LNA Technology LLC

LNA Technology PR-80 Peak Conversion Board

The PR-80 Peak Conversion Board allows you to add peak power measurement capability to the Model 43 wattmeter, (ready to run), and other wattmeters with component value changes.

When installed as instructed, the board will:
1) Load the sensing element as the meter would, to insure accuracy.
2) Amplify the signal supplied by the line section / slug, and apply it to the peak hold circuit.
3) Allow you to calibrate the meter drive level when in peak mode.
4) Allow you to electrically zero the indicating pointer when in peak mode.
5) Allow you to adjust the pointer "Peak Hold" time period.

Mounting
Mount the peak power board in a separate enclosure, or inside the wattmeter, on the back or side panel. Use standoffs to secure the board. The mounting holes in the PC board will accept #4 hardware. If you are remote mounting the unit, do not place it in a high RF environment. If you are using a long run to the line section, you may want to use plastic standoffs to help prevent a "ground loop" from effecting measurement accuracy.

Power source
The PR80 requires a regulated 8-15 volts DC power source, capable of supplying 1ma. A wall type power supply, or 9 volt battery will operate the unit. **Limit RF exposure (radiated) to the DC power source leads! Dress the power leads away from coax and antennas.**

Electrical Connections
Connect the leads from the Line Section to the input of the PR-80, and the output of the PR-80 to the meter (observe polarity). You may choose to wire in a small switch to connect and disconnect the PR-80 in and out of circuit. (or other switching method that you devise) If leads are over 24" or the unit is in a high RF field , use shielded wire.

Since the PR-80 does not substantially influence average readings, it is just as well to leave it in line at all times. If you decide to use a switch, follow the connection diagram below. A small DPDT switch and 20-22ga. hook up wire is all that is required to jump the line section signal around the PR-80, for average readings or calibration.

Pointer Zero Adjustment (See diagram #2)

For most PR-80 boards, this adjustment is not necessary. In some cases the adjustment is required due to tolerances in amplifier characteristics. If the meter pointer is at zero with no RF power applied, adjustment is not required, and the control should be set to mid range. If adjustment is required, Zero the mechanical adjustment on the front of the meter first. Connect the PR-80 and power the unit. The meter pointer may move up scale. With no RF applied, adjust the ZERO control to match the resting position of the pointer. Turn the power on and off, waiting a few seconds for the capacitors to discharge when zeroing the pointer.

CALIBRATION (CAL) (See Diagram #2)
Switch the PR-80 out of circuit.

With the correct element for the frequency selected for testing installed in the line section, apply a steady **unmodulated carrier** (CW) and adjust the RF power to move the pointer to full scale. Switch in the PR-80 and adjust the CAL control on the PR-80 to match the pointer position obtained with the PR-80 out of circuit. You may try this a few times at different scale positions. Just switch the PR-80 in and out of line, and adjust so both readings match. If you have wired in the PR-80 without a switch, you can remove power from the PR-80, and jump the input to the output to take it out of line. This method introduces a calibration error because the PR-80 input and the meter are connected in parallel. Also, note that the meter movement is an analog non linear device, and therefore the indication and calibration point will not track across the whole scale.

Peak Hold Adjustment (See diagram #2)

With the PR-80 connected, and the same test setup as for the peak adjustment, apply a modulated signal, or speak into the microphone and adjust the peak hold time to an amount that suits your visual preference. (You may find a longer pointer hang time makes it easy to read the peak power for voice transmissions.)

Pointer Ballistics

The pointers on most wattmeters are large, and have sufficient mass to cause overshoot on large voice peaks. This is most evident when the element power selected will have the pointer near the top of the meter scale. For example, when you first begin transmitting, the pointer must go from zero to near the top of the scale. It is not unusual to see the pointer overshoot above the actual peak power due to inertia, and then settle down to the actual peak level. Nothing can be done to correct this, since it is a function of the pointer weight, the amount of power step change, and damping designed into the meter movement.

Troubleshooting tips

If you are having a problem with the PR-80, first make sure the power source polarity is correct, and the voltage is between 8-15vdc. "Clean" regulated DC voltage is required!

Check for shorted connections where you soldered to the PC board. Check carefully for Shorts to adjacent tracks, or solder splashes.

Check the input and output wiring for open or shorted connections.

Make sure you have the correct element installed (power level and frequency) in the line section, and check to make sure it is in the correct direction for forward power measurement.

Long coax runs to the line section can allow RF to be conducted into the meter circuit, leading to measurement accuracy problems. You may have to wrap a few turns of the lead running to the line section through a ferrite toroid, or use the snap on type. The same applies with the DC power leads. The PR-80 circuit is bypassed at all inputs / outputs, but RF can still come through the ground connection. RF conducted on the leads, or radiated RF, can introduce error! If you detect errors at high power levels, install a ferrite choke as described above.

Using the PR-80 with other wattmeters

There are many wattmeters that can benefit from the PR-80 peak wattmeter board. To help you interface the PR-80 to your wattmeter, a table of common meter movement resistance / operating current is supplied below. Please refer to the table to select the correct component values for your application. Most meter movements have the Full Scale (FS) current listed at the bottom corner of the meter scale. If your meter FS current is not listed, you can measure the meter resistance. **Do not measure the resistance with a DMM !** The voltage applied by the DMM may damage the meter movement! Measure the resistance by carefully applying a very low voltage, (from a 1.5 volt battery will do) through a high value variable resistor (100-500k) Connect the resistor so the full resistance is in circuit to start, so you don't "pin" the meter movement! Adjust the variable resistor for a full scale reading on your meter. Now connect a second variable resistor (10k ohms) across the meter movement, and reduce the resistance until the meter is exactly at half scale. At this point the meter and the variable resistor are sharing the current equally, so the resistance of the variable resistor must equal the meter movement resistance. Remove the power and the variable resistor you had connected across the meter movement. Measure the resistance of the variable resistor without disturbing the setting. The measurement is equal to the meter movement resistance. To select Rin value, Subtract 250 from the meter movement resistance. (this will center the CAL pot)

Manufacturer	Meter R	Meter FS/ current	Rin	Rfb	Rout
Bird 43	1420	30ua	1.2k	1.1m	75k
Collins312B-4	1000	200ua	820	560k	27k
Bird	1000	100ua	820	680k	33k
DrakeW4	3k w res	200ua	2.4k	220k	27k
Drake WH7	1100	200ua	820	680k	33k

All values listed are approximate. It may be necessary to parallel resistors to "trim" adjustment due to actual meter resistance.

Use the circuit below if you wish to switch between Peak and Average, and turn the power on / off with the same switch

Diagram 1
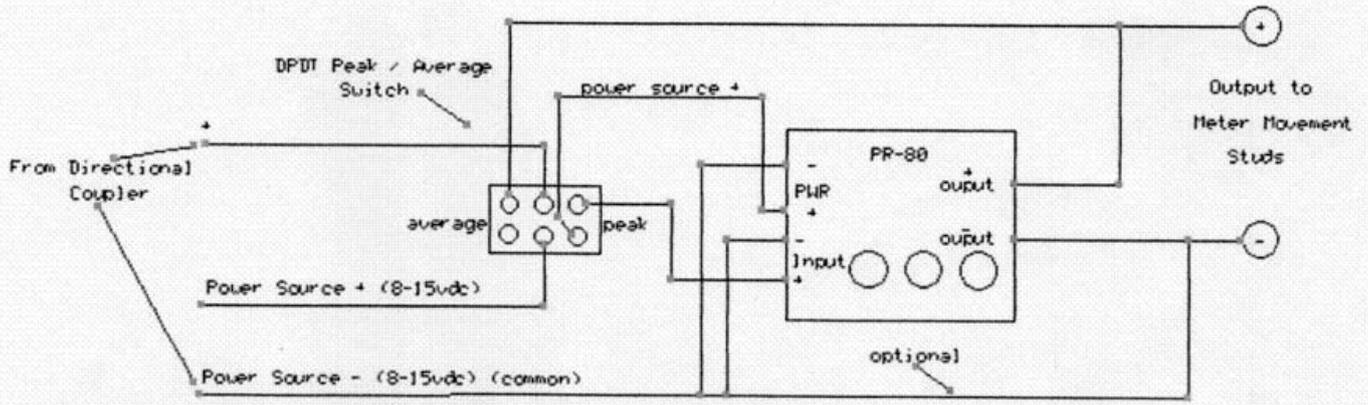
Please NOTE !

Input -	Common connection
Output -	on PR-80 Board
Power Source -	

Diagram 2

PR-80 Connection Interface Solder Pad Locations