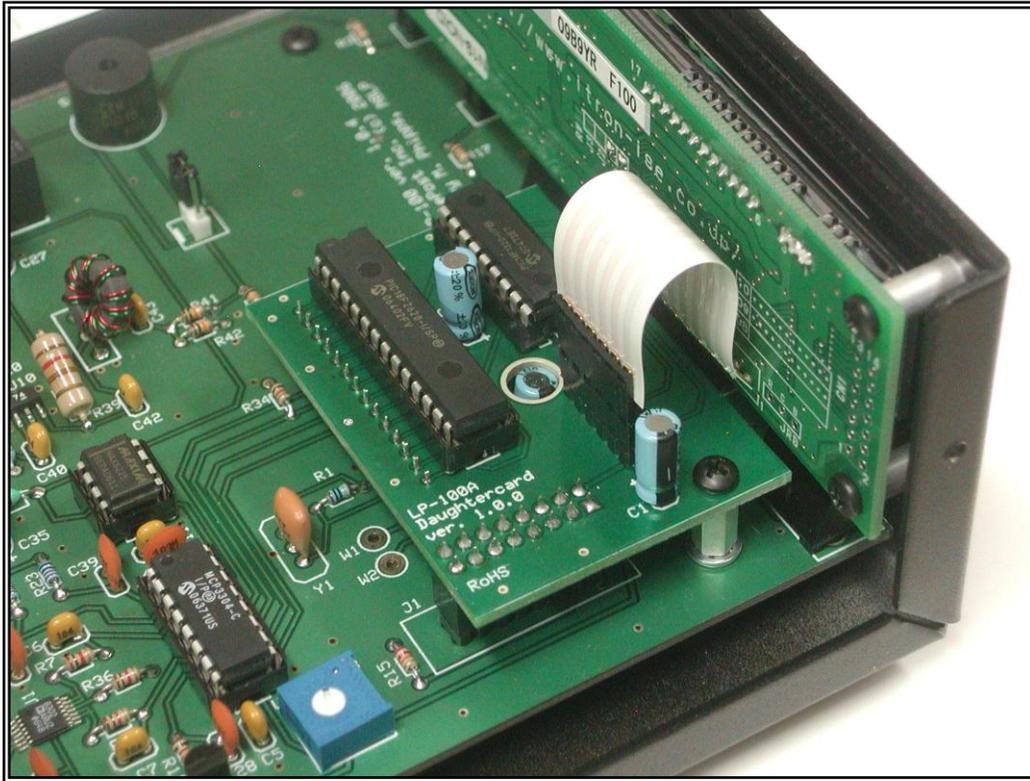


LP-100 to LP-100A

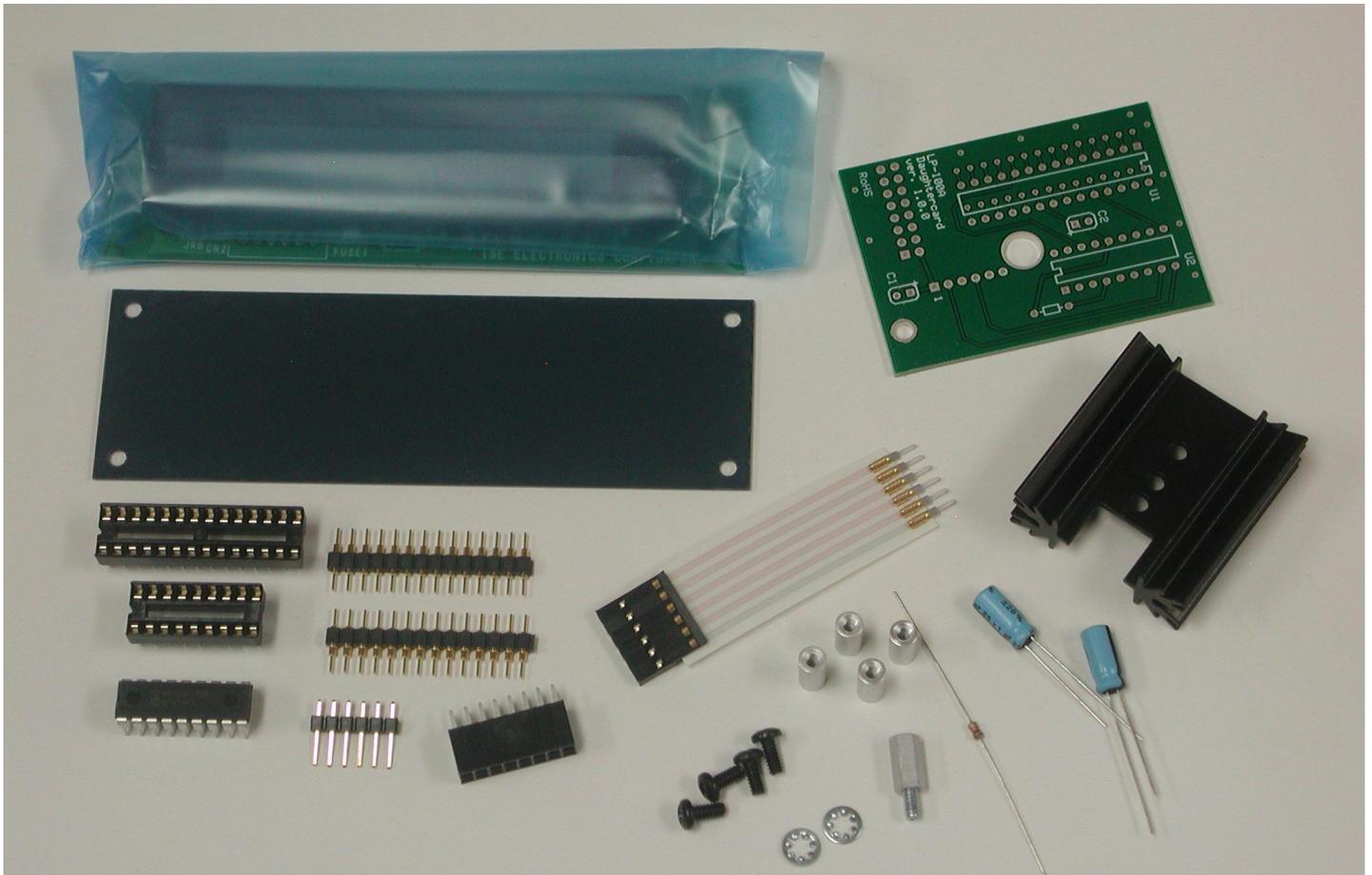
GVFD Display Upgrade Kit



Assembly Manual

July 2012
TelePost Incorporated
Rev. A5

Parts List - Subject to change without notice.



QTY	Part No.	Description
1		GVFD Display Module
1		Anti-glare Neutral Density Filter
1		Daughtercard PCB
1	U2	18F1320 PIC Micro-controller
1	R1	10K 1/8W Resistor
1	C1	10uF Electrolytic Capacitor
1	C2	1uF Electrolytic Capacitor
1		28-pin DIP Socket
1		18-pin DIP Socket
2		14-pin Header
1		6-pin header
1		16-pin Socket
1		Ribbon Cable with Connector
1		Heat Sink
4		4-40 x 3/8" Threaded Standoff (Female/Female)
4		4-40 x 1/4" Machine Screws
1		4-40 x 3/8" Threaded Standoff (Male/Female)

Note: The two lock washers shown in the picture are no longer needed or supplied. You should check all parts before starting to allow you to start the process of obtaining replacement parts as soon as possible. It is also a good idea to sort the parts in advance... egg cartons are handy for this (passive parts only). Many crafts stores, Like Michael's, also have nice plastic cases with dividers at low prices.

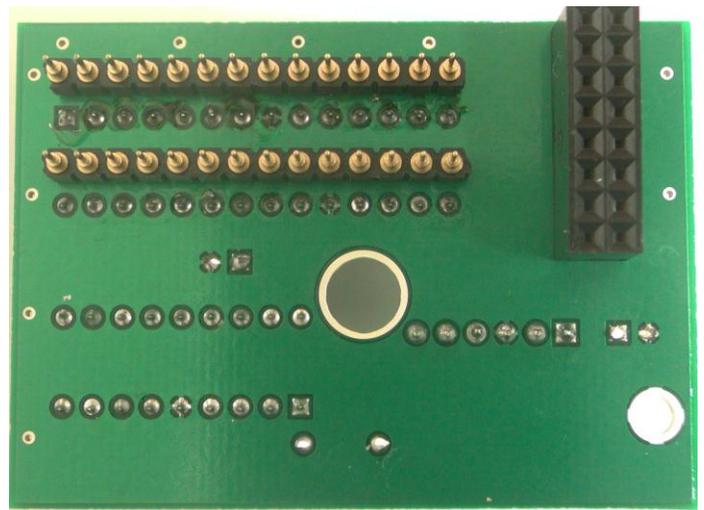
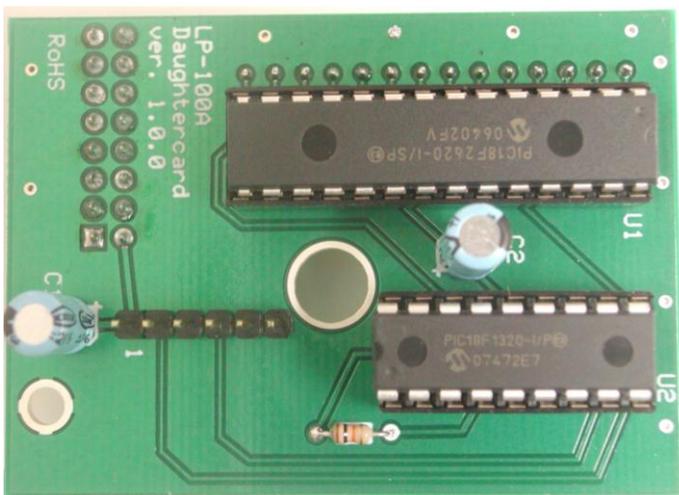
Assembly

Assembly overview (do not start assembly yet).

Assembly will roughly follow this order. Detailed instructions for each step will follow.

- Installation of headers and 28-pin socket at U1 on the daughtercard
- Installation of 18-pin socket at U2 on the daughtercard
- Installation of 16-pin socket on the daughtercard to mate old display header on main PCB
- Installation of R1 on the daughtercard
- Installation of 6-pin header on the daughtercard for connection to new display
- Installation of caps.
- Removal of old display. Note: 4 of the screws will be re-used
- Installation of standoffs on the front of the new display
- Installation of ribbon cable on the back of the new display
- Installation of new display and filter to the front of the enclosure
- Removal of 18F2620 PIC micro-controller from main PCB
- Installation of original 18F2620 and new 18F1320 to the daughtercard
- Installation of 3/8" M/F standoff on main PCB in place of screw
- Installation of daughtercard
- Installation of new heat sink in place of the old one
- Flash programming of PIC to update to LP-100A firmware

For reference, here are pictures of the completed top and bottom of the daughtercard...

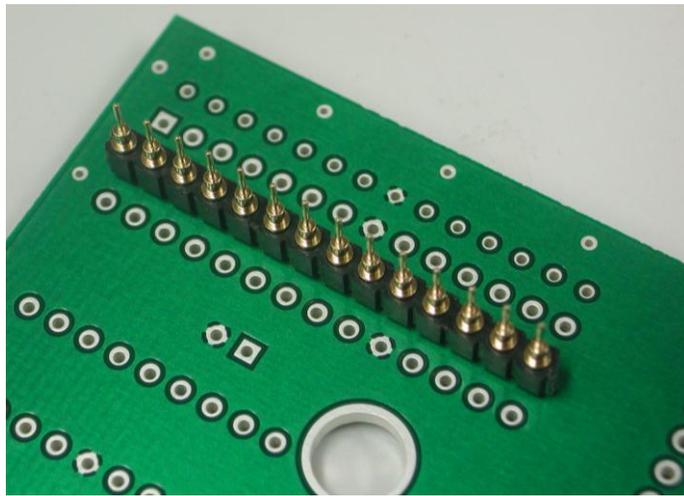


It is recommended that you print this manual to allow for easy reference while building, and to allow you to check off the steps as you complete them. Make sure your work area is static-free to avoid damage to the parts. It is also advisable to wear an anti-static wrist band.

Assembly Cont'd

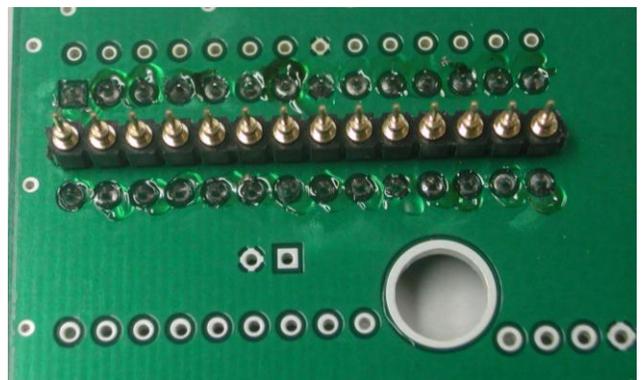
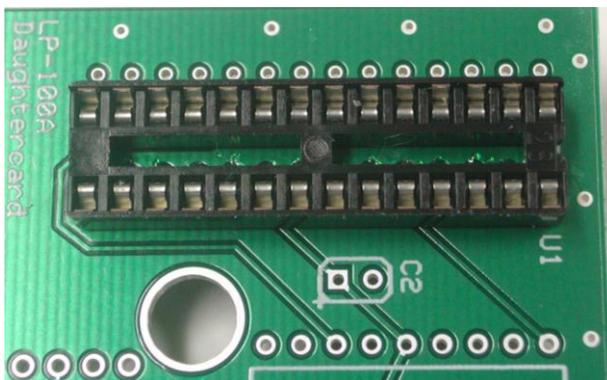
Hardware Installation...

- ❑ Install one of the 14-pin headers on the underside of the daughtercard, between the rows of the U1 socket as shown here...



The side of the header with the shorter pins should go toward the board. Start by soldering one pin, then adjust the header so that it is perpendicular to the board before soldering the remaining pins.

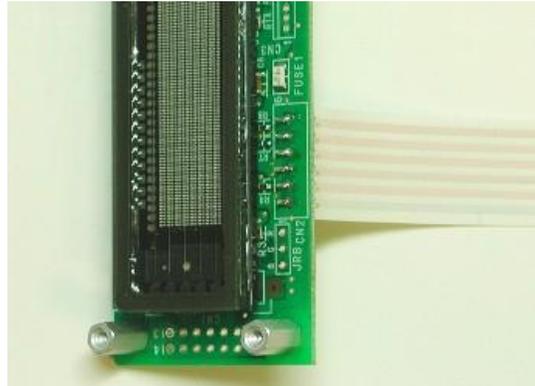
- ❑ Install the 28-pin DIP socket on the top side of the board, as shown here. If you plan to clean the flux from the board, this would be a good time to clean around the header, because it's easier to access at this time.



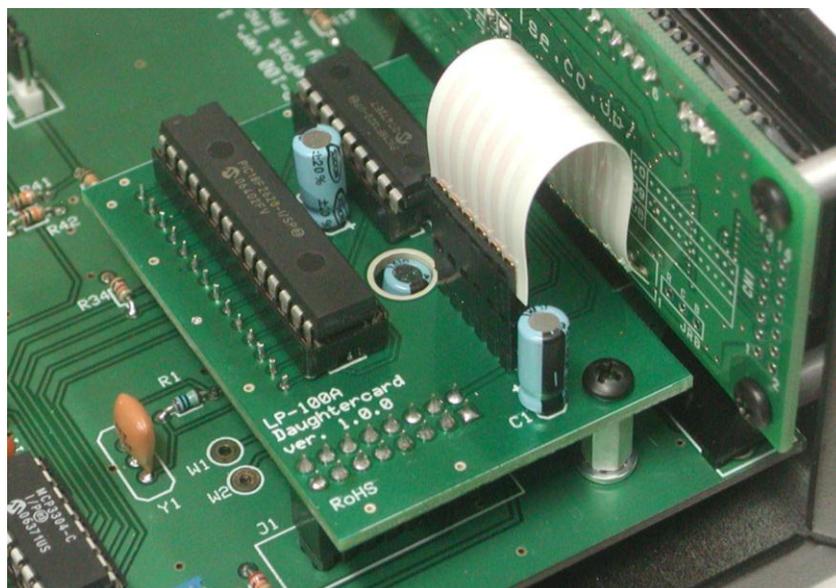
- ❑ Install the remaining 14-pin header on the underside of the board, as shown on the underside picture on page 3.
- ❑ Install 18-pin socket at U2
- ❑ Install 16-pin socket on the underside of the board, as shown on the underside picture on page 3. This connector will mate with the original display header on the main PCB.
- ❑ Install 10K resistor as shown on the page 3 top side picture.
- ❑ Install 6-pin header on the top of the daughtercard.
- ❑ Install 10uF electrolytic cap at C1. Pay attention to polarity as shown in the silk screening.
- ❑ Install 1uF electrolytic cap at C2. Pay attention to polarity as shown in the silk screening.
- ❑ Remove the old display and ribbon cable from the enclosure. The 4 screws will be used in the next step.

Assembly Cont'd

- ❑ Install 4-40 x 3/8" (9.53mm) standoffs on the front side of the GVFD module at the corners using the 4-40 black machine screws removed in the previous step. Note: Supplied standoffs may be round or hex. **Handle the display with care as it is made of glass.**

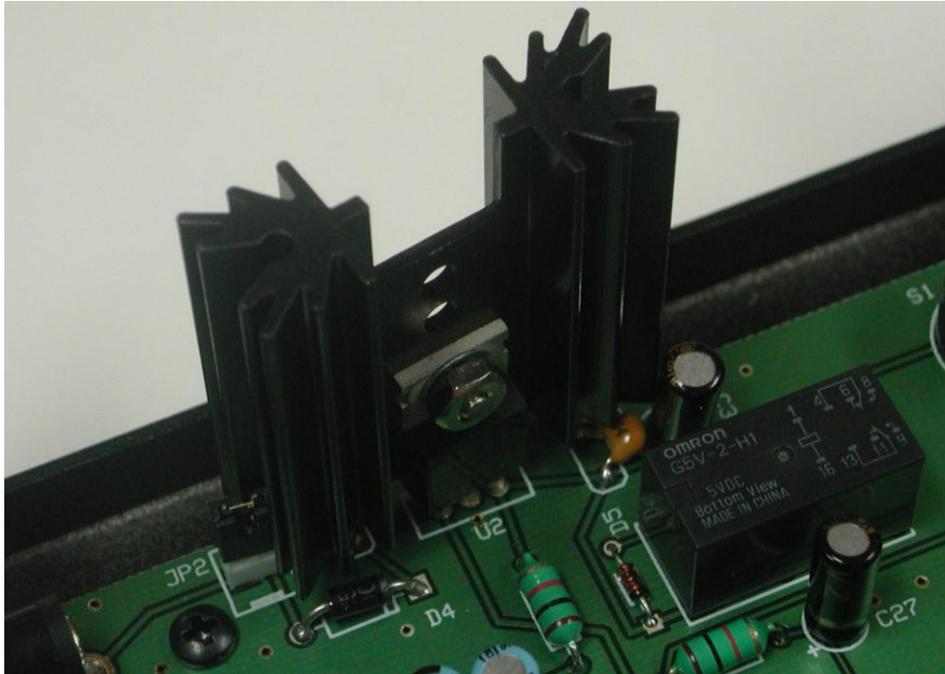


- ❑ Install the flex ribbon cable to the back of the GVFD display. The silver colored trace should go to pin 1 on the display, as shown.
- ❑ Install the display to the front of the enclosure using the (4) 4-40 x 1/4" screws. The filter goes between the display and enclosure front, with the matte side facing the user. Make sure you remove the protective film from both sides of the filter before installation. The blue film is on the shiny side, and the clear film is on the matte side.
- ❑ Remove the 18F2620 PIC at U3 on the main PCB
- ❑ Install the 18F2620 at U1 on the daughtercard. Refer to the pictures on page 3 for details.
- ❑ Install the 18F1320 PIC at U2 on the daughtercard. Notice that the two chips face in opposite directions.
- ❑ Remove the screw holding the front of the main PCB to the enclosure, and replace it with the 4-40 x 3/8" M/F standoff. Save the screw to hold the daughtercard to the standoff. **Note: the lock washers shown in the picture are no longer used or needed.**
- ❑ Carefully line up the daughtercard with the socket and display header on the main PCB. Press the daughtercard down onto the display header on the main board and line up the daughtercard header pins with the U3 socket on the main PCB. Be careful to make sure that the electrolytic cap on the main board lines up with the hole in the daughtercard. Press the daughtercard down so that the header pins are fully seated in the U1 socket. Install the screw removed from the previous step to hold the daughtercard in place.



Assembly Cont'd

- ❑ Remove the heat sink from the regulator on the main board. The hardware will be used to mount the new heat sink.
- ❑ Carefully bend the small caps near the regulator down toward the board, and bend the electrolytic cap at C3 away from the regulator if possible. Install the new heat sink using the hardware from the previous step. You will probably have to twist the regulator slightly to make the new heat sink fit, as shown...



An alternative method that may fit better, depending on the age of your LP-100, is to install the heat sink with the gap facing downward. If lucky, C3 will fit into the gap on the side of the heat sink.

This completes the hardware installation of the new display. Proceed to flash programming of the meter to update to the latest LP-100A firmware, described below.

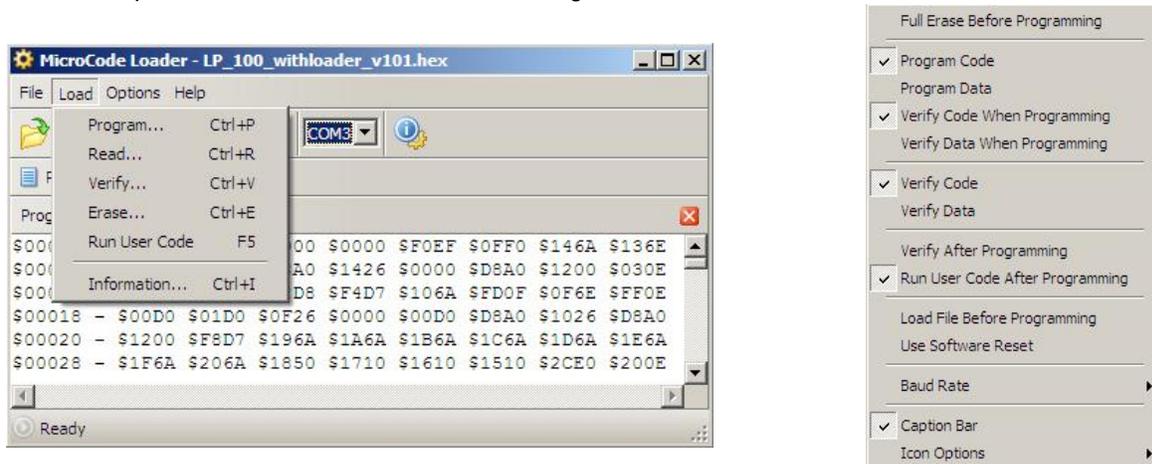
Software

Flashing the new firmware.

New firmware must be flashed into your original processor in order for the new display to work. To start with, download the latest firmware from the TelePost website. The latest firmware can be found at the bottom of the page, <http://www.telepostinc.com/LP-100-Update.html>. The version number will be v1.2.1.3 or newer. There have been several versions uploaded recently. Save this hex file in a convenient folder on your PC.

Locate MCLoader. If you can't find it, email TelePost for a new copy, which will be sent to you via email. MicroCode Loader works with the MCLoader bootstrap loader program installed on your PIC. It allows the user to easily update the firmware in the LP-100A. Before attempting to flash new firmware, make sure the connection between the LP-100A and PC is solid. You can do this by running the VCP program. Once you have verified a good connection, close VCP.

Start MCLoader. It will look like the picture on the left (but without the additional menu on top). If you see data in the white window, it is the hex data from a previous programming session. This data goes with the filename shown in the blue bar at the top of the program, next to the name MicroCode Loader. Click on the File menu, and select Open. Navigate to the new hex file you downloaded and unzipped earlier, and open it. The name in the blue bar will change to the new filename, and the data in the white window will change.



Click on the Load menu, and select Program. This will start the programming process. The first thing you will see will be a message to reset the microcontroller. To do this, simply turn the LP-100A off and back on. The message will be replaced with a progress bar showing that programming is underway. When the process is finished, the LP-100A will start back up with the new firmware.

Once programming finishes, the display should come to life. To familiarize yourself with the new features, you may want to look at the latest LP-100A Quick Start Guide (on the LP-100 web page), since you now essentially have a LP-100A, and there are some slight differences.