LPS II

LPS II (Light Pen Systems for the Apple][)
Gibson Laboratories, Inc.

Applesoft and Machine Language
48 K RAM, FP in ROM or Language card, 1 drive, color TV or monitor preferable
DOS 3.3
Unlocked

Reviewed by Michael L. Weasner

INTRODUCTION

Once in a while an item comes along that is beyond belief. First it was the Apple II computer itself, then true word processing with the Apple, then Visicalc, and now the LPS II from Gibson Laboratories. Since words cannot totally describe its functions, I have included some photographs of my color TV screen to show just what can be done and how (we will discuss the photos later). To get a better appreciation of this product will require you to see it in action at your local dealer and I recommend doing so. But first we need to discuss just what the LPS II is.

The LPS II is not a "BAR CODE READER" but a true light pen with which you can draw on the computer's display screen, be it a black-and-white or green phosphor CRT, a color TV (with an RF modulator), or a color monitor, as though the screen were a piece of paper. For the creation of graphics, its operation is similar to the well-known graphics tablets but at roughly half the price. Unlike the tablet, the light pen can do things such as menu selection by pointing the pen at the item desired. Its applications are only limited by your imagination, and with the simplicity of writing programs that use the LPS II, you may discover that your imagination has found wings and will soar to new heights.

The LPS II consists of the pen, a sealed card that goes in slot 7, and supporting software. It is the software that allows the pen to perform its "magic." The manual and software used for this evaluation were preliminary and hence the "pending" Peelings Rating. Once the final version of the LPS II package is available, Peelings will update this review to include the new software, which is currently undergoing final development. Since the LPS II is an integrated package of software and hardware, and the hardware is nothing without the software, Peelings will be departing from its normal policy of not rating hardware products. An overall rating will be assigned to the LPS II once the final product is available for review.

A DIGRESSION INTO WHY LIGHT PENS WORK

To understand why the LPS II can work with any standard Apple display requires that we know a little something about how a TV display is created. Being no expert, I have relied on the discussion of this topic in the preliminary LPS II manual.

A TV (or CRT) display is created by a moving dot of light sweeping across and down the screen, turning on and off as it goes. This motion, called Video Refresh, begins at the upper left-hand corner of the screen, travels across a horizontal line, then jumps down to the next scan line to repeat the process until it completes the last horizontal line at the bottom of the screen. This sequence of line motion is known as a Raster Scan. The computer (your Apple) controls the on and off state of the dot (the Video Signal), when to start at the top of the screen (Vertical Sync), and when to start each horizontal line (Horizontal Sync). These three signals combine to form the Composite Video signal that your Apple sends out from the connector at the rear of the computer. (See the excellent article in the the JUNE 82 Call A.PP.L.E. "Video Interfacing", p9)

The light pen detects the Video Signal (the moving dot), and since it monitors the Sync signals, it "knows" its position on the screen. By determining the delay since the last Horizontal Sync signal was sent out by the computer to when it "sees" the dot, the pen calculates its horizontal position on a line. The number of Horizontal Sync signals sent since the last Vertical Sync signal provides the pen with the line it is on. Thus the pen is able to know precisely where it is looking on the screen. Because the screen is updated sixty times a second, the pen is able determine its position at the same rate. This means that the pen responds to changes in position almost instantaneously and hence, can be used in a wide range of applications. The LPS II does not support use with 80 column displays because the pen requires the standard Apple II screen. It will not work properly with any of the 80 column display cards but this is not a limitation.

THE LPS II HARDWARE

Currently the LPS II is packaged in an 8 inch diskette plastic case (a super idea) and consists of the following:

The pen connected to a card
Manual (preliminary)
Software on a write protected 5¼ inch diskette
Registration card

The final manual is to be looseleaf in a padded binder and may not fit in the case.

The light pen is about the size and weight of a standard felt tip pen with about three feet of shielded electrical cable permanently attached to one end of the pen (the other end is open to see the screen). The cable is attached to a small sealed card which is inserted into slot 7. If you have an RGB board in slot 7 or some other card that absolutely must be in slot 7, the pen can be placed in any other slot but must have access to the Composite Video signals available only in slot 7. The manual discusses how to modify the pen card and run a jumper wire from it to the Apple's motherboard, which requires some soldering on the pen card but none on the Apple itself or the RGB card. From the instructions provided in the manual, this seems to be a simple fix. One point here: the card is fat and may place pressure on the ribbon cable coming from a disk controller card in slot 6 and push on that card. This does not appear to be a problem but could mean you might have to reroute your disk cables.

Working with the pen is a pleasure and creating the picture for this review was not tiring, although it involved holding the pen to the screen for several hours. This did not require continuous contact or pressure to the tip to activate a sensor as with other pens.

The pen is practically indestructible. Just don't step on it (the case is plastic) or try to carry your Apple using the electrical cable, and it can be damaged electronically by installing it wrong or with the power on. The reliability of the pen is indicated by the recent increase in the warranty period from 90 days at introduction in March 1982 to an 180 day warranty. The ability of the pen to withstand normal physical abuse *makes it ideal for use as a teaching aid for children.*

THE DOCUMENTATION

The current documentation consists of a 37 page Preliminary Reference Manual with a 32 page Revised Addendum. Both are Apple manual sized and of good quality. The final looseleaf manual will allow updates to be inserted easily because the supporting software for the LPS II will most certainly expand.

The manuals provide installation and checkout procedures plus an excellent discussion of the "&" routines used by the pen (more on this later). The Preliminary Reference Manual does not discuss any of the current applications software on the Preliminary Software disk, but the programs are sufficiently self-documenting. The Revised Addendum does explain PATTERN EDITOR, PENPAINTER, and

ANIMATOR. The manuals are easy to read (even fun at times), and the update is presented in a tutorial fashion which Gibson Labs has called "HOP IN" for "Hands On Push It Now." Since the software is unlocked, you can look at and modify the programs provided to your heart's content. With this preliminary documentation as an appetizer I look forward to seeing the final version.

THE PENTRAK DRIVER

As magical as the LPS II is, it would be just another light pen without the PENTRAK Driver. This little (6902 bytes) machine language routine provides all the functions of the pen to your Apple and gives the user access to them via the "&" jump in Applesoft. That this driver was well designed and implemented is really an understatement. When you boot the LPS II disk, several things happen in the HELLO program. First the driver is BLOADed at 25000. A CALL 25000 is issued which starts the PENTRAK Configurer searching the slots for the light pen and when located performs a self test and slot configuration on the pen. Next, the driver is relocated in to high memory just below DOS where it is protected from just about any command including FP, INT, or even RESET. Only rebooting will disturb it. Finally the "&" hooks are setup. One of the slicker capabilities of the driver *is to allow use of other co-resident & routines*. If you don't think you read that last sentence correctly, then go back and reread it. The driver will recognize if another & utility is connected when the CALL 25000 is issued and take appropriate action not to disturb it. Once an & jump is requested, the driver looks at it first, and if it does not recogize the syntax as a LPS II command, it then passes the command to the other routine. If the command is recognized but contains a pen syntax error, a "- LPSII SYNTAX ERROR" message will be displayed. Although not required, if a HELLO program has been used to BLOAD the driver and do the CALL 25000, once all the above has been completed, the driver scans the HELLO program backwards from the end looking for a REM statement. If found, the balance of the statement is placed into the keyboard buffer, which means that a line like:

```
1000 REM RUN MENU
```

will actually RUN the MENU program on the active disk drive.

There are 34 commands and options available in the & set. These control which page or screen is displayed:

```
&TP = display primary text page
&HP = display HIRES primary page
&HS = display HIRES secondary page
```

The &HP and &HS are similar to the Applesoft HGR and HGR2 but do not clear the HIRES screen before displaying. In that respect they are more like POKE 16304,0 to toggle the HIRES screen but certainly easier to remember and use. Which HIRES screen is drawn on is determined by:

```
&DHP or &DHS
```

Plus there are a multitude of light pen specific or other useful HIRES graphics features. Some examples are:

&TRACK =	overlays a HIRES cursor on the current HIRES screen which will track the pen
&LINES =	adds horizontal and vertical flashing lines through the cursor to aid positioning
&WRITE =	adds HIRES text to the current HIRES screen at the coordinates specified (there is a default font available in the PENTRAK driver but DOS Tool Kit fonts can be used)
&NEG =	reverses the image; black becomes white and white becomes black
&DOTS =	XORs HIRES dots on the current screen (turns on dots if off or turns off if on); does not affect the picture but is useful to provide a grid
&FRAME =	inserts a "window" into a HIRES screen while providing the ability to "save" the overwritten data to any memory location for subsequent redisplay when the need for the window is completed; is totally user defineable as to size, location, purpose, and text inside the window

All of the & functions can be used in immediate mode although many will be best utilized from within a program which leads into a discussion of the software.

THE SOFTWARE

When the LPS II disk is booted, all the above-mentioned actions occur in just a few seconds, and a menu of programs is displayed along with a description of the programs. The light pen is used to make your selection by pointing to a large white dot next to the program name. You must calibrate the pen each time you boot *with a different display unit*. This is a simple operation controlled by the CALIBRATE program. On screen instructions walk you through the necessary actions and nothing can go wrong unless you press RESET during the time a calibrated version of PENTRAK is being written to disk. Should you make this mistake, you will still have a copy of PENTRAK on the master disk and can FID it to your working copy or recopy the entire disk. The reason the calibration is required and why it must be accomplished for each different display unit is that the delays from the time the signals are sent by the computer to the actual time the signal appears on the screen will vary depending on the type of monitor. If you use both a color TV and a green phosphor monitor, you will need two calibrated versions of the PENTRAK driver. The least confusing solution is to have separate working copies of the master disk for each unit with its own calibrated PENTRAK. Another alternative is to use the PEEKs and POKEs mentioned in the manual to change the parameters in your Apple's memory. The calibration program only takes a couple of minutes and can be rerun at any time should you change display units (e.g., upgrading from a color TV to a color monitor). Once calibrated, the light pen will be centered on its HIRES cursor and the cursor will follow the pen's movement exactly. Then you can begin exploring the power of your light pen system.

Many of the programs on the preliminary software disk are demo programs to familiarize the new pen user with the capabilities and use of the pen. While these demos will still be available on the final software disk as individual programs for the new user, there will also be more complicated and powerful single programs that will combine many features into large multi-function applications software. However, the current software disk contains sufficient applications software in some form to be usable for the creation of assorted graphics displays. To indicate this, a picture was created using various programs and saved to disk before proceeding with the next program. The following sequence was used to make the final Space Shuttle HIRES picture. Please refer to the figures as indicated.

I made an 8½" by 11" black and white transparency (on a copier) of a Space Shuttle landing picture, and placed it over my screen with the TV's brightness control turned up. The pen was able to "see through" the slide. This procedure is different than the one used for the graphics tablet which allows direct use of a paper copy. Using the GEOMED II program, an outline of the orbiter and the horizon line were drawn (see Fig 1). GEOMED II was used because it draws geometric objects (circles, lines, rectangles) by simply touching the pen to the screen where an endpoint, center, radius, or corner of the desired figure is to be and then pressing a key. The computer does all the work and you don't have to worry about trying to make straight lines or good circles. One problem with GEOMED II was discovered. When drawing arcs, the computer performs some erroneous calculations and the arcs drawn are incorrect. Next the SKETCH program was used to add curves and other objects to approximate positions on the outline (see Fig 2). SKETCH provides a user selectable "inertia" to the pen's tracing on the screen. This averages what are called pen hits over a variable period of time to either make the pen very sensitive to motion (rough lines) or very insensitive (smooth lines). An excellent feature of all LPS II software is its ease of use for either the right or left-handed user. When drawing with the right hand, the left hand is used to press the "pen up and down" keys (the 1 and 2 keys on the keyboard). When drawing with the left hand, the left and right arrow keys are more accessible to the right hand and so control the pen up or down. A nice touch. This was followed by

EASYEDIT: a super pixel editor. Figure 3 shows the completed black and white picture before zooming into a small area for editing. To edit, simply place the pen's cursor over the desired location and press the spacebar. Instantaneously a 40 by 24 dot area of your picture is displayed using the Apple text page (see Fig 4). Dots are toggled on and off by placing the pen at the desired spot and pausing for the location to be read. Then the dot is either turned on or off with an audible "click" as feedback that something has happened. The use of sound throughout the LPS II software is an excellent indicator of something happening.

Once an area is edited, the spacebar is again pressed, immediately returning the normal graphics display to view the overall picture and select another area to edit. It may be necessary to change the screen brightness during a light pen session because of changes in intensity of your pictures. One caution: don't have the screen brightness too high when zoomed in for editing, or you may find dots toggling on and off where you didn't intend, since stray dots may be read by the pen. Once the final black and white picture is saved to disk, that portion of the picture creation is done. As with most of the preliminary software, loading and saving picture files is as easy as pressing the "S" or "L" keys. A filename prompt line will appear in the middle of your picture (using the &FRAME command), and you enter the filename including the ",D2" if needed. Since the HIRES page is used, and the string is entered through the PENTRAK routine, no EXTRA IGNORED error will appear from having the comma in our input. An extra goodie from the PENTRAK driver.

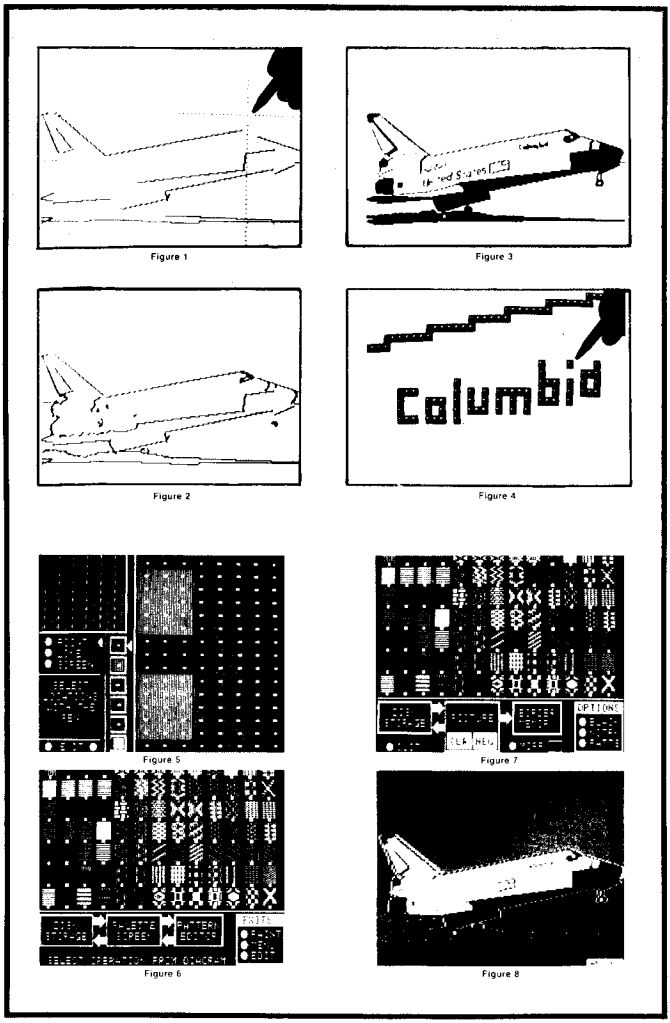

Figure 1

Figure 3

Figure 2

Figure 4

Figure 5

Figure 7

Figure 6

Figure 8

Now the color must be added to the picture. The PENPAINTER program utilizes "palettes" of "patterns" to paint blank areas of a picture. Creation or editing of patterns is done with the PATTERN EDITOR program. Figure 5 shows what the zoomed in mode of PATTERN EDITOR looks like. LPS II software is evolving to more and more use of the pen and less reliance on the keyboard for inputs. In PATTERN EDITOR and PENPAINTER, less keyboard use is evident. The right half of the edit screen is an expanded pattern. The white dots are the pixels (dots on the screen) used by the pen for pattern creation. In the edit mode, you select with the pen a point, line, or screen from the menu on the left of Figure 5. Next select the color to be used from the color menu in the middle. When you place the pen to the dots on the pattern side, you will see the color appear at that location as well as on the small display in the upper left-hand corner. This small display is what your pattern will look like in actual use and provides indications whether the pattern will be correct. You exit to the main display to place your pattern on the palette (see Fig 6). Figure 6 is the entry display for PATTERN EDITOR and shows the Info-Flow (TM) diagram at the bottom. Initially the palette is empty of patterns but using the Info-Flow and the pen you can load a palette from the disk for editing or save a completed palette. To use Info-Flow you touch the arrow or dot indicating the action you want. Filenames are prompted for when required. Switching from palette display to the editor display is a matter of using the Info-Flow to indicate your choice. If you are moving a pattern to the editor for changes, the program will prompt you to indicate which pattern. You either touch the pen to the pattern or to the white dot below the pattern. When pattern creation is completed, or if you have previously made a palette, you can go to PENPAINTER from the Info-Flow or PATTERN EDITOR. Figure 7 is the PENPAINTER display with the palette available for use. Notice the change in the Info-Flow prompts. With PENPAINTER you can either draw the outline of your picture (similar to SKETCH) or load a file to be painted. The Space Shuttle picture file was loaded (Fig 3) since it was black and white outline and needed color added. The spacebar toggles between the palette display and your picture.

When ready to paint, you first must "border memory." This is a necessary step for painting and is selected form the Info-Flow display. If there is fine detail in your picture, the border memory function

will smear the detail somewhat, requiring you to return to EASYEDIT after painting is completed to fix it up. This is only a minor annoyance. Once the memory has been bordered, you are ready to paint your picture. First touch the pattern (or the dot below it) with the pen. Once registered, the display will automatically flip to your picture. Place the pen inside a bordered area where you want that pattern or color and it will be painted in just a few seconds. Return to the palette display by touching the spacebar and select another pattern. Once you have finished your artwork, you can name it and save it to disk. Figure 8 shows the completed Space Shuttle picture. This picture required one Saturday afternoon to make, and the time included writing down comments for this review. With a little practice, anyone can create useful and beautifully colored HIRES graphics using the LPS II and its software.

Another program on the disk will allow you to make shadowed boxes that look three-dimensional, and insert text, centered, into the boxes simply by typing the text directly form the keyboard into the box. Great for organizational charts. Other demonstration programs show how the light pen can be used to write music, solicit responses to questions, and even make the smoothest animation sequences this reviewer has ever seen. The ANIMATOR program is preliminary and will probably stay that way until after the other software is released in final form. Figures 9 and 10 show the normal and zoomed-in edit screens of ANIMATOR. Figure 9 shows all the frames that make up the animation sequence (similar to a movie loop). Editing (Fig 10) is the same as with EASYEDIT. Currently the animation is only left to right at the top of the display as shown in Figure 9. Gibson Labs plans to expand this to motion in any direction by any number of objects.

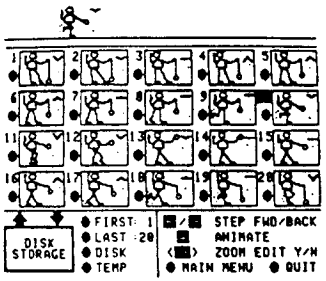

Figure 9

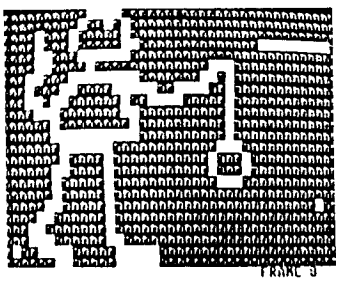

Figure 10

SUMMARY

For a preliminary software package, the LPS II applications software are pleasingly free of problems. Some minor distractions are being corrected in the final version. There are already too many excellent features to mention all of them in a review. An additional required program not planned by Gibson Labs is a color editor with the zoom capability for editing dots in color, as EASYEDIT only works in black and white. The lack of such a program does not mean the pen is any less powerful or useful but it would be nice as a future development.

If you would like to create graphics of any type and want to stay away from using paddles, joysticks, the keyboard, or the expensive graphics tablets, then the Gibson Laboratories Light Pen System for the Apple II may be just what you need. Although this preliminary review hasn't discussed it, the LPS II is usable for educational purposes where small children are interacting with the computer. It is suited for menu selection or answering questions from a list.

Finally, if you want a state-of-the-art add-on for your Apple II that is useful and fun, then the LPS II is worth looking at. Some words of caution: the ability to create so easily great looking graphics could mean you will want to see them in their fullest detail. If you are using a black and white TV or monitor, you will definitely want a color monitor or TV. If you are using a black and white printer for hardcopies, you may feel the need to buy a color printer to display your works of art. All this means $$$ will be spent to support your new love, but it has always been so.

FUTURE

Gibson Laboratories has recognized that having a superior product like the LPS II is just not enough. It needs to be backed up by excellent software and dependable support. Some may wonder why the final software is taking so long since the LPS II was introduced in March 1982. The answer seems to be great emphasis on professionalism. The final software is expected to be released by early November. It will be an integrated set of applications programs that will be interconnected through a faster menu program. Once a picture is in memory it will stay there and not be overwritten by program displays. The preliminary versions require that a picture be SAVEd and reLOADed from disk when transfering from one program to another, as was done for this review. Also, as was mentioned earlier, single applications programs will combine many features currently in separate programs. Commands and other syntax will stay uniform throughout all the final software. A disk CATALOG will be available when you are prompted for a filename as will default filenames and overwrite protection. Currently a FREE SPACE routine has been patched into the LPS II software's DOS and is useful since graphics files consume considerable disk space. The final software will take advantage of routines that give faster disk access. Finally, because there is so much power in the PENTRAK driver, Gibson Labs wants to allow the user to take advantage of that power right away, hence more applications software is being prepared. There are programs such as a font editor which allows the user to create HIRES text characters and ANNOTATOR to place your HIRES text anywhere on the screen. An advanced shape editor program will be provided that will allow shapes to be created, edited, SAVEd to disk, and reused in your HIRES graphics at any time in any location. This means that while the final software and manual may appear later than originally intended, its quality and capability should be outstanding. Peelings looks forward to reviewing it and passing the information on to you.

Finally, no product can survive without outside software support. The LPS II is receiving this support from many vendors who are either modifying their software to provide a light pen version or writing new software to exploit the wonders of the LPS II. Peelings will review these new LPS II applications software packages as they become available.