

LP-100A

Quick Start Guide v4.1



Connections...

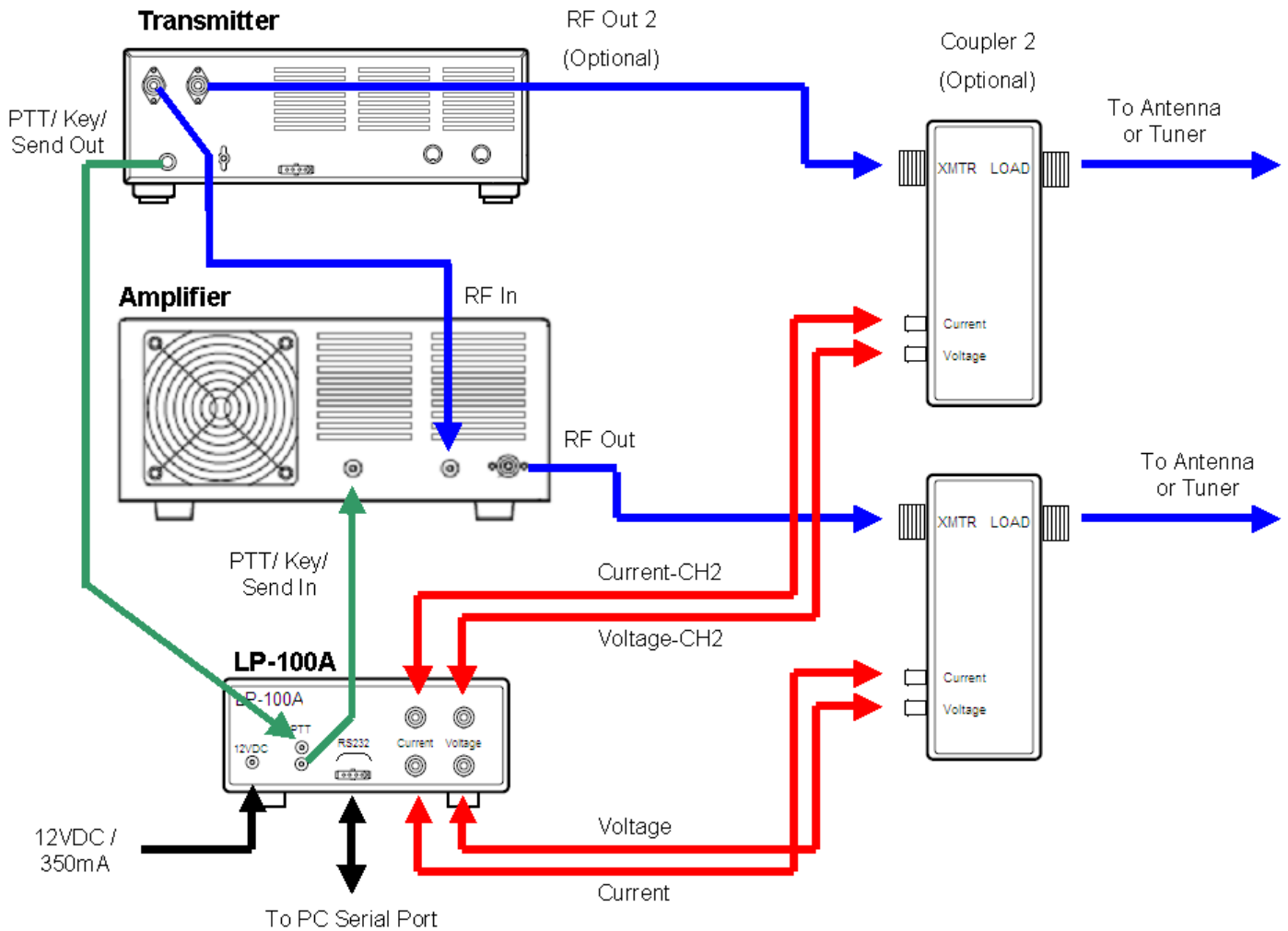


Fig.1. Shows installation with dual coupler option installed and transmitter with two ANT jacks. Ignore 2nd coupler and its connections for a standard single coupler installation. Current cables are marked with red band (2 red bands for 2nd coupler).

Power: 11-16 VDC @ 330 mA max., center pin +, 2.5mm. The lead with the white stripe on the supplied cable is +
 (Note: If connecting LP-100A to a high current supply, add an inline 1A fuse for protection.)

PTT: Loop the PTT (amp keying) between your amplifier and rig through the LP-100A using RCA connectors
 RS-232: Connects to computer... standard M-F straight through DB9 serial cable. See Operation Manual for usage.
 Current/Voltage: Connect to corresponding jacks on the coupler(s) using supplied RG-58C/U cables.

Basic Operation

Operation of the LP-100A 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-100A. There are five main modes for the LP-100A, which are accessed by momentarily pressing the "Mode" button. The mode status is saved in non-volatile memory, and the LP-100A will return to the saved mode upon powering up. There is also an automatic three-step screen saver mode which dims the screen after 1 second of inactivity, scrolls your call sign across the screen after a user programmed delay time, and turns the display off after another user programmed delay time. The first step is only active in the Normal (most often used) mode. **NOTE: The user can limit the number of modes displayed by turning each mode ON or OFF using the Setup screen titled "Opt. Mode Display". Refer to Setup Screens on page 6. The Power/SWR mode and Vector Impedance modes are always displayed. Limiting the displayed modes allows faster navigation between modes by eliminating modes that the user doesn't need or want.**

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.

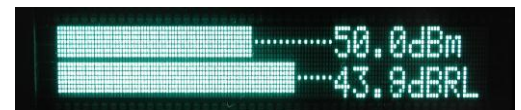
Normal mode is designed to display all the information you normally need on one screen. It displays power in three auto-ranging scales, and SWR (or Ref Pwr), plus bar graphs for both. A summary of the behavior options for the bargraph and numerical displays is provided below in the Setup section, along 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 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. **This mode is disabled by default and must be enabled in SETUP. See page 6.**



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-100A. 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. There is more on this in the manual, including the use of VCP (Virtual Control Panel) and a program called PolarPlot to automatically plot antenna patterns. **NOTE: The maximum power for the direct inputs is 2W. This mode is disabled by default and must be enabled in SETUP. See page 6.**



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. **This mode is disabled by default and must be enabled in SETUP. See page 6.**



Setup and Calibrate Allows accessing the Setup and Calibrate modes. Hold Mode button for 1 second to enter Setup mode (top right picture). Hold another second to enter Calibration mode (bottom right picture). Once you are in each of these modes, the Mode button lets you cycle through the choices of that mode. There is more information on the Setup page of this guide. Details for the Calibration mode are in the LP-100A Assembly and Operation manual. Normally, this mode is not used except by kit builders, since the assembled meters are factory calibrated with accuracy traceable to NIST.



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 value is adjusted in Setup mode. 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. The snooze mode allows adjusting an antenna tuner without the alarm going off, but it returns to normal after tuning to protect the amplifier as intended.

Peak/Avg/Tune (Up) Button

This button provides two functions.

- 1) Short Tap (momentary) – Cycles among the three power display modes... Average, Peak Hold and Tune.

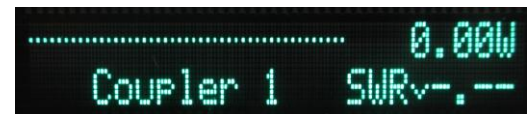


----- Power Mode Indicator. w=Average, W=Peak, T=Tune (pulser)

In all cases, the bar graphs remain in fast attack mode, with decay that's adjustable in Setup. The character after the numerical power readout indicates which mode you are in. A "W" indicates peak mode, a "w" indicates average mode and a "T" indicates tune mode. Average mode is best for taking accurate measurements with steady state signals, or for tuning an antenna tuner. 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-100A 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 Peak mode, except that the peak hold time constant is set to 0.25 sec as opposed to the hold time set in Setup. The Average and Tune modes use the preset bargraph range in the setup section, while the Peak mode shows a fixed 13 dB range. The Tune mode is designed mainly for tuning an amplifier using a pulser, and uses a much longer decay to smooth out the pulses.

- 2) Long Tap (1/2 second) - Cycles among the three dual coupler selections... Coupler 1, Coupler 2, Auto-Sense.

The dual coupler option must be installed and enabled for the directional arrows to be displayed. A little "arrow" next to the "SWR" text indicates which coupler is active (down for coupler 1, up for coupler 2). When in Auto-Sense, the LP-100A will display the data from whichever coupler is receiving the most power. This is especially useful for SO2R operation, or when using a rig with separate HF and 6m outputs. The meter automatically applies the correct calibration table for the active coupler. Coupler models can be intermixed.



Normal Operation

Generally, the LP-100A is left in the Normal mode. For SSB or CW operation, you should use Peak power mode. You can access this mode by tapping the Peak/Avg/Tune 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-100A 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-100A. There is more about this in the Appendix of the manual.

For amplifier tuning with a carrier, you should use the Average mode (small "w") to see both bargraph and numerical readout change as you tune. You can stay in Peak mode if all you care about is the bargraph. 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-100A 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. For antenna tuner adjustment, any mode is good, as both the bargraph and numerical readout update continuously. Use the dBm/RL mode if you prefer peaking rather than dipping. Tapping the Alarm button will temporarily disable the alarm during tuning, then turn it back on after a minute. 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 (keying) through the LP-100A unless it is a modern amplifier with advanced protection circuitry.

The screen saver dims the screen after approx. 1 second of inactivity, and scrolls your call sign across the screen after a user programmed delay. After a further delay, the display is turned off (sleep). Screen saver mode is cancelled whenever you transmit again, or tap the Mode button (with default reset option). If the display is asleep, it will fade back up when screen saver is cancelled. All of this is done to extend the life of the display. The GVFD display in the LP-100A should last the lifetime of the meter in normal operation.

Setup Mode

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

Wherever CH1 is shown, there is also a similar screen for CH2 that is displayed when the CH2 coupler is active.

The default settings for a standard LP-100A are shown below.

Net/Fwd power...	Net	Coupler...	LPC1
Low power range...	15W	SWR Resting Style...	- . - -
Mid power range...	100W	Lower Bargraph Mode...	SWR
High power range...	1500W	Display Brightness...	6
Alarm Pwr Threshold...	0W	SS Timers...	Scroll=2, Sleep=5
User Alarm Setting...	3.5:1	SS Reset...	Mode button or RF Sensing
Tuning Range...	12dB	Optional Mode Display...	Optional modes disabled
Pwr Average samples...	8	SWR Power Threshold...	0.5W
SWR Average samples...	2	Pk Pwr Reset Threshold...	30%
Peak Hold Time...	2 sec	Dual Coupler Option...	Disabled unless installed
Bargraph Decay...	Med		

	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. The Dn button resets the microprocessor, and is normally not used. The Up button toggles the temperature mode between deg F or C. The LP-100A has software temperature correction, but little is needed due to the advanced design and precision chips. The software correction reaches a maximum of 1% at 125 deg F.
	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.
	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. Note: This threshold only affects the alarm. Use the SWR threshold Setup screen to limit both the SWR display and alarm below the selected power level. Pwr Mode options are Fwd Power and Net Power (Fwd minus Ref). The Up button toggles these choices. The default is Net.
	Range. Allows setting of maximum bargraph scale for the three autoranging scales. The Dn button cycles between Low, Mid & High range. Select a power range, and then set the bargraph maximum range. Bargraph Max Range. The Up button scrolls through the various max power options for each range... 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, 2500, 3000W. The displayed range includes 10% above the indicated value. Note: Defaults are 15W, 100W, and 1500W. Note: These ranges are scaled by a factor of x1.67 when using a 5KW coupler, and 3.33 when using a 10KW coupler.
	This screen is used to set the width of the bargraph in the Average and Tune modes. The Peak mode is always 13dB. 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 Use Dn to lower value, Up to increase it.
	This screen allows setting of the number of samples used to average the numerical readout in Average Power mode, and for SWR in all modes. The range is 2 to 24 samples for Power, and 0 to 5 samples for SWR. The default is 8 samples for Power and 2 samples for SWR. Use Dn to cycle through Power settings and Up to cycle through SWR settings. Both wraparound to the beginning.
	This screen allows setting the peak hold time in the 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.
	This screen is used to set the decay rate for the bargraphs. Decay choices are "Fast", "Med." and "Slow." The slowest setting corresponds to a decay of about 3 seconds, and smoothes the response considerably for SSB. Default is Med. Try all the settings to see what suits you. Use Dn to lower value, Up to increase it. Note: the attack setting is always fast, and will provide full response to a single dit at 100wpm.

<pre> CH1 Coupler Type LPC1 3KW 1.8-54 MHz </pre>	<p>This screen is used to select different maximum power values to be used with custom high power couplers. Use Dn/Up to cycle through the choices. The default is LPC1 (the standard coupler). Current choices are "LPC1 3KW 1.8-54MHz", "LPC2 5KW 1.8-30MHz", "LPC3 250W 0.1 - 20MHz", "LPC4 5KW 1.8-54MHz", "LPC5 10KW 1.8-30MHz" and "LPC6 1KW 0.10 to 10MHz". Use Dn/Up to cycle through choices.</p>
<pre> SWR Resting Style <-,--> </pre>	<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. Use Dn/Up to cycle through choices. Default is as shown.</p>
<pre> Lower Bargraph Mode >SWR REF </pre>	<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 reflected power will be referenced to either NET power or Forward Power (F+R) depending on your earlier selection for the power display. F+R is the preferred choice to use with REF pwr. Use Dn/Up to select.</p>
<pre> Ltr Pos'n Callsign 1 N8LP </pre>	<p>This screen is used to program your callsign into the screen saver. The Dn button is used to select the position of the letter you want to change... 1 thru 6 from left to right. The Up button is used to scroll through the choices... 0 thru 9, A thru Z, space, / and -. Both buttons wrap around. Step thru the positions, scrolling to the letter you want for each position. The callsign is saved as you see it.</p>
<pre> Display Brightness Dim -----+-- Bright </pre>	<p>This screen is used set the display brightness. Each step represents a 12.5% change in brightness. The default setting is 6, which equals a brightness level of 75%. This provides almost full brightness, and provides some measure of added display life. You can use any brightness level you like. The display is rated for 50,000 hours (5.7 years) of continuous display at full brightness before brightness drops to half. With the LP-100A's screen savers, you can expect much more than that with typical operating habits. Use Dn to reduce brightness, Up to increase. The brightness of the screen changes as you adjust it.</p>
<pre> SS Timers - Minutes Scroll=02 Sleep= 05 </pre>	<p>This screen is used set the display screen savers. The two timers that can be set are the Scroll timer and the Sleep timer. The Scroll timer sets the time in minutes from the last transmission to the time when your call sign starts scrolling across the screen. The Sleep timer sets the time from the last transmission to the time when the display turns off. The Scroll saver should be set first, since it also affects the Sleep timeout. Each can be adjusted for up to 10 minutes (20 minutes total). The screen saver extends display life, and reduces power consumption and heat when the meter is idle. There is also a third screen saver timer, but it is factory preset. It dims the screen to 25% one second after transmission ends when in the Main Mode. If Peak power mode is selected and the hold time is set for 1 second or more, it dims at the end of the hold period. The default is as shown.</p>
<pre> SS Reset Mode Mode Button or RF Sense </pre>	<p>This screen is used to determine how the meter is waked from ScreenSaver or Sleep modes. The options are... Mode Button or RD Sense, Mode Button Only. The second option is useful in industrial installations where it operation is 24/7 continuous, and protects the display from excessive wear when the meter is monitored remotely. The default is as shown.</p>
<pre> Opt. Mode Display dBm / RL On </pre>	<p>Allows disabling of modes that the user may not use or doesn't want to scroll through. The optional modes are... dBm/RL, Direct Input (Field Strength) and Peak to Average Ratio. The default is all ON.</p>
<pre> SWR Power Threshold 0.50W </pre>	<p>Sets the lower limit that the meter will display. The choices are... 0.05W, 0.5W, 2.0W, 5.0W, 10.0W. Setting the value higher allows the meter to ignore samples taken during voice pauses. This eliminates some samples taken at the limit of the gain/phase detector accuracy, where SWR readings may be slightly higher. It smooths out the SWR display, and lets SWR adjustments be made while talking, for instance.</p>
<pre> Pk. Tmr Reset Threshold 50 Percent of Peak </pre>	<p>This sets how far below a peak reading that power must drop before the peak hold timer resets and grabs a new sample. The default is 10 percent.</p>
<pre> Dual Coupler Option Not Installed </pre>	<p>This screen allows enabling or disabling of the dual coupler option. This is done so that most users don't have to see the up/down arrows that show which coupler is active. The choices are "Installed" and "Not Installed".</p>

Calibration Mode

This mode is accessed as described in the Mode section earlier. You should thoroughly read through the calibration procedures in the Assembly and Operations manual before attempting to use this mode.