

\*\*\*\*\*  
\*  
\*  
\* Revised Addendum \*  
\*  
\* to the \*  
\*  
\* LPS II - Preliminary Reference Manual \*  
\*  
\*  
\*\*\*\*\*

July 21, 1982

Gibson Laboratories, Inc.  
23192-D Verdugo Drive  
Laguna Hills, CA  
92653

July 21, 1982

Revised Addendum to the  
LPS II - Preliminary Reference Manual

NEWS!! \*\*\* NEWS!! \*\*\* NEWS!! \*\*\* NEWS!!

Reaction to the new LPS II Light Pen System for Apple II computers has been staggering!! At the recent Boston Applefest, Stephen Wozniak (the designer of the APPLE) saw the LPS II for the first time. To directly quote him: "This has got to be the product of the year ... the software is incredible!" (He liked it) ... then he purchased one. The corporate offices of Apple Computer have also purchased several LPS II Light Pen Systems. They are seriously considering using the Pen (with their own internally generated software) to demonstrate the Apple II in retail dealerships across the country!!!

Stoneware's excellent product, GPS - Graphics Processing System - will soon be available with complete support for the LPS II.

Island Graphics ILLUSTRATOR II, the extensive Hi-Res drawing system by Steven Dompier, when released, will include full support for the Pen.

A well known commercial Apple game publisher has almost finished writing a fully interactive, fast action game called "LPS II Madness." It has been created specifically for the LPS II !!!

More than four hundred and fifty LPS II Light Pen Systems are operating in the world today, with a suprising result ... More than 450 Pens in use today and not a single failure. NOT EVEN ONE!!! The LPS II is built with the finest components money can buy. As a result of this demonstrated reliability, we are extending the LPS II Limited Warranty to a full 180-days ... that's right, SIX MONTHS!!! Effective immediately, and retroactive to every Pen ever sold.

By popular demand, the diskette you have received contains two of our newest, previously unreleased, programs: ANIMATOR and EASYEDIT. The Boston Applefest brought many questions and requests. One topic stood out from the rest: Animation. So we've responded with an eye-popping animation system (written entirely in Applesoft using PENTRAK) This revised addendum contains thirteen pages of preliminary documentation on the care and feeding of ANIMATOR. EASYEDIT is the cleanest, easiest to use editor of Hi-Res images imaginable. Even though EASYEDIT's preliminary documentation was not ready in time for this addendum, using EASYEDIT, once ANIMATOR's zoom-mode screen editing operation is understood, will not require instructions ... it's that easy!!!

Gibson Laboratories is fully aware that the documentation which accompanies this LPS II will be inadequate for many people. We are equally aware that many of the applications presently contained on the enclosed diskette have rough edges which need polishing. The correction of these problems has the highest priority within Gibson Laboratories. Our people are responding to the excitement and interest being generated by devoting themselves to the task of improving and enhancing the software and documentation of the LPS II. At this rate, we will soon have the best product possible. Since YOU have purchased the LPS II prior to the completion of our plans, we feel that you should receive this final "best possible" documentation and software FREE. It will be sent, the moment it's ready, at no charge to all registered LPS II owners.

You will find the OWNER'S REGISTRATION CARD enclosed with the Pen. THIS MUST BE RETURNED!!!! to Gibson Laboratories for several reasons.

- 1: In order for us to send the final software to you (we KNOW you want it!), we must know WHO and WHERE you are!!
- 2: The receipt of the registration card constitutes a subscription to the PENMASTER NEWSLETTER. This insider's newsletter will be sent periodically to all owners of the LPS II. It will contain, among other things, a growing directory of LPS II compatible software, listings of programs which occur to us after the final release of the LPS II software, an inter-user communication forum, a column called "PENTRAK ONE-LINERS", and news of the availability of graphics hardware and software of interest to the Apple owner. Interesting Light Pen related puzzles and contests will also appear.

(In case you haven't read any of the above ...)

```

*****
*
* BE SURE TO RETURN YOUR OWNER'S REGISTRATION CARD !!!
*
*****

```

\*\*\*\*\*

This Addendum supplements the enclosed Preliminary Reference Manual and serves to outline the enhancements embodied in PENTRAK 1.1. Additionally, the long-awaited PENPAINTER System (PENPAINTER and PATTERN EDITOR) is now included with the standard LPS II support software. As mentioned above, the new ANIMATOR and EASYEDIT programs are also here.

We'll say it just one more time:

**WE WANT YOU TO HAVE THE FINAL REFERENCE MANUAL AND SOFTWARE ON DISKETTE ... RETURN THE REGISTRATION CARD OR WE WON'T KNOW WHERE YOU ARE.**

This addendum is divided into the following four parts:

- 1. PENTRAK driver enhancements
- 2. Operation of the PATTERN EDITOR for PENPAINTER patterns
- 3. Operation of PENPAINTER
- 4. Care and Feeding of ANIMATOR

Without further discussion, let's get to it:

\*\*\*\*\* PENTRAK 1.1 \*\*\*\*\*

The first version of the PENTRAK driver was PENTRAK 1.0. It was released just prior to the San Francisco West Coast Computer Faire. The current version, PENTRAK 1.1, first appeared at the Boston Applefest. PENTRAK 1.1 includes many significant enhancements over the prior version. These extensions reflect our growing experience with the LPS II and with this new breed of Apple^--Pen related applications, as well as our desire to create a true Gourmet's Delight product. The Pen is rapidly approaching this ideal.

It may be that much of the confusion surrounding the LPS II's documentation arises from the fact that a true Light Pen SYSTEM is NOT a simple peripheral. It is a sophisticated, incredibly flexible tool. The software required to bring this flexibility to the user's programs must be equally sophisticated and packed with options ... or the power of the Light Pen is lost. This all boils down to a simple fact: The details of the PENTRAK driver ARE NOT FOR EVERYONE. If you're not a skilled Applesoft programmer needing to write your own Light Pen programs, then there is nothing about the PENTRAK driver which you need to know. The included applications, and the LPS II compatible software which will soon become available from other sources, have been written to shield you from the boring details of Light Penmanship. You're not missing ANYTHING by skipping over the sections about PENTRAK, and delving deeply into the use of the Light Pen applications.

However, if you ARE a skilled Applesoft programmer, you can expect to uncover the Gourmet's Delight we spoke of earlier. A highly skilled and experienced product design engineer spent a solid year and a half implementing PENTRAK. We receive constant enthusiastic praise over the result of his work.

So, feel completely free to skip now to the second section of this addendum!

----- PENTRAK 1.1 ENHANCEMENTS -----

FRAME:

The FRAME function has been enhanced in two significant ways:

- 1" A new syntax is supported: &FRAME(X,ramloc,X1 TO X2 AT Y FOR N) Without the preceding 'X' the command is identical to example 2 on page 23 of the Preliminary Manual. The addition of the preceding 'X' instructs PENTRAK to Exclusive-Or the memory contents into the specified screen area rather than to overlay.
- 2" The PENTRAK 1.0 version of FRAME does not allow complete freedom in the choice of the X location variables (they had to fall on BYTE boundaries) during the restore operation (example 2 page 23). PENTRAK 1.1 has been enhanced to support all combinations, and complete freedom of X coordinate selection.

&OFFSET(X,Y):

PENTRAK 1.0 did not provide a clean method for the calibration of the horizontal coordinate of the Light Pen. In addition, very old Rev.0 Apple motherboards generate a video vertical sync signal which differs significantly from later revs. A provision for setting the vertical Light Pen offset is therefore required. The new OFFSET function provides this service.

X=0 : Y=0 : &OFFSET(X,Y) ... example 1.

The PENTRAK driver normally operates with non-zero offsets for both X and Y axis. When, as in example 1 above, OFFSET is called with variables which are BOTH equal to zero, PENTRAK 1.1 stores the current X and Y offsets into the first and second variables respectively. This allows you or an Applesoft program to readout the current offsets before they are changed.

X=X+1 : &OFFSET(X,Y) ... example 2.

When EITHER of the two variables in the OFFSET function are non-zero, PENTRAK assumes that the current X and Y axis offsets are to be set to values of the variables. If the statement in example 2 above were to follow example 1, the result would be an increment by one of the horizontal offset. The Y offset would not be changed.

The CALIBRATE program included has been updated to provide for REV.0 motherboards and European 50 cycle operation.

&DOTS:

A new ultra-fast grid-drawing command has been included: DOTS immediately Exclusive-Or's a full screen field of simple dots onto the current drawing screen. The pitch of the dot field is exactly eight. There is no provision for altering this dot spacing as eight seems the best tradeoff.

SKETCHn and MIRRn:

Two new features have been added to the list of possible options in the TRACK function call. Both are oriented toward the Sketch style of drawing seen in the provided program SKETCH.

SKETCHn:

The SKETCH option instructs PENTRAK to draw a continuous line wherever the Light Pen is tracked. The line is drawn in the current color as set by the Applesoft HCOLOR= statement. If the color selected for sketching is not either black or white, the sketched lines are drawn in such a way as to guarantee correct sketching with contiguous (non-broken) lines. The SKETCH option REQUIRES an argument in the range 0 to 5. This specifies the amount of real-time POINT AVERAGING to apply to the received coordinates prior to actually drawing the line. Experience as shown that better sketching results from averaging across a history of Light Pen locations. The new SKETCH program included with the PENTRAK 1.1 release demonstrates this better than words.

(Try it)

The argument following the SKETCH option is the log base 2 of the averaging history length. Use the following table:

n	Length
0	1
1	2
2	4
3	8
4	16
5	32

#### MIRRN:

We could not resist one last embellishment to the SKETCHING function, ... real-time mirror imaging. It's not clear that there are any solid practical application, but it's great to watch!!!! (The SKETCH program has this too) The default is an implied MIRR0 (no mirror imaging). If the MIRRN option accompanies the SKETCH option in a TRACK function, and if the MIRRN is MIRR1, MIRR2, or MIRR3, mirror imaging of everything drawn (in any and all colors) will occur. The effect is so dramatic, it must be seen to be believed. (Try it with the SKETCH program) The argument of the MIRR option has the following meaning:

n	Mirror Image Mode
0	No mirror imaging
1	Mirror across the Vertical Centerline
2	Mirror across the Horizontal Centerline
3	Mirror BOTH Vertical and Horz.

The power of the PENTRAK driver allows a single command to perform complete sketching functions in real-time with multiple-point smoothing! Without even writing a program, try typing the following lines into Applesoft (after booting your copy of the PENTRAK diskette)

```
&HP,MIXED,DHP,CHP,NEG : HCOLOR=0
&TRACK(X,Y,KEY,NC,SKETCH5,MIRR3),TP
```

Now point to the screen and draw!!! Hit any key to quit.

NOTE: The Commands FIX, SELECT, and FILL

Three additional commands have been added to the extensive vocabulary of the PENTRAK driver, these are: FIX, SELECT, and FILL. They are extremely dangerous intrinsics used by the PENPAINTER system. They assume that they are being used properly, and do not check for abuse. Additionally, they assume the presence of the PENPAINTER.ML machine language system which supports these operations. Do to the nature of these commands, they should be used only from the PENPAINTER program. Their use in your own applications is not recommended, and will not be supported at this time.



The flow-chart like diagram is called an INFO-FLOW<sup>tm</sup> diagram (a trademark of Gibson Laboratories). It is a very exciting concept!!! Once you get used to the idea behind INFO-FLOW, you'll find that the documentation and memorization required for the use of the computer is greatly reduced ... making the computer much more friendly!!!

The INFO-FLOW diagram works on the idea of information transfer within an application program or system. The diagram shows and labels the major information-containing blocks, while the arrows connecting these blocks show legal information-paths. Any system can be reduced to its essentials in this manner. In this instance, there are three major info-containing blocks: DISK STORAGE, PALETTE SCREEN and PATTERN EDITOR. Each is shown with it's own box. Arrows connect the DISK STORAGE to the PALETTE SCREEN, and the PALETTE SCREEN to the PATTERN EDITOR. To activate an information transfer between any two boxes, you simply TOUCH THE ARROW WHICH INDICATES THE CORRECT TRANSFER!!!! Right now the prompting line below the INFO-FLOW diagram is telling us to select an operation from the diagram, so let's do it!

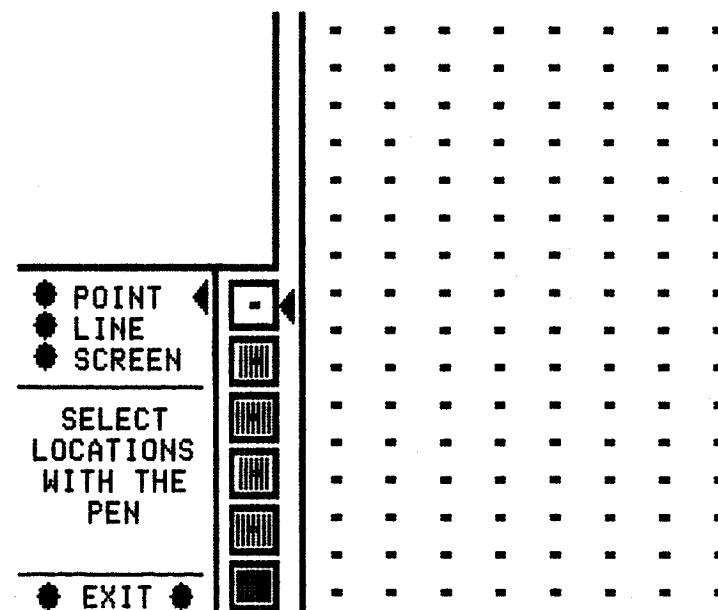
Using the Light Pen, touch the arrow which would indicate a transfer of information FROM the disk storage TO the palette screen. After a moment of confirming delay, the computer will "boop" in acknowledgment of your selection, and will ask if you wish to "LOAD: PATTERNS ?" Although patterns are what will be loaded, the computer means the FILENAME "PATTERNS" Since this is the name of the pattern file which is included on the disk, simply hit the "Y" key on the Apple to load this file. The disk will whir, clank, and make those stratching noises which indicate information being (in this case) read, and the upper portion of the display screen will fill-up with an entire array of vivid color patterns. (If you still haven't purchased an RF Modulator for your home color television ... maybe you'll do it now???)

You are looking at a 13 by 7 array of PATTERNS. Ninety-One in all. These were all created using the program in front of you right now ... and within ten minutes, you'll be creating and editing your own. Since you may be using this array of patterns frequently, we 'll point out several things about the provided PATTERNS file:

All four Apple solid colors appear in the upper left of the screen. Below they've been mixed with white, and below that with black. Solid white and black are present, as are various mixtures of the basic colors. The rest of the pattern array is filled with a creative variety of different patterns. These have been provided to stimulate your own imagination, as well as to give you something to paint with right from the start. Using this PATTERN EDITOR, any or all of these patterns may be modified or replaced with patterns of your own design. You can name the resulting new pattern array anything you want and store it onto the disk for later use or further editing.

Now that the provided PATTERNS file has been loaded onto the PALETTE SCREEN, let's take a look at editing a pattern:

Under the column labeled EXITS, the last option is EDIT. Select the EDIT exit now with the Pen. After the usual confirming pause the computer will "boop" the the screen will change to show the actual PATTERN EDITING area. There is a blank area in the upper left of the screen, and a grid of white dots filling the right half. Two arrowheads appear, one pointing to the words POINT MODE, and the other pointing to the BLACK box in the color-selection menu. Also, the mini-screen above the " \* EXIT \* " now contains a message for you. Your screen should look like this:



Experiment with changing the EDIT MODE and CURRENT COLOR by touching the mode selection buttons next to the words POINT, LINE and SCREEN, and by pointing to the centers of the six color-filled color-selection boxes. Notice how the mini-screen changes as the edit mode is changed, always suggesting a possible course of action.

The three EDIT MODES have the following functions:

**POINT:** Individual pattern dots pointed to on the Zoome-edit grid are immediately set to the current color. This provides a very simple and direct method for pattern editing.

**LINE:** A straight line of the current color is drawn between any two specified endpoints. The mini-screen will prompt you for the endpoints.

**SCREEN:** After selecting SCREEN mode, the mini-screen will ask for the color which the ENTIRE screen will be CLEARED to. SCREEN mode will automatically switch to POINT mode after completion. This is like an erase function, though the screen may be cleared to any color.

The CURRENT COLOR is indicated by a white arrow in the color-selection menu area, which always points to the color which will be used for any pattern modification. This color selection may be changed at any time by simply pointing to the white dot in the center of the color you want, or by pointing to the white frame surrounding the color patches.

The large zoom-edit grid, filling the right half of the screen, functions both as menu and display area. Points on the pattern are indicated by touching the pen to the desired location (like menu selection). If the location contains a color, the pen does not need to be centered in the square, but the white trigger button located in the center provides a positive, reliable response. This is also true of the color selection menu.

Now take your experimenting one step further. In addition to selecting MODEs and COLORs, point to dots in the zoom-edit grid and note the effect. Try this with all three edit MODEs, reading the mini-screen at first so you know what to expect.

As you begin filling the zoom-edit grid with colors, you'll notice that the upper left corner of the screen has been busy too. You'll see that anything and everything drawn in the zoom-edit grid is echoed immediately 30 times. These are "life-size" images of the pattern, and allow you to preview the final, painted appearance of any pattern you're editing. This is exactly how it will appear when PENPAINTER uses your pattern for filling in (painting) an area of a picture!

When you've created whatever pattern you wish, leave the EDIT MODE by touching one of the two EXIT buttons. The display will immediately switch back to show the palette screen. At this time, your newly created pattern is still in the EDITOR. It must be moved over to the palette screen before it may be saved to disk, or used by PENPAINTER. (You'll note that the INFO-FLOW diagram implies this ... that the disk ONLY saves from the palette screen.) Looking at the INFO-FLOW, you probably already know how to move the EDITOR's current pattern over to the palette screen.. Simply touch the lower right-most arrow which indicates an "info-flow" from the PATTERN EDITOR to the PALETTE SCREEN. The lower prompting line will ask where on the palette the new pattern is to be placed.

\*\*\*\*\*  
 NOTE: If you point to the lower arrow after the "boop" of recognition, the computer will assume that you want to cancel the operation. The question "INDICATE WHICH PATTERN" will be withdrawn, allowing you to select a different info-flow.  
 \*\*\*\*\*

Indicate the pattern cell which is to receive your newly composed pattern by pointing either to the pattern currently occupying that cell, or to the trigger-dot just below the pattern. (The trigger-dot makes pointing to empty (black) or dark patterns easy, and always gives you something reliable to point to.) Point to the cell of your choice, and your pattern will appear there, having been copied from the EDITOR. NOTE: Any pattern which occupied that location will be lost forever, since it is completely covered up by your new pattern.

Several options are available now. The EDITOR still has your last pattern, if you want to go back to it and make some more changes after saving this version, choose the EDIT exit as you did before. This will "exit" you from the palette screen and place you into the EDITOR WITHOUT TRANSFERRING ANY INFORMATION. Information is only moved when you touch one of the INFO-FLOW arrows on the palette screen. If, however, you wanted to save your newly modified palette onto the disk, point to the lower left-most arrow. The system remembers the name you most recently used, and offers to save the new palette into that filename. When done, you can continue.



**A NOTE ABOUT DISK TRANSFERS:** Every LPS II application program allows you to completely cancel any disk load or save operation by simply hitting the RETURN key in response to the prompt for a filename. Remember -- you need only to hit RETURN to back-out of any disk transfer. Also, for the sake of speed and simplicity, most of the applications do not ask for a drive number (1 or 2) or a slot number (if more than one controller). The applications will always use whichever drive and controller were last used unless you specify otherwise. THE ONE EXCEPTION TO THIS IS FOR RETURNING TO THE MAIN MENU, AND FOR ACCESSING OTHER PROGRAMS FROM THE MENU THE MAIN DISK WITH "MENU" MUST ALWAYS BE IN DRIVE 1 OF THE SLOT 6 CONTROLLER WHENEVER YOU ARE RETURNING TO THE MENU. For loads and saves in the LPS II applications, you are always allowed to specify which drive you wish to use by adding the ",D1" or ",D2" at the very end of the filename. If you're unfamiliar with this, see page 22 of your DOS 3.3 MANUAL for a more complete explanation.

If you wish to view or modify any of the patterns provided on the diskette, just touch the upper right-most info-flow arrow to specify transfer from the palette screen into the pattern editor, then indicate which pattern to view and edit. You'll be switched into the editor, with the pattern being scanned and read onto the zoom-edit grid and onto the life-size array area. In this way, existing patterns may be edited and re-saved whenever desired.

Once you've edited and created all the patterns you want, you MUST SAVE the resulting palette of patterns to the disk. Any modifications made to the pattern array are strictly temporary until stored on the disk for later use.

**NOTE:** If you wanted to simply rearrange the locations of patterns on the palette screen, you would have to copy each pattern into the editor, then out again onto the palette screen. Although this will work without problem, it would take time. The final LPS II software release will contain and document a program called PATTERN MOVER which moves patterns around the palette screen in the blink of a eye. (Get that owner's registration card into the mail!)

When you are finished editing patterns, you may exit the program to the main MENU, or to the PENPAINTER.

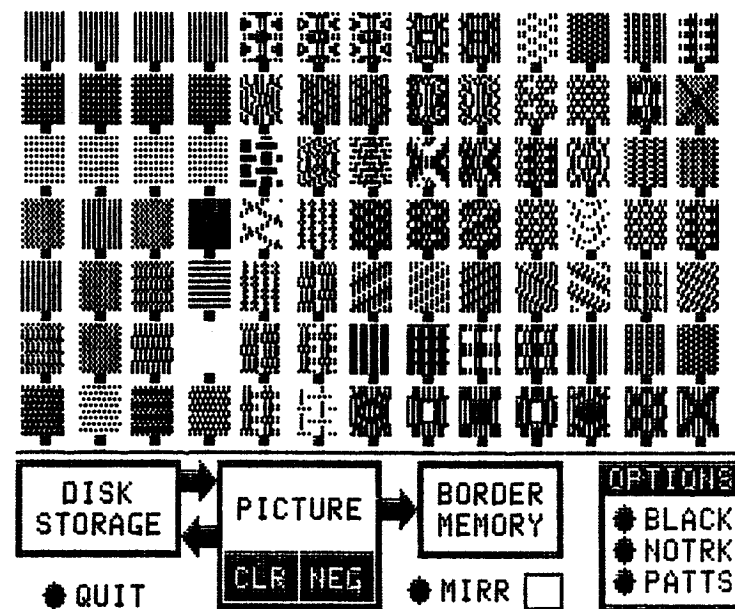
If you choose to go directly to the PENPAINTER to use the patterns you have just created, simply hit the light-button to the left of the word "PAINT" on the EXIT MENU of the palette screen. PENPAINTER will be loaded and run with your latest array of patterns.

And now ...

\*\*\*\*\* PENPAINTER \*\*\*\*\*

Run PENPAINTER or, better yet, select the PAINT exit option from PATTERN EDITOR to take you automatically to PENPAINTER. The appearance of PENPAINTER's INFO-FLOW diagram will look rather familiar to you by now, and you probably won't need much instruction (the beauty of INFO-FLOW), however, several aspects of PENPAINTER are not obvious from the info-flow diagram, so there are several points to be made:

For one thing, the INFO-FLOW diagram implies the flow of PICTURES, NOT PATTERNS. PENPAINTER does not manipulate patterns, (that's the domain of the PATTERN EDITOR), its pattern handling abilities are limited to the loading of a pre-existing pattern file onto its palette screen (like PATTERNS provided on the disk). This palette screen loading is accomplished by touching the menu button next to the word PATTS on the OPTION MENU area. However, if you are coming directly from the PATTERN EDITOR, and wish to use the same set of patterns, loading the palette screen will not be necessary since they are left behind on the screen by PATTERN EDITOR.



Between the DISK STORAGE and the PICTURE are the normal two-way arrows indicating that the PICTURE may be loaded and saved to the disk. The PICTURE referred to here is NOT the one you're looking at now (not the palette screen), but rather another which actually contains the image being painted by PENPAINTER. Notice that only one arrow pointing from the PICTURE towards a box called BORDER MEMORY. This obviously implies that picture information may be moved INTO the border memory (whatever that is) but that it may not be moved out again. This is, in fact, true.

Notice too that the PICTURE box is not as simple as in past INFO-FLOW diagrams. The box contains two Light Pen buttons: CLR and NEG. As you might guess, these are abbreviations for CLEAR and NEGATE, and again refer NOT to the palette screen directly above, but rather to the PICTURE which we have not yet seen.

There are a few things not pertaining to info-flow which must be understood: At all times, hitting the ^SPACE" bar of the computer will flip your view back and forth between the palette screen and the PICTURE. Just as the pattern editor contained two screens, PENPAINTER also uses two. Try hitting the SPACE bar now several times and see the effect. You'll note that the drawing screen starts out completely white. This is the screen upon which you and PENPAINTER will be drawing. PENPAINTER always paints on a white screen, using black outlines as the BORDERS for painting.

The Borders referred to just now, and in the info-flow box "BORDER MEMORY", always consist of black lines on a white background. Painting a picture involves THREE distinct steps. First, the borders for the painting must be drawn or loaded onto the PICTURE screen. Then, as the second step, these borders must be moved into the BORDER MEMORY where they remain separate from the picture being painted. The third step is the painting of the picture using the patterns on the palette screen. We'll take a close look at each of these three steps:

Borders can come from one or both of two sources: loaded from the disk or drawn by hand. If loaded from the disk, the picture may have come from any source as long as it is mostly white with black line borders. Pictures which already contain colors cannot be painted. Any of the LPS II application programs on the PENTRAK Software diskette may be used to generate an image for painting. If you wish to load a previously created image into PENPAINTER for painting, touch the upper left arrow on the INFO-FLOW diagram. You will be asked for a filename to load, then the screen will flip to the image area so that you may watch.

The alternative to loading an image from disk is drawing the image freehand. To draw freehand, hit the SPACE bar to view the all-white PICTURE page. Then hit the LEFTARROW or the "1" key to start drawing

and the RIGHT ARROW or the "2" key to stop. This is identical in operation to the simple SKETCH program on the diskette. Under the BORDER MEMORY box of the info-flow you'll notice the word MIRR with a dot to the left and a small empty box to the right. Touch the MIRR dot and watch the small box. This box shows the type of mirroring in effect at any time. Leave the small box with both horizontal and vertical lines inside, then flip over to the PICTURE page and draw something. MIRR stands for MIRROR image drawing.

If you make a mistake while drawing the picture and want to correct it you can do one of two things. You could touch the CLR word in the PICTURE box. This would erase the entire image and allow you to begin again. If you want to only erase a small mistake, there is an alternative. In the OPTIONS box in the lower right of the screen is the word BLACK. This is the current color which will be drawn by the Pen. Touching the dot to the right of the word will change it to WHITE. Holding the Pen there will cause the color to change back and forth until you remove the Pen. With the word saying WHITE you can sketch-out any mistake you may have made.

The word below the current color word is NOTRK. That stands for No Tracking Cursor. The tracking cursor is normally useful during the third step of painting, but could be handy in erasing a mistake. Pointing to its dot causes it to change to TRACK and back again. Normally NOTRK is the best setting during drawing on a white background.

If an image was loaded from the disk, it could be enhanced with direct sketching following the load, but the image would have to be loaded first and the freehand sketching performed afterwards.

If the image loaded from the disk is a white-line drawing on a black background rather than black-line on a white background, the NEG button on the INFO-FLOW diagram will NEGATE it, thus making it correct for PENPAINTER.

Now for the second step... When you have the image you wish to paint, flip over to the INFO-FLOW diagram and touch the arrow which moves the picture you've been drawing into the border memory. As the transfer is made, the screen will show the picture being scanned into border memory. When done, you will be returned to the INFO-FLOW display. Notice that the arrow you touched and the MIRR word are now gone as is the arrow allowing you to load an image from disk. They have been removed to remind you that the border memory has been loaded, and that it can only be loaded ONCE. After being loaded, freehand drawing and picture loading are not permitted. We are now ready for the third and most exciting step: PAINTING!

Selecting from the palette in front of you, point to a pattern which you enjoy. Select that pattern, as before, by pointing to it, or better yet, to the white dot just below. As soon as the computer has recognized your selection, the screen will automatically switch to the picture you drew. IMMEDIATELY REMOVE THE PEN FROM THE SCREEN as soon as the screen switches. If you do not remove the pen quickly, the computer will assume that you wish to paint the pattern you chose at the same area of the picture you drew.

Now, decide which one of the areas in your picture to paint with your chosen pattern, and point to it. After the usual programmed delay, the computer will fill the entire area you pointed to, no matter what the shape, with the pattern you have chosen!!!!

You could fill-in another area of the picture with the same pattern by pointing again, or change the painting-pattern any time by flipping to the palette screen and selecting another. In this way, the entire picture may be painted using patterns from the palette. Even the palette could be changed at any time by loading another with the PATTS option.

Pictures like this one are easily created:



One of the most powerful and useful features of PENPAINTER is the ability to re-fill any already painted area. If a color or pattern doesn't look right, simply select another and paint right over the old, wrong one!

There may come a time when you need to point to a black area for painting, or to a dark pattern which the Pen cannot easily read. If so, a tracking cursor may be brought into use. Flip to the OPTIONS menu on the palette screen and select the NOTRK option. As the computer reads your selection, the word NOTRK will be changed to TRACK. With the word set to TRACK, flip back to the picture. Somewhere on the picture will be a TRACKING CURSOR. It looks like a white square with little points on the sides. If you can't find it, point to ANYTHING bright and the tracking cursor will immediately lock onto the Pen's point. Move the cursor to the area you wish to paint and hold it motionless. After a confirmation delay, PENPAINTER will paint the area you've selected. The tracking cursor will continue to function until you remove it in the same manner it was created.

Once you've achieved artistic bliss, the resulting image may be saved onto the disk. Just touch the proper arrow, then think of a name for the picture file. Any of the standard screen-dump programs may then be used to produce a paper copy of the image ... even in color!! (With a color screen-dump program and a color printer)

Remember -- you must save your drawing to the disk if you ever want it back.

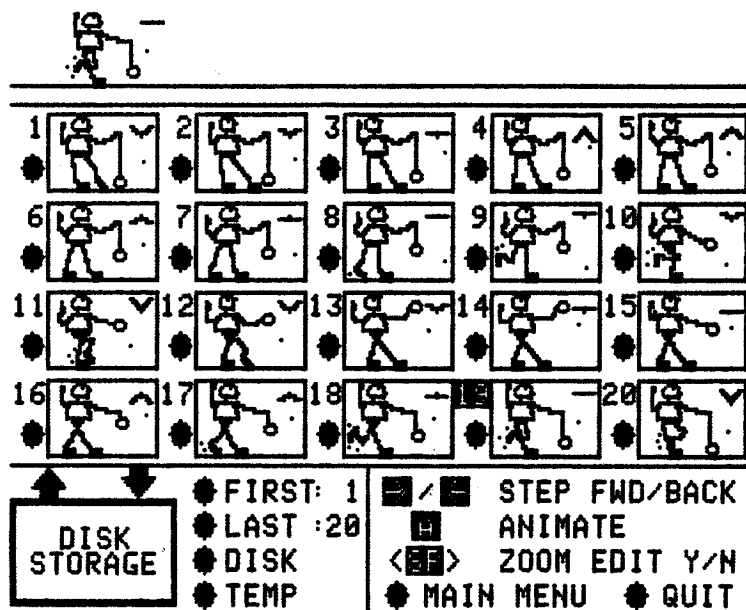
Finally, use the QUIT button on the info-flow screen to exit from PENPAINTER.

If you ever need to load a picture file onto the Hi-Res Primary page for dumping to a printer, the following command will do this for you:

```
._&HP : BLOAD "Filename",A$2000 : &TP
```

Replace the "Filename" with the actual name of the picture to be loaded. This command will flip to the Hi-Res Primary page, show you the image loading, then flip back to the Text page for your dump commands.

## ANIMATOR



ANIMATOR's display screen

## Overview-

The ANIMATOR program provides the LPS II owner with a simple method for experimenting with animation. High-quality animated sequences can be easily created, edited, saved, and recalled.

Animation is the illusion of motion which occurs when we see a series of rapidly changing, but non-moving, images. Our human brain and vision system fills in the gaps between the separate "frames" of an animated sequence, giving the impression of smooth and continuous motion. As you may already know, the images generated by the television in your home do not actually move, but are really composed of single still "frames" displayed at a high rate. A characteristic called PERSISTENCE OF VISION causes this illusion of motion. Standard broadcast television displays sixty separate frames in each second. Research has shown that this is much faster than is required for motion. Movies in the theatre are seen at only 24 frames per second,

and a lower limit of eight frames per second has been found acceptable. ANIMATOR operates at a frame rate of 18 frames per second, thus the animation is of very high quality. If you have not already done so, run ANIMATOR, and respond with "Y" to the question about a DEMO. You will quickly see just how good the illusion of motion can be.

## Program operation-

In keeping with our HOP IN (Hands-On, Push-It-Now) approach to learning about Pen operation, you should now be seated in front of the computer with a COPY of the LPS II software in drive one. We assume that you've already calibrated your pen once for this computer and display monitor, and that the monitor's brightness and contrast controls have been set for good operation of the Pen.

## TAKE SPECIAL NOTE OF THIS:

When ANIMATOR was designed, we found it necessary to choose between color animation and higher resolution animation. Due to the way the Apple handles hi-res color it is not possible to have both at the same time. (See the appropriate appendix for more details on Apple's color/resolution situation.) In our effort to keep the animation quality as high as possible, and ANIMATOR usable and simple, we decided on higher resolution, sacrificing color in the animations. We feel, in retrospect, that the right decision was made. So, if you are using ANIMATOR with a color monitor, superior results will be achieved if you turn your monitor's COLOR LEVEL down as far as possible. This will remove the annoying color side-effects. Owners of the Electrohome Supercolor II RGB board should see the Supercolor II appendix for a modification to ANIMATOR which will suppress color automatically.

Now, start ANIMATOR running. Either through MENU, or by typing RUN ANIMATOR. If the program is already running, simply restart it by hitting the RESET key, then type RUN. Respond "N" to the question "DEMO ?" We will now walk through the various ANIMATOR operations while you HOP IN and try it as we go.

## Loading Animation Sequences-

We'll begin by loading a previously composed animation sequence from the LPS II software disk. If you're already familiar with the INFO-FLOW<sup>tm</sup> concept of light pen control, you can guess how that might be done: in the lower left of the display screen you'll see a box containing the words "DISK STORAGE". This is the symbol representing the floppy disk storage on your computer. Two arrows are graphically connecting the box to the larger array of empty frames above. The arrow on the left points from the disk storage toward the array above, while the arrow on the right is pointing from the array above down into the disk storage. Since we wish to load an animation sequence FROM the DISK STORAGE into the ARRAY, we will point and hold the Light Pen at the center of the LEFT arrow, the one which indicates a flow of information from the disk to the array. Hold the Pen stationary until the audible "boop" is heard, indicating that the computer has registered your selection. Immediately take the Pen away from the screen.

The LOAD FILE: message will now be seen in the center of the screen. The space to the right of the LOAD FILE: message is provided for you to type the name of the floppy disk file you wish to load. ONLY SPECIAL ANIMATOR-type FILES SHOULD BE LOADED. These are files containing animation sequences which have been generated and saved using ANIMATOR. Loading other kinds of files (like pictures or programs) will not make sense to ANIMATOR. Several sample animation files have been included with the LPS II for use with ANIMATOR. To help us tell animation files apart from all the other types of files, we have put the special ending ".ANI" onto all animation files. The anything you want, but we suggest you help yourself by following this simple rule.

Meanwhile, the computer is still waiting patiently for a file name to be typed. Before we do that though, without typing anything at all, just hit the RETURN key. You'll notice that the box and message disappear, and that you can see the screen that was being temporarily covered up. It is important for you to know that in ANY of the LPS II programs, if you change your mind about loading or saving to or from the disk, simply hitting RETURN without typing anything will cancel the operation.

## Animation Files-

Once you've mastered ANIMATOR, you can browse through the catalog on each side of the diskette, there are several interesting .ANI animation files to watch, but for now let's use the same file as was used by the DEMO of ANIMATOR. Not suprisingly, it's called: ANIMATORDEMO.ANI so type the file name exactly as shown. If you make a mistake while typing, the back-arrow key will backspace as usual. When done, hit the RETURN key. The box and message will disappear, and the disk drive will light up and begin making those scratching sounds which means the file is loading. When the file has been loaded, you will hear a warbling tone indicating successful operation completion.

If you had asked for a non-existent file, or had mis-typed the filename, the appropriate error message would come onto the screen accompanied by a rather discouraging error noise. Then in a second or so the FILE NAME: message would return and wait for you to try again. You could abort the whole thing as usual by just hitting RETURN, or try typing the name again.

All disk accesses are made to the disk drive which was LAST ACCESSED. If this is not the drive you want, simply add the drive number to the end of the filename. For example, if you wanted to load a PACMAN animation from the second drive, where the animation file is called PACMAN.ANI, you would type PACMAN.ANI,D2 Your DOS 3.3 manual contains all the details about drive and slot numbers.

## ANIMATOR Interaction -

As the disk grinds to a halt, having loaded the ANIMATORDEMO file, the FRAME ARRAY will fill with the single frame images of a walking person with yo-yo, accompanied by bird and buzzing bee.

## Notice several things:

First, the individual FRAMES are each numbered. The numbering goes from 1 to 20, across the top row from left to right, then down one row and so on to the lower right corner. Notice that underneath every frame number is a light pen FRAME SELECTION BUTTON (the big, round-white dot). Also notice that the first frame, frame #1, has its number in reverse, a black number on a white background. This is because frame number one is the CURRENT FRAME. The CURRENT FRAME is the frame which the computer is working with at the moment.

Frames can be selected at random by pointing the light pen at the chosen frame's selection button, or sequentially by single-stepping forward or backward with the Arrow keys. The other method of frame selection is automatic during actual animation. When the computer is animating a frame sequence, the frames are selected in the FORWARD direction only.

#### Single-stepping Animation Frames -

Put the Light Pen down for a moment - we'll need it in a minute, but not yet. Now watch what happens each time you press the Forward-arrow ( -> ) key. Experiment with both the forward and back-arrow keys. Watch the current frame indicator change, while the contents of the currently selected frame is also shown at the top of the screen. You are changing the CURRENT FRAME by advancing it or retarding it one frame at a time. The forward arrow advances the frame number and current frame, while the back arrow reverses this sequence. All the while, the image contained within the selected CURRENT FRAME is being shown at the top of the screen in slow-motion animation. You'll also see that, when going in the forward direction, each successive frame is drawn ONE DOT POSITION TO THE RIGHT OF THE LAST FRAME. This is obviously necessary, or the overall animated sequence would not appear to travel across the screen. Actually, a frame being drawn is placed on top of the last frame drawn, shifted by one dot position, thus covering up most of the image which was there before.

#### \*\*\*\*\* SPECIAL NOTE FOR ADVANCED ANIMATORS \*\*\*\*\*

If any frame of an animated sequence has dots turned on in its left-most column, the next frame (which will be placed down one dot position to the right) will NOT remove those left-most dots from the screen. This can be used to great advantage to allow animated action over a fixed or moving background. See the PACMAN.ANI animation included as an example of this.

The forward- and back-arrow keys are invaluable aids for developing and debugging good animated sequences. You will probably use this "single-step" mode frequently. In ANIMATOR, as with all Light Pen applications programs, we have attempted to provide for both Left-handed and Right-handed people. Just as with SKETCH and GRID DRAW, the "1" and "2" keys may be substituted for the back-arrow and forward-arrow keys respectively. This is more convenient for right-handed people.

#### Zoom-Editing Mode -

Now, hang onto your seat! Hit the SPACE BAR once. The current frame will ZOOM-IN for a VERY close look. Notice the frame number, shown in the lower right corner of the screen. Now, even while zoomed-in, the forward and back-arrow keys will allow you to single-step through the animation sequence. Experiment for a while with a mixture of the space bar and the arrow keys, zooming in and out and moving forward and backward from frame to frame.

#### Animating the sequence -

Let's add another key to the growing list of commands you're mastering. The sequence of frames could be animated by hitting the forward-arrow key over and over, but there's an easier way. First, zoom-out so you can see the entire frame array. Now just hit "A" (for Animate), do so now. Again, we'll call your attention to several things:

First, (and most obvious) there is now a man walking leisurely across the top of your screen from left to right. There is no provision for causing him to walk backward automatically, nor is there any way to control to speed of the animation. One of the main goals we set during the construction of these light pen applications was ease of use. By intentionally leaving out many options which occurred to us we have managed to get the most function for the least confusion. Minimizing learning time is good for everyone. If you feel a strong need for something which is not here, remember - that all light pen applications, including ANIMATOR, are written in simple Applesoft. With a little study, you can make any changes you may want.

You will also notice that the current frame indicator has disappeared while the animation is running. This happens because attempting to scan every number in the frame array with the frame number would slow the main animation too much. As soon as the animation is stopped, the frame indicator will appear at the current frame, indicating the exact frame at which the animation was halted. To stop the animation, simply hit any key on the keyboard. The space bar tends to be hit often for this since it is right up in front, and hard to miss.

Now try zooming in (with the space bar) and then pressing "A" to animate WHILE ZOOMED-IN! That works too, and just as before, any key hit will stop the animation at the exact frame being viewed. Experiment with all four keys: the two arrows, the "A" and space bar, in all combinations, until you feel comfortable with their effect.

## Random Access to Frames -

Now pick up the Pen. Zoom-out so that you are looking at the entire frame array. Pointing the Pen at any frame's selection button immediately selects that frame as the current frame. Actually, you may point the Pen anywhere in the area of the frame, even at the figure inside, or at the frame number, but the selection button gives a solid, always present and easily hit target. Notice that the animation area at the top of the screen does not change as you randomly select frames. It is only changed by the sequential motion produced by the arrows or the "A" key. Try selecting a frame, then zooming in for a close look ... then out again for another selection. Experiment with this for a while.

So far, we've tried just about everything except the actual drawing or composition of the animated figures. Now's the time.

## Editing Animation Frames -

Freehand drawing is very impractical for images as small and detailed as these. ANIMATOR images are not drawn freehand for that reason. Zoom-in to any frame of your choice. Do this by first choosing a frame either by stepping to it with the arrow keys, or by pointing to it with the Pen while zoomed-out, then zoom-in. While zoomed-in on any frame, the Light Pen can be used to alter the image of the zoomed-in frame. Experiment in an empty area of the zoom screen. Pointing at an "OFF" dot turns it "ON", and pointing to an "ON" dot turns it "OFF". This action is known as toggling. (This is named after the familiar toggle switch which has only two states, on and off. The only thing you can do with a toggle switch is flip it the other way.) This toggling effect lets you draw any image you wish without requiring you to take your eyes from the screen to hit a key.

## Notice several things:

If you continue to point to a single location, the dot will alternate on, then off, then on and so on. The delay between these successive dot toggles, while you hold the point in the same location, is longer than if you were to move the Pen to different points on the screen. This lets you toggle dots quickly as you move the Pen, and has the good effect of not re-toggling the same point too soon if you were to leave the Pen momentarily at a point you have just toggled.

Also notice if you don't wish to be drawing with the Pen while zoomed-in, it MUST be removed from the screen ... otherwise you WILL be drawing with the Pen!

To see the new image in its real size, simply hit the space bar. The new image will already be inside the proper frame in the frame array. It is normally easier to look at the animation area at the top of the screen for the newly edited frame, rather than search for it in the frame array. This is easily accomplished while zoomed-out, just hit the back-arrow key then the forward arrow. This will step the current frame one backward, then one forward. This leaves us where we were (at the frame we were editing), but since the single-step was used, the image in the animation area at the top of the screen will be updated with the new frame's contents.

You will notice how easily successive frames may be compared and edited by single-stepping forward and backward while zoomed-in. By doing so, it will be easy to smooth-out the motion of any animated sequence. Remember that the "1" and "2" keys may be used in place of the back-arrow and forward-arrow keys.

## Short Animation Sequences -

The only animation we've seen so far has been the ANIMATORDEMO.ANI sequence. It consists of 20 frames numbered 1 to 20. When animated, ANIMATORDEMO.ANI cycles through every frame from 1 through 20 and then repeats. Some simpler animations may not require as many as 20 frames to be shown in sequence. For these animations, ANIMATOR provides a way for limiting the animation to ANY sequential series of frames in the frame array. By specifying which frame is to be the FIRST frame displayed, and also which is to be the LAST, the animation may be of any length desired as well as any sub-sequence in the frame array.

Notice the two words in the lower left area of the menu, FIRST and LAST. Following each word is a frame number. At the moment, the FIRST frame displayed in the animation sequence is frame 1 while the LAST frame to be shown is 20. These can be changed to any number in the range 1 through 20. Go ahead now and touch the light button next to the word FIRST. After the usual pause, the computer will "boop" and whatever number was showing after the word FIRST is changed into "??". This shows that the computer has cancelled the old choice, and is waiting for you to specify a replacement. Now select frame number 10 as the new FIRST frame to be displayed. Do so in the usual manner, by pointing to wherever you like on frame 10 (we recommend the selection button just below the number 10). After the pause, the computer will again "boop" and the number 10 will appear after the word FIRST indicating that THE COMPUTER WILL JUMP TO FRAME 10 AFTER IT SHOWS THE LAST FRAME. Now, Single-step the animation and watch the frame indicator step from 20 (the LAST frame) directly to 10 (the new FIRST frame). Hit "A" and watch the animated result.

Stop the animation (by hitting any key) and change the LAST frame to 11. Now hit "A" and watch the result. Experiment with various settings of the FIRST and LAST frame numbers. Try one where the FIRST frame to be shown is a number LARGER than the LAST frame to be shown. Notice what happens, the animation does not run in reverse, but rather the animation sequence goes from the FIRST up to 20, then wraps around to 1 and continues up to the LAST frame ... then back to the FIRST and so on.

Besides allowing short animation sequences, the FIRST and LAST controls let you place several short animations in the same animation file. You could select which one you wish to work with by setting FIRST and LAST appropriately, then the single-step and "A" animation would keep the frames within that area.

#### Creating Animations from Scratch -

In our effort to keep the controls, commands, and program operation simple, we have not provided a command which clears the animation frame array to all blank, but doing so is simple. First stop the program by hitting your computer's RESET key, then type RUN. Respond with "N" to the question about a DEMO. The entire frame array is now blank, and ready to receive YOUR own animated sequences! (Before proceeding with these instructions, clear the array as indicated above.)

Several command tools have been provided to aid the creation of ANIMATOR's frame-animated sequences. Their use will be explained and demonstrated here. In most animations, a large portion of the image in the animation frame is duplicated from frame to frame. The ANIMATORDEMO.ANI animation is a good example of this: Throughout the animation sequence, the legs, arms, head and other accessories are in constant motion, but the man's body never moves. You could zoom-in on him and hit "A" to see this. His body is the REFERENCE POINT for all of the other actions. This being the case, it would be needlessly tedious to draw the same, non-changing body, into every frame of the animation sequence (after all, that's what computers are for). ANIMATOR provides a simple and elegant solution to this situation:

#### TEMP -

Before experimenting with frame duplication, you will need to have something to duplicate. With your entire frame array now blank, select frame number 1 as the current frame, and zoom-in. Now draw an image of any kind. If you are not currently consumed by a burning urge to express yourself in animation, and can't think of anything to draw, start with a simple four-sided, empty, square box. Place it on the "ground", with about the same distance from the left edge as from the right, and with a height of about one third the height of the frame. Make it roughly square. When you have completed the box (or hopefully a creation of your own), read on...

Now zoom-out so that the entire frame array is in view. Point to the light button next to the word TEMP in the lower left area of the screen. After the usual confirming pause, the computer will "boop" and the symbol for the DISK STORAGE will change into a symbol for the TEMPORARY FRAME STORAGE REGISTER. This will be all white, with the word TEMP in the center. Just for the exercise, hit the light button called DISK, to see that you are free to change your mind anytime. Now go back to TEMP mode by again pointing to the TEMP light button.

As a result of your artistic experimentation, frame 1 should now contain some image. Just to see it move, set the LAST frame to 1, (same as the FIRST frame), and hit "A". Your masterpiece will slide along the top of the screen from left to right, until you hit any key. Stop the animation now by pressing any key.

You saw your creation move across the screen, but it didn't have any motion of its own. This motion is created by sequencing through many DIFFERENT frames, rather than by simply redisplaying the same one over and over. First, you will need to place copies of your first frame into many of the frames after it. The TEMPORARY FRAME STORAGE REGISTER is itself a storage frame. It is a place into which a frame may be copied. To place your first frame into TEMP, touch the arrow pointing down into the TEMP box. The computer will "boop" to indicate recognition of this action. Now the computer is waiting to know which frame to copy down. Indicate frame 1 by pointing to the light button below the number 1. After the usual "boop" you will see the image you designed in frame 1 appear inside the TEMP register! At all times you can see the contents of the temporary register. To copy that image into the other frames, just touch the arrow which points OUT of the TEMP box. After the "boop", indicate which frame is to receive the TEMP image. The image in TEMP will then appear in the frame of your choice.



Additional copies of the TEMP image may be copied into the animation frames above, by repeating the process. Touch the OUT-going arrow of the TEMP box (the one on the left), then indicate where the TEMP image is to be placed. This process may be repeated as often as required.

To create an animated sequence from here, use the zoomed-in edit mode to modify each image in some way. REMEMBER --- reset LAST to some frame number other than 1 or you will not be able to single-step to other frames.

Use everything you have learned so far to create a multi-frame animated sequence. Use the TEMP storage register to make at least several copies of your original frame, put them into frames 2, 3, 4, 5, 6, etc. Then modify each to create a flowing animation. After you're happy with the result, read further. We will conclude this discussion of ANIMATOR by showing you how your animated sequences may be saved onto the floppy disk for later recall and use.

#### Saving Animations to Disk -

Once a page of animation frames have been created, the entire page may be saved onto one of your own floppy disks. This allows you to create collections of animated sequences, or save some un-finished work for later completion. We will assume the frame array now contains an animated sequence to be saved onto the disk. First, the DISK STORAGE symbol must be present in the lower left corner of the screen. If you've been using the TEMP register, you will need to switch back to DISK STORAGE mode by pointing to the word DISK near the symbol box. When the computer has recognized your selection, the image in the box will be replaced by the words DISK STORAGE.

Now, as you have already guessed, touch the arrow which is pointing FROM the frame array INTO the DISK STORAGE symbol. After the confirmation pause and "boop", the words SAVE AS: will appear in the center of the screen. With the proper diskette in your disk drive, type the filename which you wish to use for saving your animated sequence. Remember to put the ending ".ANI" onto the name as a clue to yourself about the type of data stored in this file. If you do not wish to use the disk drive which was last used (the default disk drive), add the final ending ",D1" or ",D2" to the filename to specify drive-one or drive-two. See your DOS 3.3 manual for more on filenames, slots and drives. End this filename construction by hitting RETURN. The indicated drive will light-up, spin and make all those clanking and scratching noises which mean data is being saved. When successfully completed, the happy warble sound will sound, and your

entire animation screen (with whatever it contains) will be saved into a 12-sector, 3K, file. If you've been slaving for long hours toward the perfection of your animation, it may be wise to save a backup copy of the animation screen to another diskette, or save a second copy with a different name to the same diskette. For example, if the first filename was MY OWN PICTURE.ANI, you could save a second copy on the same diskette as MY OWN PICTURE.ANI.BAK where .BAK is short for Backup.

If DOS 3.3 has any problem saving the animation images, you will receive the appropriate error message, and be given the chance to correct the problem. As always, if you decide to abort the file save, simply hit the RETURN key before typing any file name.

#### Animation Screen Menu -

Nothing has been said about the lower right area of the screen. The images there serve two functions. They are both a reminder of the keys which may be hit to command ANIMATOR's various actions, and they are themselves light buttons which may be hit instead of the keyboard keys. The MAIN MENU and QUIT buttons function as labeled: MAIN MENU immediately returns control to MENU, from where you can select any other application program. The QUIT selection exits ANIMATOR, leaving you in command mode of Applesoft.

#### Conclusion & Future Plans -

Having followed along with this tutorial on ANIMATOR, you have been exposed to every aspect of ANIMATOR's operation and application. You've experimented with the manipulation and modification of previously composed animation sequences. You've even started from scratch and designed your own animation from the ground up. You've been exposed to another example of the INFO-FLOW<sup>™</sup>-control technique, as well as having used the powerful zoom-screen editing features which the PENTRAK driver makes possible.

If you've caught "animation fever" as a result of using ANIMATOR, you may be a bit frustrated with ANIMATOR's limitations. Color animation is unsupported, only one object may be moved at one time, and even then, at only one speed. To those of you who feel the need for more "animation" from an "animator" we have a reply:

The ANIMATOR program DOES have limitations ... and they would be crippling liabilities for a general purpose animation-tool package ... which ANIMATOR is NOT. ANIMATOR is an invitation to animation, an introduction. Never before has the magic of true animated action been created so easily. Never has animation been available to so many. We feel that ANIMATOR serves its purpose beautifully, but at the same time, we're not unaware of the possible extensions to this idea. Remember that ANIMATOR is written entirely in Applesoft and PENTRAK<sup>™</sup>. We therefore faced some strict limitations too.

So, we've been thinking about better animation. If the users of the LPS II express a strong desire for more complete animation capabilities, we will produce a machine-language written Light Pen ANIMATION package as extensive and powerful as the PENTRAK driver. This would support multiple object, full color, variable speed, machine-language-performance animation without the need for ANY machine language programming. If this sounds like something you'd go crazy over, let us know.

Communication between the LPS II user community and Gibson Labs will be in the form of the LPS II PENMASTER NEWSLETTER. Make sure we know who you are by returning the Owner's Registration Card which was part of the original LPS II package. If the card has been somehow lost, a phone call to us will get another on it's way to you.

Hope you enjoy ANIMATOR!

End of the Revised Addendum  
to the  
LPS II Preliminary Owner's Manual

July 21, 1982

