

LP-100

Quick Start Guide v1.3



Connections...

Power: 11-16 VDC @ 160 mA, center pin +, 2.5mm. The lead with the white stripe on the supplied cable is +
PTT: Loop the PTT between your amplifier and rig through the LP-100 using RCA connectors
RS-232: Connects to computer... standard M-F straight through DB9 serial cable. See manual for usage.
Current/Voltage: Connect to corresponding jacks on the coupler using supplied RG-58U cables.

Note: This guide assumes you are using firmware version 1.1.63 or newer. Meters starting at serial # 101 can be updated online to this level of firmware. See the MCLoader portion of the Software section of the manual for details. Serial numbers before #101 will have to be returned to the factory for a processor upgrade and recalibration. There is a nominal \$17 charge for this service to cover the new processor and return shipping.

Operation of the LP-100 is straightforward, and designed to require a minimum of input. There are only three buttons which are used in combination to access all the menus on the LP-100. There are five main modes for the LP-100, which are accessed by momentarily pressing the "Mode" button. The mode status is saved in non-volatile memory, and the LP-100 will return to the saved mode upon powering up. There is also an automatic two-step screen saver mode which dims the screen after approx. 30 sec of inactivity, and marches your call sign across the screen after approx. 2 min. of inactivity. More on this below.

Mode Button

There are five basic modes, selectable with the Mode button... Normal, Vector, dBm, Field Strength and Peak-to-Average. The mode button is also used to access Setup and Calibrate modes by holding the button for 1 second to access Setup and another 1 second to access Calibration. To return to the normal sequence of mode selections, press Mode button for 1 second from the Calibrate mode.

Normal mode is designed to display all the information you normally need on one screen. It displays power in three auto-ranging scales, and SWR, plus bar graphs for both. A summary of the behavior options for the bargraph and numerical displays is provided below in the Setup section, along with the default settings. There are more details in the manual. [For those in a hurry, see the section below on Normal Operation.](#)

Vector mode displays magnitude of Z, phase angle of Z, X and R. These values are relative to the "LOAD" connector, not the antenna. There is much more info in the manual on interpreting this screen, as well as using the LP-100_Plot program to do automatic graphing of a number of parameters.

dBm mode uses professional dBm and RL (Return Loss) terminology instead of watts and SWR to indicate power and load quality. The resolution is 0.1 dB for both. The range is +15 dBm to +64.9 dBm, and RL from 0 to 49.9 dB.

Direct/Field Strength mode is similar to dBm mode except that it is calibrated to display power from -15 dBm to +33 dBm. There is no return loss in this mode because it does not utilize the coupler. Power is supplied directly to one of the inputs on the back of the LP-100. This mode can be used for accurate low power bench measurements, as in checking the output to a transverter or the level of a local oscillator or mixer. It is also very useful for doing antenna field strength measurements, as in plotting a beam pattern. This requires feeding a small pickup antenna to one of the inputs. There is more on this in the manual, including the use of LP-100_VCP and a program called PolarPlot to automatically plot antenna patterns. **NOTE: The maximum power for the direct inputs is 2W.**

Peak-to-Average Ratio displays the ratio of the peak signal to average level of the RF envelope. It is used to determine the effectiveness of speech processing and compression equipment in your radio. It requires the use of an audio test tone, available on my website, that I created specifically for this mode. Again, there is more information in the manual.

Setup and Calibrate Allows accessing the Setup and calibrate modes. Once in each of these modes, the Mode button lets you cycle through the choices of those modes.

Alarm (Dn) Button

The Alarm button is used to set the SWR alarm set point. There are 6 choices... OFF, 1.5, 2.0, 2.5, 3.0 & User. The User setting is adjusted in Setup/CAL mode, and the programmed value is shown next to the word "User" on the display. Holding the Alarm button will advance the choices every half second or so. Tapping the button will put the Alarm in "snooze" mode for a minute. Tapping again during tuning will reset the function for another minute. This allows adjusting an antenna tuner without the alarm going off, but it returns to normal after tuning to protect the amplifier as intended.

Fast/Slow (Up) Button

This button toggles between a fast responding numerical display, a peak-hold display and starting with firmware version 1.1.47, a tune mode. In all cases, the bar graphs remain in fast attack mode, but the decay is adjustable in Setup. The character after the numerical power readout indicates which mode you are in. A "W" indicates peak mode, a "w" indicates fast mode and a "T" indicates tune mode. Fast mode is best for taking accurate measurements with steady state signals, or for tuning an antenna tuner. Slow (peak) is best for CW or SSB operating. Note: The Peak Mode is VERY fast, and can respond to a lip smack, mic button click, etc. Don't be alarmed by this... it is normal, and allows the LP-100 to provide an accurate indication of peak power. Unless a lot of compression is used, the peak reading will occasionally be somewhat higher than the indication with a carrier... as much as 30% depending on the ALC attack time in your rig, and power supply regulation of rig or amplifier. Tune mode is similar to Slow mode, except that the peak hold time constant is set to 0.25 sec as opposed to the hold time set in Setup. The Fast and Tune modes use the preset bargraph range in the setup section, while the Slow mode shows a fixed 13 dB range. The Tune mode is designed mainly for tuning an amplifier using a pulser, and locks the bargraph in high power range to eliminate range hunting. In this mode, you will normally not see any bargraph when using just an exciter.

Normal Operation

The default settings that affect normal operation are...

Net/Fwd power...	Net
Low power range...	15W
Mid power range...	100W
High power range...	1500W
Alarm Pwr Threshold...	0W
Alarm Set Point...	2:1
Tuning Range...	12dB
Average samples...	8
Peak Hold Time...	2 sec
Bargraph Decay...	Off
Bargraph Style...	
Coupler...	LPC1
SWR Resting Style...	- . -
Lower Bargraph Mode...	SWR
Display Type...	PLED
"W" Mode SWR Display...	Avg. During Snooze

See Setup Mode section for details on setup options.

Generally, the LP-100 is left in the Normal mode. For SSB or CW operation, you should use the Slow (or peak-hold) Power mode. You can access this mode by tapping the Fast/Slow button until you see a capital "W" next to the power readout. This mode will show peak power and SWR and hold them for the preset hold time unless a higher peak is detected, at which time the timer resets. Do not use this mode for steady-state power or SWR measurements.

The peak power reading can be as much as 30% higher than steady-state power readings taken in the Fast mode. This is because of the ability of the transmitter or amplifier to deliver short bursts of higher power due mainly to power supply regulation issues. This is especially true of older amplifiers with unregulated power supplies, but also is affected by the ALC timing characteristics of modern rigs in both CW and SSB. The peak detector in the LP-100 is very fast, and will grab even the smallest peak. Peak SWR will show values a little higher than steady-state at times due to the wide dynamic range of the LP-100. There is more about this in the Appendix of the manual.

For amplifier tuning with a carrier, you should use the Fast mode (small “w”). When using a pulser for tuning, switch to Tune mode “capital “T”) for fast update of both bargraph and numerical readout. The bargraph sampling in the LP-100 is about 100 samples/second, and it will display a single dit at 60 wpm, or a string of pulses from a pulser. Full accuracy should be attainable down to about 500 mW for both power and SWR. Good accuracy should still be maintained down to < 100 mW. **Note: The bargraph scale is fixed on the High scale in the Tune mode to prevent autoranging from clouding adjustments. For antenna tuner adjustment, the fast mode is best, or dBm/RL if you prefer peaking rather than dipping.**

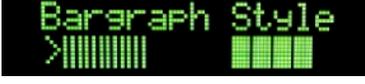
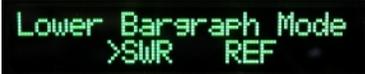
For antenna tuner adjustment, you can use any mode in terms of the bargraph behavior. For continuous updating of the SWR numerical display, you should use the “w” mode. Tapping the Alarm button will temporarily disable the alarm during tuning, then turn it back on after a minute. Alternatively, you can stay in the “W” mode with the “W” Mode SWR Display option set to either Always Average or Avg. During Snooze. This allows the SWR numerical display to be Average, either all the time or during alarm snooze operation.

Normally, the SWR Alarm should be set for 2.0:1 unless you purposely operate with an antenna that is close to 2.0:1 SWR. It is up to you whether to enable the alarm sounder, by using JP1. In any case, it is recommended that you loop your amplifier PTT through the LP-100. This helps protect your amplifier.

Setup Mode

There are many ways the LP-100 can be customized to suit almost any need. The screens that are used for selecting setup options are accessible by entering the Setup mode, as described above. Upon entering the Setup mode you will see the Reference screen shown below. The Mode button will allow you to cycle through the other Setup screens. Below are descriptions of all the Setup screens along with the factory settings.

	<p>Reference screen. Displays the reference voltage from the gain/phase detector, as well as the RSSI voltage (Received Signal Strength Indicator) from the AGC chip used in the frequency counter preamp. The screen also shows temperature in Deg F or C. The Dn button reboots the microprocessor, and is useful when flash updating the firmware in the LP-100. The Up button toggles the temperature mode.</p>
	<p>This screen is used to set the “User” SWR Alarm setpoint. It can be set between 1.0 and 5.0 in steps of 0.1. Use Dn to lower value, Up to increase it.</p>
	<p>This screen allows setting the SWR Alarm power threshold and Power display type. The alarm threshold is used mainly in contesting stations with multiple transmitters to prevent false alarms when energy from another transmitter is picked up by an antenna. The choices are 0,0.1, 1.0, 10.0 and 100.0 W. The default setting is 0.0W (active at all power levels). The Dn button will allow you to cycle through these choices.</p> <p>Pwr Mode options are Fwd Power and Net Power (Fwd minus Ref). The Up button toggles these choices.</p>
	<p>Range. Allows setting of maximum bargraph scale values for all three autoranging scales. The Dn button cycles between Low, Mid or High range. The choices wrap around to the beginning.</p> <p>Bargraph Max Range. The Up button allows scrolling through the various max power options for each range. The choices wrap around to the beginning.</p> <p>Low – 5, 10, 15, 20, 25W Mid – 50, 75, 100, 125, 150, 175, 200, 225, 250W High – 500, 750, 1000, 1250, 1500, 1750, 2000, 2250, 2500W</p> <p>The displayed range includes 0.4dB overshoot (~10%) above the indicated value. Note: These ranges do not affect the numerical readout, which has no limits. Defaults are 15W, 100W, and 1500W.</p>
	<p>This screen is used to set the width of the bargraph in the Fast mode. It is useful for optimizing the bargraph resolution for amplifier tuning, for instance. The displayed range goes from the maximum set in the previous screen, to a minimum which is the selected number of dB below that maximum. Default is 12dB. The name of this screen was changed to Fast Bargraph Range in a later release. Use Dn to lower value, Up to increase it.</p>
	<p>This screen allows setting of the number of samples used to average the numerical readout in Fast mode. The range is 2 to 32 samples. The default is 8 samples. Use Dn to lower value, Up to increase it.</p>

	<p>This screen allows setting the peak hold time in the Slow (peak) mode. The range is 0.25 to 5 seconds. The default of 2 seconds is good for normal SSB or CW operation. Use Dn to lower value, Up to increase it.</p>
	<p>This screen is used to set the decay rate for the bargraphs. Attack is always fast. Choices are "Off", "Fast", "Med.", "Slow". The Off setting allows the bargraph follow CW at 60 wpm with no lag and correct bar length. The slowest setting corresponds to a decay of about 1 second, and smoothes the response considerably for SSB and even amplifier tuning with a pulser. Default is Off. Try all the settings to see what suits you. Use Dn to lower value, Up to increase it.</p>
	<p>This screen is used to select the style of the bargraphs. The left side displays 3 bars/character for a total of 36 bars. The right hand option displays 5 bars/character for a total of 60 bars. Since it almost doubles the number of bars, it has more resolution. The downside is that it has small gaps between each group of 5. Despite the gap, you may well find that the increased resolution is more important to you than an evenly spaced bargraph. The default setting is the right-hand version. Use Dn to select left and Up to select right.</p>
	<p>This screen is used to select different maximum power values to be used with custom high power couplers. Several custom couplers exist and more are being developed. Use Dn/Up to cycle through the choices. The default is 3KW (the standard coupler). Current choices are "LPC1 3KW 1.8-54MHz", "LPC2 5KW 1.8-30MHz", "LPC3 1KW 10KHz-54MHz", "LPC4 5KW 1.8-54MHz" and "LPC4 10KW 1.8-30MHz". Use Dn/Up to cycle through choices.</p>
	<p>This screen is used to select the way you want SWR displayed when you are not transmitting. The choices are... "-.--", "1.00", "...", blank and hold last SWR reading. If you select Hold Last, it will be reset when you transmit again, or if you tap the Fast/Slow button. Use Dn/Up to cycle through choices. The default is "-.--".</p>
	<p>This screen is used to select what parameter is displayed on the lower half of the display. The choices are SWR and Reflected Power. If you select Reflected Power, remember that the top half will be either NET power or Forward Power (F+R) depending on your earlier selection. Use Dn to select SWR and Up to select REF.</p>
	<p>This screen is used to select the display type. There are currently two choices... the standard 2x20 PLED display, an a 2x20 VFD (Vacuum Fluorescent Display). The VFD is available in two sizes. One is a drop-in replacement for the PLED and the other is a larger display, which is used in cases where greater viewing distance is required. It requires a custom rack mounted case. Other options will also be offered in the future. Use Dn/Up to cycle through choices.</p>
	<p>This screen is used to determine the behavior of the SWR numerical readout when the peak ("W") power display mode is selected. There are three choices... Always Peak, Always Average and Avg. During Snooze. Use Dn/Up to cycle through the choices. The Always Average mode puts the SWR numerical readout in average mode to allow the number to change while adjusting an antenna tuner in "W" power mode. The last choice leaves the SWR numerical readout in peak hold mode unless you tap the Alarm button to invoke the Snooze Alarm. The readout then becomes average until the Snooze Alarm times out, and then returns to peak hold. This allows you to leave the meter in the "W" mode all the time, and just tap Alarm when you want to tune an antenna.</p>

Calibration Mode

This mode accessed as described in the Mode section above. You should thoroughly read through the calibration procedures before attempting to use this mode.

Screen Saver

The screen saver dims the screen after approx. 30 sec of inactivity, and marches your call sign across the screen after approx. 2 min. of inactivity. This is done to extend the life of the PLED display. Check the software section of the manual for instructions on programming your callsign into the LP-100. Application of RF power will return the LP-100 to normal display. Alternatively, tapping the Mode button will do the same thing if not in Calibration Mode.