROTATION

This option allows you to rotate a drawing anywhere from a fraction of a degree to a full 360 degrees.

You can rotate the desired drawing around any point on the screen. The center of rotation can be inside or outside of the drawing. A wheel turning on its axis is an example of an object rotating about a point inside itself. The earth revolving around the sun is an example of an object rotating about a point outside of itself.

1. Clear the screen and create a drawing shaped so you can watch its rotation.
2. Pick MODIFY/ROTATION.
3. The CHOOSE menu will appear.
4. Identify the drawing you wish to rotate.
5. Move the cursor so it is in the center of your drawing and press down.
6. The beep you hear lets you know you have chosen a center of rotation. The center of rotation does not have to be in the center of the drawing, but it is a little easier at first to practice with it this way.
7. Now you will create a reference point. Again you can pick any point, but at first it is easiest to pick a point on the outer edges of the drawing. Move the cursor to this point and press down.
8. A line will now be drawn between the center of rotation and your reference point. This is your base line against which the angle of rotation will form. This will be clearer after the next few steps.

The same warning that was given to press down often enough on the button in the MODIFY/POSITION section applies here also.

9. Move the cursor anywhere except along the line just drawn, and press down.
10. A new line the same length as the base line is drawn only this time it extends from the center of rotation towards the new cursor position. These two lines form an angle where they meet. The number of degrees formed by this angle will be exactly the number of degrees that your drawing will rotate.
11. Move the pen in a circle around the center of rotation and keep it pressed down.
12. You will see one line after another is drawn and then erased as a new line is drawn. Every angle of rotation from 0 to 360 will be represented at some point.
13. Choose the angle you wish and indicate you are done.
14. The drawing disappears from the screen. After a short while it will be redrawn and rotated the exact amount you have indicated.

With a complex drawing, especially when done in freehand, this rotating and redrawing process may take as much as 15 seconds. If it seems you have erased your drawing, have patience and it will soon reappear.

If you find all this talk of degrees and angle of rotation confusing, another way of thinking about it is that your reference point (the endpoint of the very first line drawn) will now be exactly at the endpoint of the final line drawn and the rest of the drawing will swing around proportionately. Instead of thinking how many degrees you wish to rotate, think "Where do I want the reference point (the final cursor position) on my drawing?"

15. Practice rotating your drawing. When you can predict exactly how your drawing will rotate before you indicate you are done, then start over and this time pick a reference point which is outside the drawing.

It does not matter how far away your reference point is. Whether the line drawn from the center of rotation is five inches or barely visible, the drawing will rotate in exactly the same way. The reference point will still end up precisely at the last cursor position chosen before indicating you are done.

16. Now go back and try the same thing with a center of rotation outside the drawing. This makes it harder at first to accurately predict what will happen when you rotate your drawing. There will be less confusion if you pick a reference point which is part of your drawing.

17. When you are skilled at rotating your drawing around a center of rotation which is outside the drawing, try doing it with a reference point which is also outside of the drawing. This may tax your predictive abilities, especially if spatial relationships are difficult for you. But keep practicing until you have control.

It is easy to rotate your drawing so part of it is off the screen. As with the POSITION option, this does not mean you have erased the drawing. However, with the last exercise you could easily have rotated your entire drawing off the screen. No matter how long you wait, it will not reappear, and pressing the button will not help. In such a case, simply try rotating it again, or using the POSITION option to bring it back on the screen. If all else fails and you cannot retrieve your drawing, erase it and start over.

SIZE

The SIZE option allows you to enlarge or reduce a drawing to just about any size. This function works in many ways like that of ROTATION and POSITION. But, there is one important difference which dramatically affects your use of this option.

When you pick the SIZE option, a box will momentarily appear around the outside of your drawing. The box circumscribes your drawing's outer dimensions. When you make a reference point and move your cursor, your drawing will remain the same size, but this box will reappear, larger or smaller, depending on how you have moved the cursor. When the box is the size you wish, indicate your are done and your drawing will dissolve and reappear, enlarged or reduced, to fit inside the dimensions of the second box.

Your reference point establishes a ratio which affects the size of the box you can create. To understand this, visualize a horizontal continuum with its center at the center of what you want to modify. Let's say your reference point was placed one inch from the center of this continuum. Now you must move the cursor to a new position. You can move it in any direction, but only its horizontal movement along this continuum will matter. If you move it so it is two inches (horizontally) from the center, it is now twice as far from the center as the reference point. Therefore a box twice the size of the original box will be formed.

This seems straightforward enough but it has far reaching implications. If your initial reference point is very close to the center of the drawing, even a slight horizontal movement away from the center will cause a tremendous magnification of the object. You will find it difficult to create any new box which isn't so large that part, if not all, of it is off the screen.

The reason for this is obvious. In our first example we had a ratio of 2:1. This ratio is made by dividing the distance between the center point and the last cursor position by the distance between the center point and the reference point. If this last distance is very small, you are in effect dividing by a fraction, and your ratio will be quite large.

Conversely, if the initial reference point is distant from the center, because there is a limit on how far we can move the cursor, our ratio will always be comparatively small and you cannot magnify the drawing to any considerable degree.

Therefore, although you may choose any reference point, in actual practice you will get the best results if your reference point coincides with one of the vertical lines which initially surrounded your drawing. If your drawing is very small, you can make a reference point an inch or so from the center of your drawing permitting you to increase your box size gradually. If your drawing is very large, you cannot enlarge it much and still keep it on the screen. So again you will find that placing your reference point on one of the original vertical lines will work quite well.

When enlarging or reducing a group the SIZE option treats the group as an object and takes the center of the group as its center. Thus the entire group is enlarged or reduced simultaneously and proportionately. For example, if you make a group face out of separate objects (head, nose, eyes), when you enlarge or reduce the face, the objects will not be affected. This means that if you increase the face to twice its size, the eyes and nose will not overlap as they would otherwise have done, but will retain their same relative position. This also applies when using the SIZE option with a picture.

1. Create a drawing.
2. Pick the MODIFY/SIZE option.
3. Choose your drawing.
4. A box flashes on the screen circumscribing your drawing's outer dimensions.
5. Move the cursor so it is on top of one of the vertical lines of this box and press down. Although this box is only displayed momentarily, you can look at your drawing and easily see where a vertical line of a box surrounding the drawing would be.
6. You have just established your reference point. Move the cursor in either direction horizontally and press the button.
7. A new box is created. If you moved the cursor towards the outer edge of the screen, the new box is larger than before. If you moved the cursor towards the center of the screen, the new box is smaller.
8. Practice moving the cursor and pressing the button at the same time to make new boxes of different sizes appear. These boxes circumscribe the dimensions of your drawing when you indicate you are done.
9. When you have created a box that suitably enlarges or reduces your picture, indicate you are done.
10. The box will disappear and reappear to fit the dimensions of the box you chose.
11. This is now the size of your drawing. It will remain this size unless you change it, which you can do as many times as you like.

It is possible to enlarge the box so that one or all of its lines will be off the screen. This does not mean that the SIZE option no longer works. It does mean that if you indicate you are done, your drawing will enlarge to such an extent that most of it will probably be off the screen. To get the drawing back again, use the SIZE option to reduce it. Since the initial box will now not be visible, make your reference point near the edge of the screen and move the cursor towards the center. Press down until a box appears that is completely on the screen. Sometimes you can bring back an object which is off the screen through the use of the ROTATION or POSITION option as well.

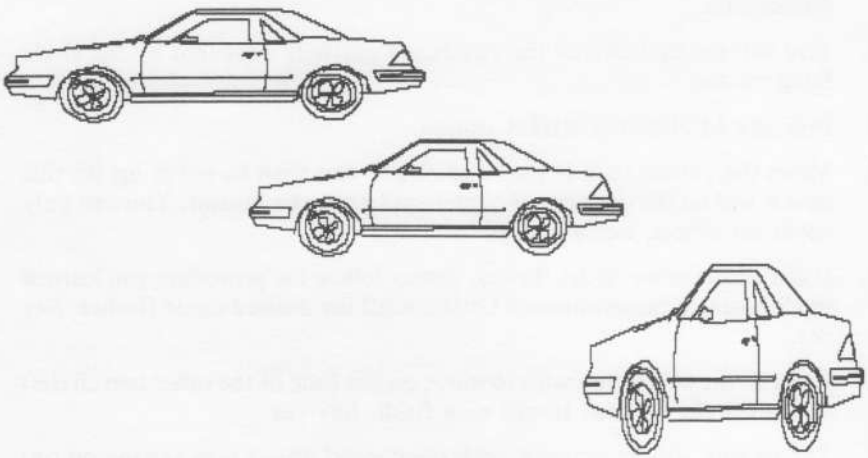
PROPORTION

The SIZE option allowed you to enlarge or reduce a drawing. The PROPORTION option allows you to change the vertical or horizontal dimensions. For example, if you have drawn a face, you can stretch it horizontally to make it appear fat, or stretch it vertically to make it appear skinny.

When using the SIZE option, only the horizontal movement of the cursor affects the size of the box being created. With the PROPORTION option, movement in any direction affects the size of the box being formed. Horizontal movement affects the width of your drawing and vertical movement affects the height. Even if your reference point is on one of the original vertical lines, you can still have problems here if it is at the vertical center of the drawing.

When using the SIZE option, only the horizontal movement of the cursor affects the size of the box being created. With the PROPORTION option, movement in any direction affects the size of the box being formed. Horizontal movement affects the width of your drawing and vertical movement affects the height. Even if your reference point is on one of the original vertical lines, you can still have problems here if it is at the vertical center of the drawing.

Therefore, it is best to pick one corner of the box as your initial reference point. Unless your drawing is very flat or very thin, you will be assured of not being too close to either the horizontal or the vertical center. If you do make a reference point too close to either center, you will find that slight movement will enlarge that portion of the box radically. You will still be able to gradually enlarge or reduce the other side of the box.



1. Create a drawing.
2. Pick the MODIFY/PROPORTION option.
3. CHOOSE your drawing.
4. A box flashes around the outer dimensions of the drawing.
5. Move the cursor so it is over one corner of the box that flashed briefly.
6. Press the button. You have just made your reference point.

7. Hold the button down and move the cursor until the box drawn represents the proportions you want.

In order to gradually enlarge or reduce the box's horizontal and vertical dimensions simultaneously, simply move the cursor diagonally towards or away from the center of your drawing.

8. Practice moving the cursor until you can get the box just the shape you want, then indicate you are done.
9. Your drawing has been redrawn to fit the dimensions of the box you selected. This is permanent unless you modify it again.

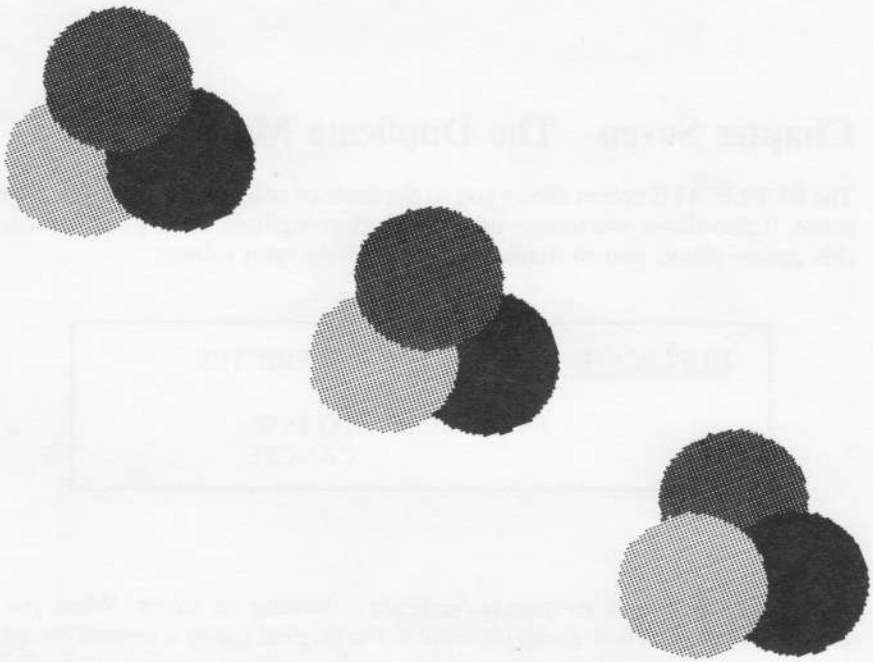
ORDER

This option allows you to take an object or group hidden behind another object, and place it on top of that object instead. It does this by changing the order in which the images are drawn. The chosen object or group is drawn immediately after the object you first picked.

This means that depending on the order of the objects initially, you can move an object to the top or bottom of the pile, or above some objects and beneath others.

The following instructions apply equally to groups.

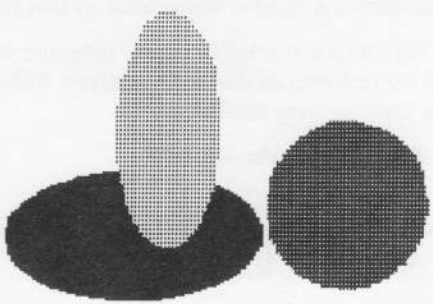
1. Pick DRAW/FREEHAND and draw three overlapping circles. Be sure to use the END option after each circle is drawn.
2. Pick MODIFY/COLOR/AREA/OBJECT and color each circle differently.
3. You will see that two of the circles are partially obscured by the circle lying on top.
4. Pick the MODIFY/ORDER option.
5. Move the cursor so it is over the object you wish to cover up (in this case it will be the uppermost circle), and press the button. You can only cover an object, not a group.
6. If one of the other circles flashes, simply follow the procedure you learned in Choosing a Superimposed Object until the desired circle flashes. Say yes.
7. Point to the object you wish to move on top (one of the other two circles) and press the button. It will now flash. Say yes.
8. The picture will be redrawn with the desired object now resting on top of the object you first chose.
9. Practice reordering the position of the circles until you can move any circle to any position.



PUTTING IT ALL TOGETHER

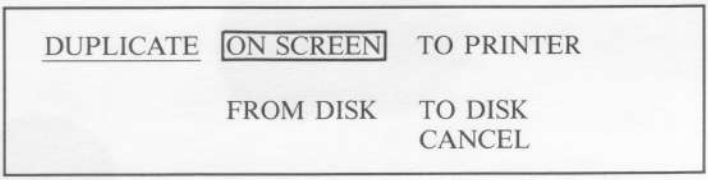
Perhaps you have noticed that while you can now stretch a drawing vertically or horizontally, you cannot stretch it diagonally. If you have a drawing which you would like to modify in this way, pick the MODIFY/ROTATION option, rotate the drawing until the diagonal is either horizontal or vertical, go back to PROPORTION and stretch the drawing as desired. In this way, any and all of the modification options can be linked together.

You can also perform all of these modifications while in the ZOOM mode. Bear in mind that if you modify part of a drawing which is zoomed, even that part which is not zoomed and is not on the screen will be similarly modified. Thus if you rotate a portion of your drawing, when you leave the ZOOM mode all of that drawing will be rotated.



Chapter Seven The Duplicate Menu

The DUPLICATE option allows you to duplicate or copy any drawing you have made. It also allows you to save or retrieve a drawing from a floppy disk. Also, this option allows you to duplicate your drawing on a printer.



ON SCREEN

This option allows you to quickly duplicate a drawing on screen. When you duplicate a group, a new group identical to the original group is created except that any subgroups which existed in the original will no longer exist in the duplicate. The objects will still be there, but you cannot display or modify them separately as a subgroup.

When a picture is duplicated, all objects in the picture are duplicated and placed in a newly created group. This group can be modified, displayed, etc.

1. Create a drawing.
2. Pick DUPLICATE/ON SCREEN.
3. CHOOSE the drawing you wish to duplicate.

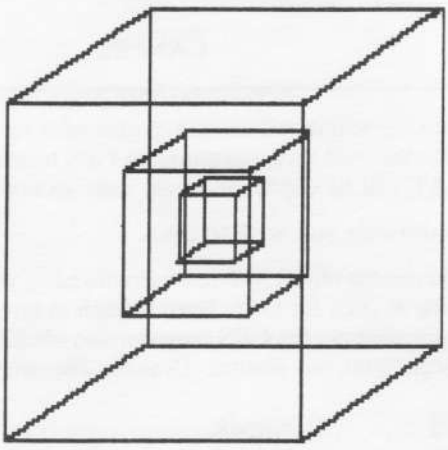
If the drawing was partially off screen, it may temporarily disappear after step #4. This can be disconcerting, but it will return after step #6.

4. Pick a reference point as you did in the MODIFY/POSITION option.
5. Move the cursor to where you want the reference point to end and press the button. Your drawing is now duplicated in this new position.
6. If you move the cursor to a new location and press the button, the duplicate will dissolve and be redrawn in this new location. When you are satisfied with its location indicate you are done.
7. A new menu will appear on the screen:

8. If you wish to make another duplicate (thus making three drawings on the screen) choose the AGAIN option.

When you choose AGAIN, the drawing you copy will not be your original drawing, but your most recent copy. This means your reference point will be in relation to the last copy made and not the original drawing.

9. Repeat step #8 as often as desired. As you can see, when you duplicate a picture, you can quickly fill your screen with objects. If you start with one object and duplicate it, you have two. Do it again and you have four. One more time, and you have eight.
10. To stop duplicating, pick the END option.
11. You now have several versions of your original drawing and can modify any of them in any way you choose. You can also duplicate a drawing, modify it, and duplicate the modified version.



TO DISK

TO DISK allows you to save your drawing on a floppy disk so you can finish or modify a drawing later, or start building a library of drawings. For example, if you are making schematics, you can draw one capacitor, one diode, one resistor, etc, and save each item on disk. Then you can duplicate them from disk, put each one where you want it, and create your finished schematic without redrawing anything. Similarly, you can do the same thing with your straight lines to guarantee that your line lengths are accurate without having to check your scale for each line.

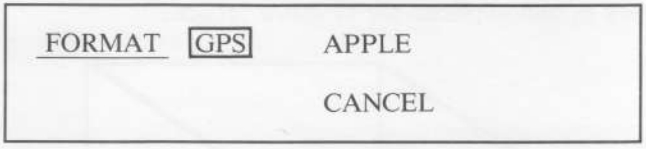
This option also allows you to easily produce simple animation by making a basic drawing, saving, duplicating, modifying, saving, duplicating again, modifying, and so on. If you then print each drawing, stack them up, and flip through them, you have created an animated cartoon.

An architect, for example, might find this option helpful where a series of blueprints is needed with slight modifications on each one.

The TO DISK option also allows you to retrieve your drawing right away, if, for instance, you modified it and then decided the original was better. If you accidentally erase your drawing or the computer goes off, you will have a permanent copy on disk.

Procedures for handling difficulties with the disk drives are discussed at the end of the FROM DISK section of this chapter.

1. Put an initialized 16-sector disk into one of your disk drives. DO NOT TRY TO STORE DRAWINGS ON THE GPS PROGRAM DISK!! THERE IS NO ROOM.
2. Create a drawing.
3. Pick the DUPLICATE/TO DISK option.
4. The FORMAT menu will appear.



5. This menu is asking you in which format you wish to save your drawing. Most of the time you will save everything in GPS format. Pick that option now. (FORMAT will be explained in the next section.)
6. CHOOSE the drawing you wish to save.

   Now, when you choose object, group or picture here, you are also identifying your drawing as such for GPS. Even though in instruction #8, you will give your drawing a name, the GPS program also identifies it by its designation as an object, group or picture. Drawing files are stored on disk as:

   OBJECT .....NAME
   GROUP.....NAME **in GPS format**
   PICTURE.....NAME
   I .....NAME **(stored with PICTURE file)**

   APPLE .....NAME

7. A colon followed by a cursor will appear.
8. Type in the name of the drawing you want to save.

   Only the first 19 characters of any name you type is recorded by the GPS program. These 19 characters become the full name of the drawing and you need only type this name when you ask the GPS program to display this drawing. It is easier to remember shorter names.

9. Because you cannot save drawings on your GPS program disk, you must now insert an initialized disk into your disk drive. If you have two drives and want your data disk in the second one, type ",D2" after the name of the drawing. Press return.
10. The drawing remains on the screen, but is now also stored on disk.

When you save a picture or group on disk by following the above instructions, any subgrouping information will be erased. So if what you are saving on disk consists of group A (which has two objects in it) and group B (which has one object in it), all three objects are saved on disk under whatever name you typed in for the group. But when you retrieve the group from disk, it will now consist only of those three objects, Subgroups A and B are no longer functional. You can recreate them, if you wish, by using the GROUP option of the Main Menu. This is not true for pictures. Subgroups on pictures are saved so that you could save a group which has subgroups as a picture.

FROM DISK

FROM DISK allows you to retrieve a drawing after you have saved it on disk.

1. Pick the DUPLICATE/FROM DISK option.
2. Pick the GPS format.

So far you have saved drawings using the GPS format only. You must now use the GPS format to retrieve them. APPLE format and its uses will be discussed in the next section.

3. CHOOSE whether you are retrieving an object, group or picture.

You can retrieve a drawing only if you identify it exactly. This means not only typing in its correct name, but also identifying it as object, group or picture. Your drawing's category is not part of the drawing's name. Thus when you enter the name, you need not type the category.

When you retrieve a PICTURE from disk, you wipe out any drawing in internal memory, so remember to load any PICTURE from disk first, then load any other objects or groups. If you have a picture in internal memory and retrieve an object from the disk your picture will not be erased.

4. Type in the number of the drive if needed, and the name exactly as you typed it in when saving the drawing. Even an extra space in the name or before it, will cause a "FILE NOT FOUND" message to appear.
5. The desired drawing should now appear on the screen.
6. Position the drawing as you would in the DUPLICATE/ON SCREEN option. If you choose the AGAIN option, your drawing will duplicate on the screen, not from the disk.
7. When you have finished duplicating your drawings, pick the END option.

When you use the DUPLICATE/TO DISK/GPS/PICTURE option, all the information about the picture is saved, including the background color, position of the ZOOM window, etc. However, if you are in ZOOM when you save the picture, the entire picture is saved, but none of it will be zoomed.

If you mistype a letter or identify a drawing by the wrong category, you will hear a beep and see an error message, such as FILE NOT FOUND, or I/O ERROR. These are standard DOS error messages and are explained in detail in your DOS manual.

If an error occurs, press the button to display your drawing. If you press again, the Main Menu will be displayed.

If you accidentally hit the RESET key, try to save your drawing on disk before starting over again from scratch. If you see an asterisk, depress the CONTROL key on your computer, and while keeping it depressed, hit the Y key. Press RETURN. Now, whether you saw the asterisk or not, type in the name of the drawing and press RETURN again. But if you were in the middle of an option (like ROTATION) when you hit RESET, your drawing may be partially lost.

FORMAT

When you save a drawing in GPS format and then retrieve it, you can use any of the editing features of this program to modify it. The APPLE format is a little different. Using this option, you can not only save drawings created by GPS in APPLE format so they can be read by other programs, you can also load drawings generated by other software (such as Apple Plot or Visiplot).

This is possible because whenever the Apple computer displays an image, there is a part of its memory which is a map of the display. For each dot on the screen there is a bit of memory. The collection of bits which map the screen is saved by the APPLE format. This is essentially the same as the Apple HiRes graphics buffer.

A drawing saved in APPLE format can be retrieved from the disk, but once retrieved it cannot be modified. No objects can be moved, no colors changed, no zooms can occur. You can, however, draw or duplicate drawings on top of your APPLE format drawing. This leads to some interesting uses. (See LAYERED DRAWINGS and BACKGROUND DRAWINGS in the Appendix.)

The APPLE format drawing retrieved from the disk serves as a background. It can be very useful when doing something like drawing on top of a graph which Apple Plot (or some other program) has generated. However, because the APPLE format drawing cannot be retained in internal memory, each time the background is redrawn by the GPS program it is reloaded from disk. If you

have a 16K RAM card, you can place the image in the background and the disk will not be accessed (see BACKGROUND DRAWINGS in the Appendix). If you do not have a 16K RAM card, you must keep your disk (which has the APPLE format drawings on it) in the drive when you wish to duplicate one of its drawings. The APPLE format drawing will act as a background until you MODIFY/COLOR/BACKGROUND. Otherwise, your APPLE format drawing will reduplicate from the disk every time your picture is redisplayed. Also, if you use an APPLE format drawing as a background and want to DUPLICATE/TO or FROM DISK, you must first MODIFY/COLOR/BACKGROUND and then DUPLICATE. The APPLE format background drawing can then be reselected.

The instructions for saving TO DISK and retrieving FROM DISK are the same for APPLE format as for GPS format, except that you do not have to designate object, group or picture.

TO PRINTER

This option allows you to print on an Apple Silentype printer whatever is displayed on the screen. You can use other printers if you save your drawing using APPLE format and then print the drawing using software provided for that particular printer.

To print a drawing you have saved on disk, retrieve the drawing from disk and DUPLICATE/TO PRINTER. You do not have to wait until a drawing is completed before printing it on a Silentype. This option allows you to print your drawing at any stage of completion to see how it will look on paper.

1. To print exactly what is displayed on the screen, use the DUPLICATE/TO PRINTER option.

2. To print only part of the picture, use DISPLAY/OBJECT or DISPLAY/GROUP and identify your drawing. Everything else will clear from the screen. Now use DUPLICATE/TO PRINTER.

   You can zoom into a drawing, enlarging whatever is in the zoom window by as much as 16 times. When you print the drawing, only that which is displayed on screen will print.

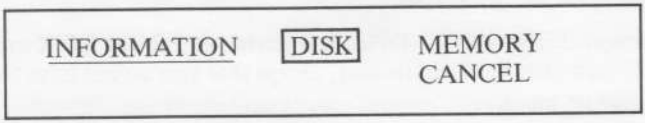
   While you most frequently will draw with white lines on a black background, it will print as a black line on white paper. If you want to print a white line, change your background color to white and your line color to black.

You can zoom into a drawing, enlarging whatever is in the zoom window by as much as 16 times. When you print the drawing, only that which is displayed on screen will print.

While you most frequently will draw with white lines on a black background, it will print as a black line on white paper. If you want to print a white line, change your background color to white and your line color to black.

Chapter Eight The Information Menu

The INFORMATION menu serves two purposes. It orders the disk to display a list of every drawing it has stored, and it tells you how much of the computer's internal memory is available to continue drawing.



DISK

This option is essentially identical to the DOS 'catalog' command. It will provide a list of every drawing on the disk to be displayed. This is especially useful to review what you put on disk, what you named it, and how you classified it (object, group or picture).

1. Pick the INFORMATION/DISK option.
2. If necessary, type in the drive number. Press RETURN.
3. The catalog of drawings is on display, with classification first, and the name second.

The classification "I .....Name" is a file with information about drawings saved as PICTURES (such as background, color, color of areas, etc.). This file is solely for the GPS program's internal use and you never need to deal with it.

4. If there are more names on the disk than can be displayed on the screen, press the RETURN key and the list will roll up. Continue pressing RETURN until you see the whole list.
5. When finished, press the button and your current picture will be redisplayed.

MEMORY

The MEMORY option tells you how much internal memory (RAM) is left. The number represents the number of "bytes" available. (A byte is a unit of memory). Each endpoint of a line uses 4 bytes. Each object takes an additional 15 bytes and the formation of a group takes another 15 bytes. There are approximately 8,000 bytes of memory in which to store drawings on a 48K Apple.

Chapter Nine The Group Menu

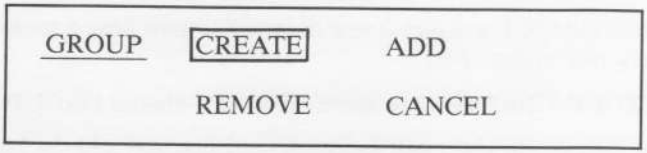
This option allows you to make groups. You have worked with groups before, and you have seen some of their suggested uses.

This is the option that will allow you to fill in concave objects by drawing several convex objects and then forming them into one concave group. Similarly, you can draw a pair of pants, a shirt, a hat, shoes, and socks all as separate objects and then form them into one group. This will allow you to color each item of clothing separately, yet manipulate the entire group as one unit.

Let's say you have a picture which consists of two trees, a dog, a sun, and four birds flying overhead. Imagine that you made the birds too small and you want to enlarge them. If you enlarge the picture, everything else gets bigger as well. If you enlarge each bird separately, it will take you four times longer than if you make the birds one group and manipulate it. This becomes critical when you want to perform two operations on parts of your picture, for instance, enlarge and rotate. As separate objects, this requires eight operations. As a group, this takes only two operations.

The GROUP option is simple in principle, but when you create groups within groups within groups, it can become tricky to keep them all straight. This potential complexity is precisely what makes it such a useful and versatile option.

The GROUP menu has three options. They allow you to create a group, add another object or group to an existing group, or remove an object or group from an existing group.



CREATING A GROUP

1. Draw four objects.
2. Pick the GROUP/CREATE option.
3. The CHOOSE menu will appear. This is asking for the first member of the group. Pick the OBJECT option.

Since no groups have been formed, you cannot pick the GROUP option this time. If you pick the PICTURE option you will be returned to the CHOOSE menu.

4. Identify the object you want in your group.
5. You now have a group with one object. The GROUP menu is again displayed and you can add to or remove from your group, or end. Pick END now. Your Group is redisplayed. To see the entire picture, DISPLAY/PICTURE.
6. Pick the GROUP/CREATE option once more.
7. CHOOSE/OBJECT and identify another object.
8. You now have another group with one object in it. To create a group with two objects, you must use the ADD option.

ADDING TO A GROUP

With this option, you can keep adding single objects to your group, or you can add groups to it. There is no limit to how many times you can use the CREATE and ADD options so you can make groups within groups ad infinitum.

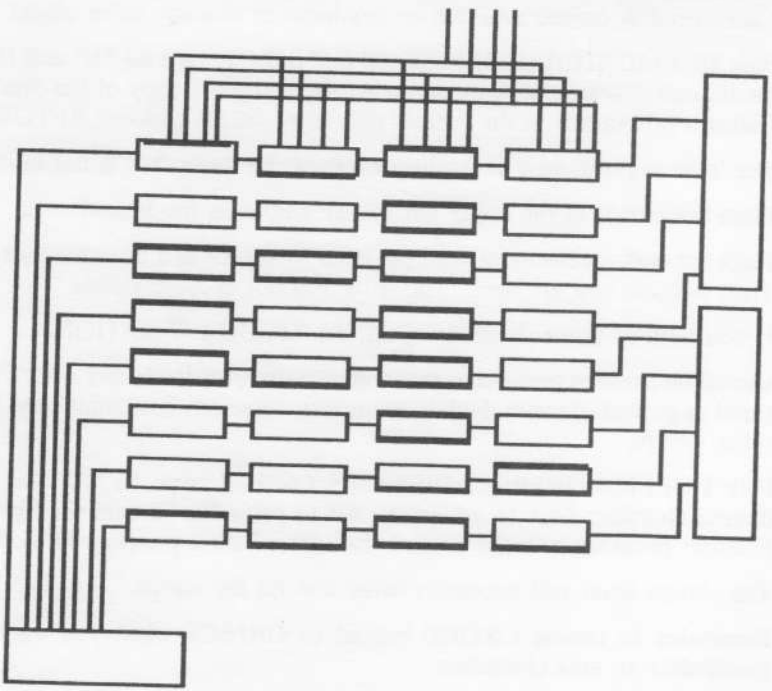
1. Draw five objects.
2. Pick GROUP/CREATE/OBJECT and pick one of the objects.
3. You now have a group with one object in it.
4. Pick GROUP/ADD.
5. Position the cursor over the last group you formed and press the button. This group will flash. Say yes.
6. Pick OBJECT again and choose another object on the screen.
7. Pick the END option. Your group now includes two objects.
8. Pick the GROUP/CREATE option.
9. CHOOSE/OBJECT and pick a new object. You now have a second group with only one object. END.
10. Pick GROUP/CREATE once more. This time choose GROUP.
11. Pick the first group you made (with two objects) and add the last group you made (with one object).
12. You have just made a third group. This one is composed of two subgroups, one with two objects and one with one object.
13. Pick the DISPLAY/GROUP option and point to your recently formed group of three objects. It will flash.
14. Say no and point to the first group you made. The two objects will now flash, indicating they are a subgroup of your larger group. You can repeat this process to make the other subgroup also flash.

Once you have created a group, you can modifv it just as you would an object, as every option applies identically to objects or groups. A good exercise now would be to go back and perform these options using a group as your drawing instead of an object.

You can keep building groups within groups until they become incredibly complex. When you go to identify one of the subgroups within this complex group, use the same procedure you learned for picking superimposed objects. If your group is quite complex, you might have to say no to quite a few subgroups before you get the one you want. Make sure that no group is identical with its subgroup. If you forget what was included where, use DISPLAY/OBJECT or GROUP to find out.

REMOVING FROM A GROUP

1. Use the three groups you created in the last section.
2. Pick the GROUP/REMOVE option.
3. Pick the subgroup with one object in it as the group you want to remove.
4. Your group now consists of the subgroup with two objects.
5. Practice removing groups, bearing in mind the notes given above.



Chapter Ten Special Features

We have included with the GPS program three special features for your convenience on the disk side labelled "Special Features." You cannot use this disk to store your drawings. However, you can copy the files onto a blank initialized disk using the copy program on the Apple Systems Master. We recommend you do this to ensure against accidents. The Special Features are described in the following sections.

When you boot the Special Features disk you will be given a choice as to whether you want to use the Grid Maker or Apple Format. Follow the instructions in this manual. You use the Text Fonts like any other drawings you have stored on disk when you want to manipulate them with the GPS program.

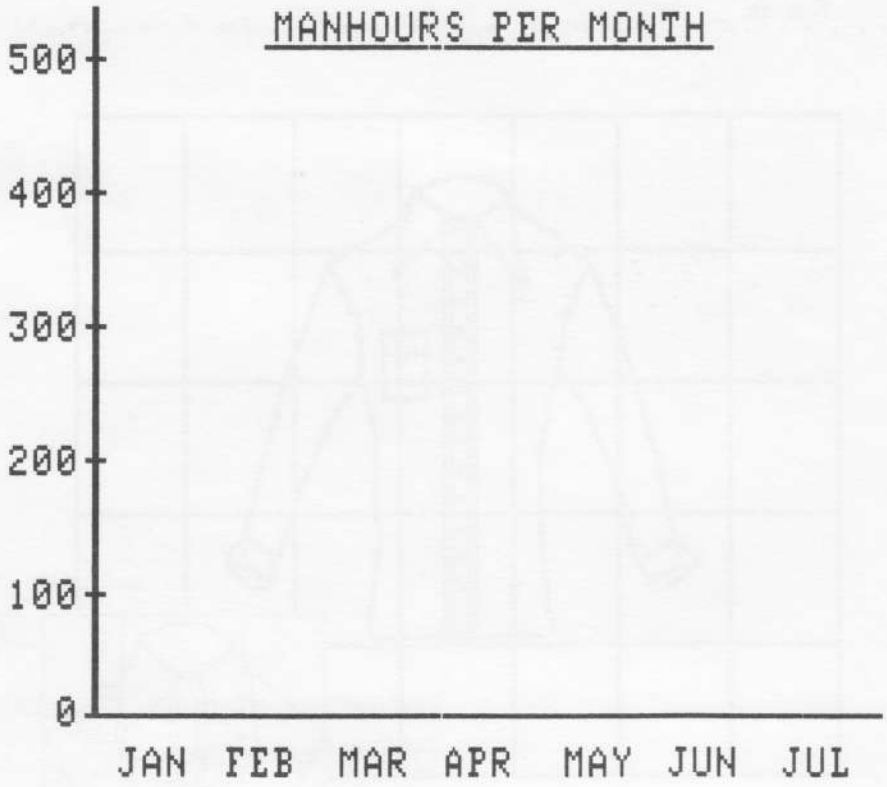
TEXT FONT

Two sets of text characters are stored in the Special Features program. The first set is called line characters and includes letters, numbers and punctuation marks. They are stored as objects and can be manipulated like any other object.

1. Pick DUPLICATE/FROM DISK/GPS/OBJECT, type an "L" and then the desired character (LA to get an A). Be sure your copy of the Special Features program is in the current disk drive before pressing RETURN.
2. The letter is positioned in the upper left of the screen but is not visible.
3. Place the cursor in the upper left corner and press the button.
4. Place the cursor where you want the letter to appear and press the button. Then indicate you are done. The letter will not become visible.
5. If you wish to move the letter again, use MODIFY/POSITION.

The second set is called area characters and contains only the letters A-Z. They are stored as groups. As with the line characters, these can be manipulated like any other groups.

1. Pick DUPLICATE/FROM DISK/GPS/GROUP, type an "A" and the desired character (AA to get an A, AB to get a B). Be sure the Special Features program is in the current disk drive before pressing RETURN.
2. The chosen letter will appear in white and fill the screen.
3. Remember to choose GROUP instead of OBJECT when you want to manipulate an area character.

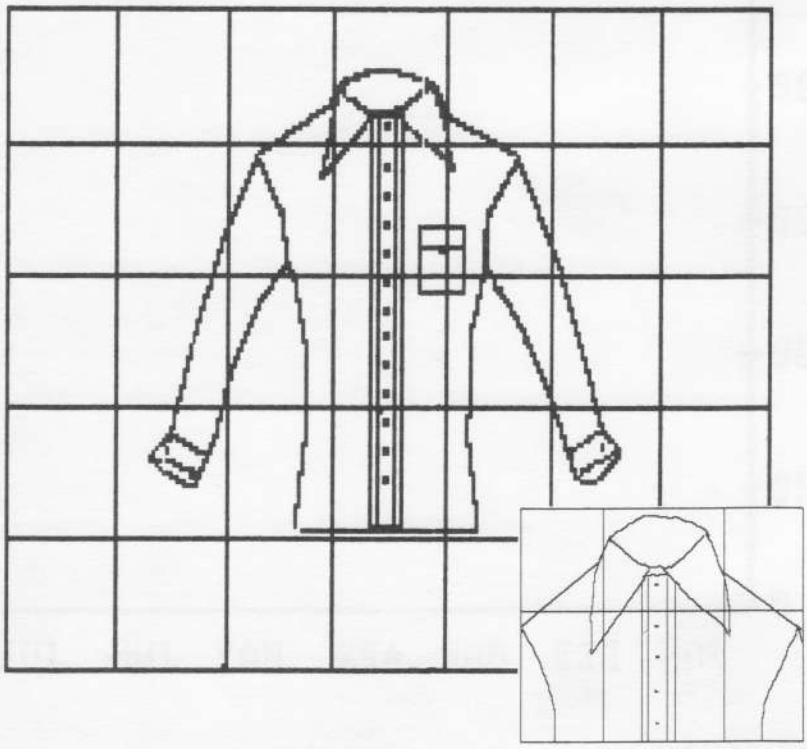


GRID MAKER

With the Grid Maker you can create a grid of any dimensions, turning your screen into 'graph paper.' The grid is drawn as an object and can be manipulated as such. It can be saved with your drawing or erased before the drawing is saved or printed. This allows precise scaling and proportions. You can zoom into part of a grid as you would any other object.

1. Exit the GPS program (remove any disks from the disk drive and turn the computer off).
2. Insert the Special Features disk in the disk drive and turn the computer on again. Be sure to have an initialized disk ready to store the grid 'drawing' that you create if you do not want to store it on your own copy of the Special Features disk.
3. Type a '1' to indicate you wish to make a grid and press Return.
4. Type the size of grid you want (5x5, 10x10, 11x11), using only one number - 5 or 10 or 11, etc. Then type the name you want to call this drawing (GRID5, G5, G11, etc.). Press Return after each entry.
5. Insert the correct storage disk.
6. This file is saved in GPS format as an object and is treated exactly like any other drawing saved as an object.

7. You have the option of creating another grid before exiting this Special Feature.

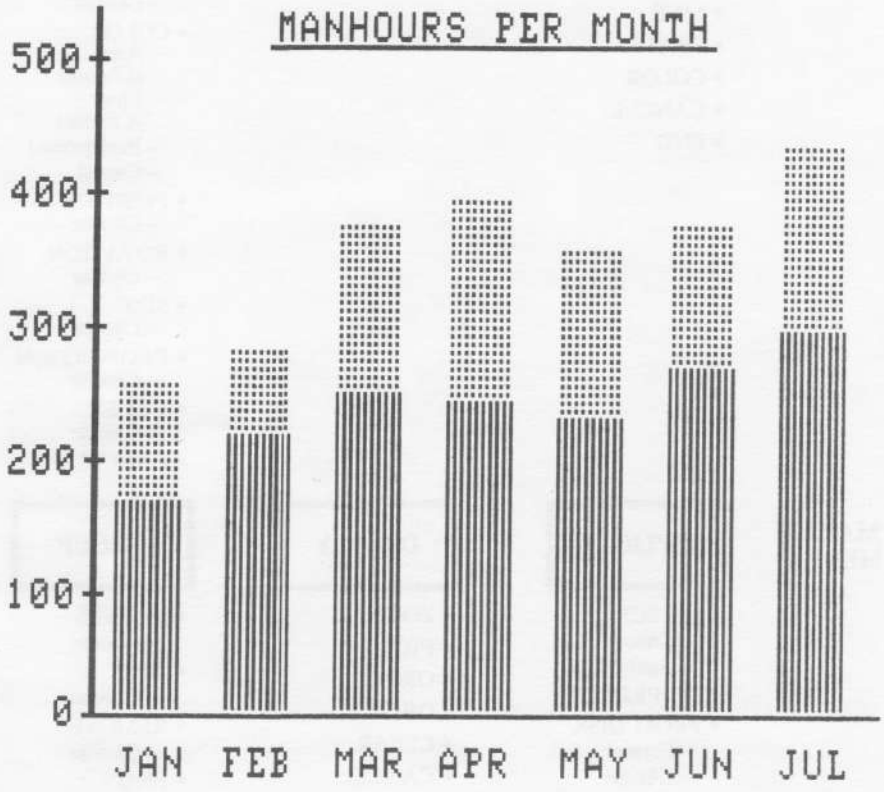


USING OTHER SOFTWARE

If you have a picture produced by some other program such as Apple Plot or VisiPlot and you want to draw on top of it, you can convert it to Apple Format and use it in the GPS program. It can then be used like any other drawing saved in Apple Format.

1. Follow instructions 1, 2 and 3 from above except type a '2' to indicate you wish to use Apple Format and press Return.
2. Respond to the prompt by typing the name of the picture you wish to convert exactly as it appears in a 'CATALOG' of that disk.
3. Insert the disk with the drawing to be converted into the disk drive as instructed on the screen.
4. GPS will load the picture and you can view it.
5. Type the name you wish to use for this drawing and press Return. You are prompted to insert the correct disk for storage. Do not type "APPLE . . ." as Apple Format does that automatically.

6. You have the option of formatting another drawing for use with GPS before exiting this Special Feature.
7. To use this drawing with the GPS program, pick DUPLICATE/FROM DISK/APPLE Format and type the name you have given it.



QUICK REFERENCE CHART

MAIN MENU

DRAW

- FREEHAND
- LINE
- ERASE
- COLOR
- CANCEL
- END

ERASE

* *CHOOSE*

MODIFY

- DRAWING
  - *Choose*
- COLOR
  - Area *(Choose)*
  - Line *(Choose)*
  - Background
  - Cancel
- POSITION
  - *Choose*
- ROTATION
  - *Choose*
- SIZE
  - *Choose*
- PROPORTION
  - *Choose*
- ORDER
  - *Choose*
- CANCEL

MAIN MENU

DUPLICATE

- ON SCREEN
  - *Choose*
  - Again
- TO PRINTER
- FROM DISK
  - Format
  - *Choose*
  - Again
- TO DISK
  - Format
  - *Choose*

DISPLAY

- ZOOM
- PICTURE
- GROUP
- OBJECT
- CLEAR
- CANCEL

GROUP

- CREATE
  - *Choose*
- ADD
  - *Choose*
- REMOVE
  - *Choose*
- END

MAIN MENU

INFORMATION

- DISK
- MEMORY
- CANCEL

CANCEL

*** CHOOSE**
- Object
- Picture
- Group

FORMAT
- GPS
- Apple

AGAIN
- Again
- End

CHOOSING A MENU

1. Move the cursor so that it is over the desired menu.

ACTIVATING A MENU

1. Choose a menu.
2. See it lit up in inverse.
3. Press the button.

INDICATING YOU ARE DONE

1. Move the cursor so that it is just off the screen.
2. Press the button.

FREEHAND

1. Pick the DRAW/FREEHAND option.
2. Move the cursor over the page's surface (without pressing the button) until you have it positioned where you wish to begin drawing.
3. Press down and draw.
4. Let go of the button.
5. Press down to draw some more.
6. Indicate you are done.

CANCEL

1. Pick the CANCEL option

LINE

1. Pick the DRAW/LINE option.
2. Move the cursor to where you wish to begin the line and press down.
3. Move the cursor to where you wish to end the line and press down. (This then becomes the starting point for your next line.)
4. Repeat for as many lines as you wish to make.
5. Indicate you are done.

ERASE LINE

1. Pick the DRAW/ERASE option.
2. Choose a reference point.
3. Pick a second reference point.
4. Press down.

DISPLAY OBJECT, GROUP or PICTURE

1. Pick the DISPLAY/OBJECT, GROUP or PICTURE option.
2. Identify the drawing you wish displayed.

CLEAR

1. Pick the DISPLAY/CLEAR option to temporarily erase the screen.

ZOOM

1. Pick the DISPLAY/ZOOM option.
2. Pick the zoom window you wish to use.
3. Position the window over the part of of the drawing you wish to zoom.
4. Indicate you are done.

MODIFY DRAWING

1. Pick the MODIFY/DRAWING option.
2. Identify the object you wish to modify, (you may only use this option on objects, not pictures or groups).
3. Perform any DRAW menu option you wish.
4. Pick the CANCEL or END option. In this one instance, and this one only, they are the same.

MODIFY COLOR

1. Pick the MODIFY/COLOR option.
2. Pick the aspect of the drawing (area, line, background) you wish to color.
3. Identify the drawing you wish to color.
4. Pick or mix your color.

COLOR AREA, LINE OR BACKGROUND

1. Pick the MODIFY/COLOR/AREA, LINE or BACKGROUND option.
2. Pick the drawing you wish to color.
3. Pick the color you wish to use.

POSITION

1. Pick the MODIFY/POSITION option.
2. Choose the drawing you wish to reposition.
3. Select a reference point.
4. Move the cursor to the new position and press down.

ROTATION

1. Pick the MODIFY/ROTATION option.
2. Choose the drawing you wish to rotate.
3. Create a center of rotation.
4. Create a reference point.
5. Pick the angle of rotation.
6. Indicate you are done.

SIZE

1. Pick the MODIFY/SIZE option.
2. Choose the drawing you wish.
3. Pick your reference point.
4. Adjust the box until you have the desired size.
5. Indicate you are done.

PROPORTION

1. Pick the MODIFY/PROPORTION option.
2. Choose the drawing you wish to change.
3. Pick your reference point.
4. Adjust the box until you have the desired proportion.
5. Indicate you are done.

ORDER

1. Pick the MODIFY/ORDER option.
2. Identify the object you wish to move another object or group on top of.
3. Identify the object or group you wish to move on top.
4. Indicate you are done.

DUPLICATE ON SCREEN

1. Pick the DUPLICATE/ON SCREEN option.
2. Choose the drawing you wish to duplicate.
3. Pick a reference point.
4. Move the cursor to a new position and press down.
5. Repeat step #4 as desired until the drawing is in the desired position.
6. Indicate you are done.

7. If you wish to make another copy, choose the AGAIN option and repeat steps #3-5. The object being copied is always the last object created, so choose your reference point with this in mind.
8. Pick the END option.

DUPLICATE TO DISK

1. Put an initialized 16 sector disk into the disk drive you wish to use.
2. Pick the DUPLICATE/TO DISK option.
3. Pick the format you wish to save the drawing under.
4. Choose the drawing you wish to save.
5. Type the name of the drawing you are saving and the number of the disk drive, if necessary.
6. Press RETURN on the computer.

DUPLICATE FROM DISK

1. Pick the DUPLICATE/FROM DISK option.
2. Choose the format you saved the drawing under.
3. Type in the name of the drawing you want.
4. Position the drawing.
5. Indicate you are done.
6. If you wish, choose the AGAIN option and repeat steps #5-6 as often as desired.
7. Choose the END option.

DUPLICATE TO PRINTER

1. Make sure your Apple Silentype printer card is in slot #1.
2. Pick the DUPLICATE/TO PRINTER option. Whatever is displayed on the screen will now be printed.

APPENDIX

MORE ON COLORS

The Apple II, through an ingenious hardware design, provides better color graphics than any computer in its price range. This design provides adequate resolution of color graphics at low cost.

But there are limitations. For one thing, the resolution of color graphics is half that of line graphics. When drawing lines, there are a total of 280 dots horizontally and 192 dots vertically on the screen. But when you draw in color, there are only 140 dots horizontally, although there are still 192 dots vertically. As a result you may notice that when you fill an area with color, instead of smooth lines appearing, you may get a box-like image.

When choosing your color, you are confronted with two rows of four boxes each. In the top row the colors are pink, green, white and black. In the bottom row, they are blue, orange, white and black. It would seem that black and white have been needlessly repeated, but there is a reason for this.

To process the information, the Apple screen is broken down horizontally into groups of seven dots. The first seven dots in a horizontal row constitute the first group, dots 8-14 make up the second group and so on. There are 40 such groups in all. The way the Apple is set up, each group can only hold colors from one row of boxes. In other words, in any seven-dot group on the screen, you may have colors from row 1 (pink, green, white, black) or from row 2 (blue, orange, white, black), but you cannot have a combination (pink, blue).

What this means in practical terms is that if you have a circle filled with pink on the screen, and attempt to move a circle filled with blue so it overlaps the pink circle, you may have some problems. The seven-dot groups cannot hold two colors from opposite rows and so the Apple chooses one color or the other. There is nothing you can do about this.

This is why you are offered a choice of two different whites and two different blacks. Let's say you have made a blue background of your picture and are attempting to draw with a white line. Because blue comes from row 2, you would have to pick the white from row 2 as well, or you will have fuzzy colors surrounding your lines. So far so good.

Now let's say you have a background which has mixed colors. You can mix blue and pink in your background because GPS mixes colors by assigning each color an alternate horizontal line. Since a horizontal line has only one color, this doesn't cause a problem. However, when you choose your white you are confronted with a dilemma. If you choose the white from row 1, it will match with the pink but will interfere with the blue. If you choose the white from row 2 to match the blue, it will interfere with the pink. Therefore, you must mix your whites, choosing white from row 1 and mixing with white from row 2. Mix your whites in the same order you mixed your background colors. These same principles hold whether you are drawing white lines on colored areas, or areas on top of areas, etc.

GAPS IN AREA FILL

Occasionally, when you enlarge or zoom into an object filled with color, a horizontal band without color will appear. This band is due to the fact that when the object was drawn, the first and last lines did not quite meet. Because the GPS program has resolution finer than the Apple screen, lines which appear to meet when drawn may actually have gaps when enlarged or zoomed.

To fix such a gap, change the object from area fill to line by choosing MODIFY/COLOR/LINE/OBJECT. Zoom into the portion of the object which has the gap. Then choose MODIFY/DRAWING and that object. Draw a line between the two lines which do not meet. Zoom out and MODIFY/COLOR/AREA/OBJECT. The area inside the object should be colored correctly.

BACKGROUND DRAWINGS (16K RAM Card Required)

This feature can only be used if you have an Apple II Plus, i.e., Applesoft Basic in ROM.

The background feature is the best means of creating complex colored freehand drawings because it will help you "extend" your computer's memory. With this procedure you build your drawing by transferring what is on the screen to a static background.

When you run out of memory before you finish your drawing, you can add more to it by turning what you have into a background. To free up memory, erase the picture, objects or groups. You can draw on top of the background, but it is frozen so that nothing inside of it can be modified.

To put what is on screen into background, place the cursor on the active part of the page, but off the screen, so the cursor is not visible, (otherwise the cursor will be in the background too!). Make sure you are not in any menu. Now touch one key on the keyboard. The options displayed on the screen will be: BACKGROUND, GRAPHICS, STOP. Hit the "B" on the keyboard. Now you have placed your picture in the 16K RAM card. To draw more, erase the picture. Try it. To see it again, say DISPLAY/PICTURE. Instantly your background is visible. You now have all the memory you started with to use for drawing. The only limitation is that you cannot modify the objects in the background. That means you cannot point to an object in the background and move it or enlarge it, nor can you zoom. However, you can draw on top of it, and at anytime you can hit a key on the keyboard and the "B" key and add to the background. This background will remain until you either MODIFY/COLOR/BACKGROUND or DUPLICATE/FROM DISK/APPLE format.

You can always save your background and picture by DUPLICATE/TO DISK/APPLE format (see Chapter Seven, FORMAT). Whatever is on the screen, background and picture, will be placed on disk. And, you can load backgrounds from disk. These can be pictures created with the GPS program, or other programs. You can convert pictures created by other programs to Apple format by running the program called Apple Format in Apple DOS. To load in a background, say DUPLICATE/FROM DISK/APPLE format. Then hit a key and the "B" key.

GLOSSARY

ACTIVATING (AN OPTION OR MENU): Pressing the button while an option or menu is "lit up" will activate that option or menu.

CHOOSING (AN OPTION OR MENU): Move the cursor over the desired option or menu. When you hear a click and see that option suddenly appear as black letters in a white box, you have chosen that option.

CURSOR: A cursor is a small dot of light which you can move around the screen at will by moving the controls on the joystick or game paddles. The cursor tells you where you are on the screen.

DOS: This is an abbreviation for Disk Operating System. It allows you to write commands which control the disk system.

DRAWING: A drawing represents anything created using GPS. It can be an object, group or picture.

DRIVE (NUMBER): This is also known as a disk drive. If you have more than one, each is given a number, such as D1 or D2. When specifying drive number, always preceed the "D" with a comma (,D2).

INDICATE YOU ARE DONE: This the the procedure used to tell the GPS program that you are through with a certain function. Move the cursor just off the visible screen and press down.

INITIALIZED: Before a disk can store your drawings, you must initialize it. Follow the instructions in your Apple DOS Manual, starting on page 13.

LIT UP: When an option or menu appears in inverse (black letters on a white background), it is lit up.

LOAD: When you load something, you are transferring information from a disk into the internal memory of the computer.

MENU: A menu is a list of options (or operations) which the GPS program can perform.

PICKING (AN OPTION OR MENU): Choosing and then activating an option or menu constitutes picking it.

SAY NO: This indicates to the GPS program that you do not want to pick the drawing which is flashing. Move the cursor off the visible portion of the screen and press the button.

SAY YES: This indicates you do want to pick the drawing which is flashing. Move the cursor so it is visible on the screen (but not inside any drawing you don't want) and press the button.