

**INSTRUCTION
MANUAL**

ORDER NO. 421B

Power Meter

PN 801168

General Description The 421B Power Meter is a measuring instrument that gives power output and direct SWR (standing wave ratio) readings. It is compact in size, easy to install and has a clean legible front panel. Operating features include power readings in three ranges up to 2000W and direct meter reading of the antenna/feedline system SWR.

The power readings from the 421B approach that of a peak reading meter system. Ex. - With a 4-watt carrier, actual peak power at 100% modulation is 16W. An averaging meter system reads about 4W with or without modulation but, depending on actual modulation at the time, the 421B will indicate from 10 to 16W under modulation. This reading is then much closer to the actual modulation peaks.

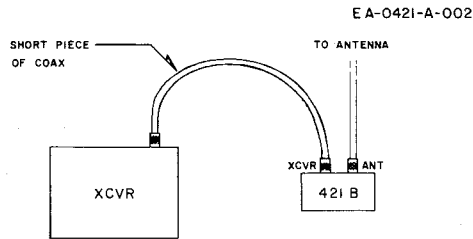
On single side band (SSB), which is usually all "peaks", the 421B will read with much greater accuracy than an averaging meter system. Ex. - Using a SSB transmitter with a 12W peak-envelope power (PEP) final output, a 12W reading can be expected instead of an averaging reading of 3 or 4W.

- Specifications**
- Frequency Range 3 - 30 MHz
 - Power Ranges 0 - 20W
0 - 200W
0 - 2000W
 - SWR 1:1 - 3:1 and higher
 - Construction high impact CyColac ® case with aluminum front and rear panels
 - Dimensions (HWD) 3½" x 8" x 5¼"
 - Shipping Weight 2½ lbs.

Installation Remove the unit from the box and check closely for shipping damage. If damage has occurred notify the carrier right away. Damage due to shipment is the responsibility of the carrier and a claim must be filed. The Hy-Gain warranty does not cover shipping damage.

Before beginning your installation you will need a short piece of RG-58/U or RG-8/U coax with PL-259 connectors on each end.

If your station uses a transceiver, install the unit by connecting the power meter between the transceiver and antenna using the short piece of coax (Re: Figure 1).

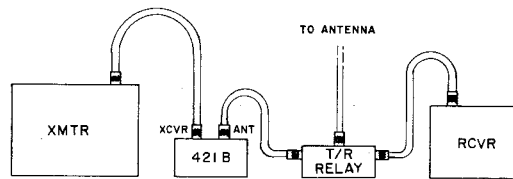


Installation with Transceiver

Figure 1

If your station uses a separate transmitter and receiver, install the unit by connecting the power meter between the transmitter and the T/R switch or relay using the short piece of coax (Re: Figure 2).

NOTE: *In this installation the 421B measures the SWR of the entire system - the antenna, feedline, T/R switch or relay and all connections - not just the antenna.*



Installation with Separate Transmitter and Receiver

Figure 2

Operating Procedures

To measure power output:

Your SWR should be less than 1.5:1 to ensure full accuracy. Always start with the 2000W range and decrease wattage until you get a reading. Do not allow the meter to be pinned as this may damage the unit. For maximum accuracy power measurements should be made using a 50-ohm dummy load.

CAUTION

Do not tamper with the internal power scale calibration. It has been factory set.

To measure SWR:

1. Turn the CALIBRATE control completely counterclockwise.
2. Set the function switch on FWD (forward) and key your transceiver.
3. Advance the CALIBRATE control until the meter reads full scale (far right side of scale).
4. Switch the function switch to SWR. Read the SWR directly from the SWR scale.

Alignment

The 421B has been factory aligned. Tampering with the internal controls will cause inaccurate meter readings. If your meter should need re-alignment, please use the following procedure:

Equipment needed:

50-ohm dummy load with a load capability of 2000W rms
Hewlett Packard 410C VTVM or equivalent (properly calibrated)
transmitter with a variable output to 2000W rms at 30 MHz
insulated alignment tool

Null Adjustment:

1. Turn the transmitter off.
2. Connect the dummy load to the antenna jack and the transmitter to the transmitter jack of the power meter.
3. Remove the power meter cover.
4. Turn the transmitter on.
5. Switch the function switch to FWD and key the transmitter.
6. Adjust the CALIBRATE control for a full-scale reading.
7. Switch the function control to SWR and adjust C1 for a minimum reading.
8. Unkey the transmitter.

Power Adjustment

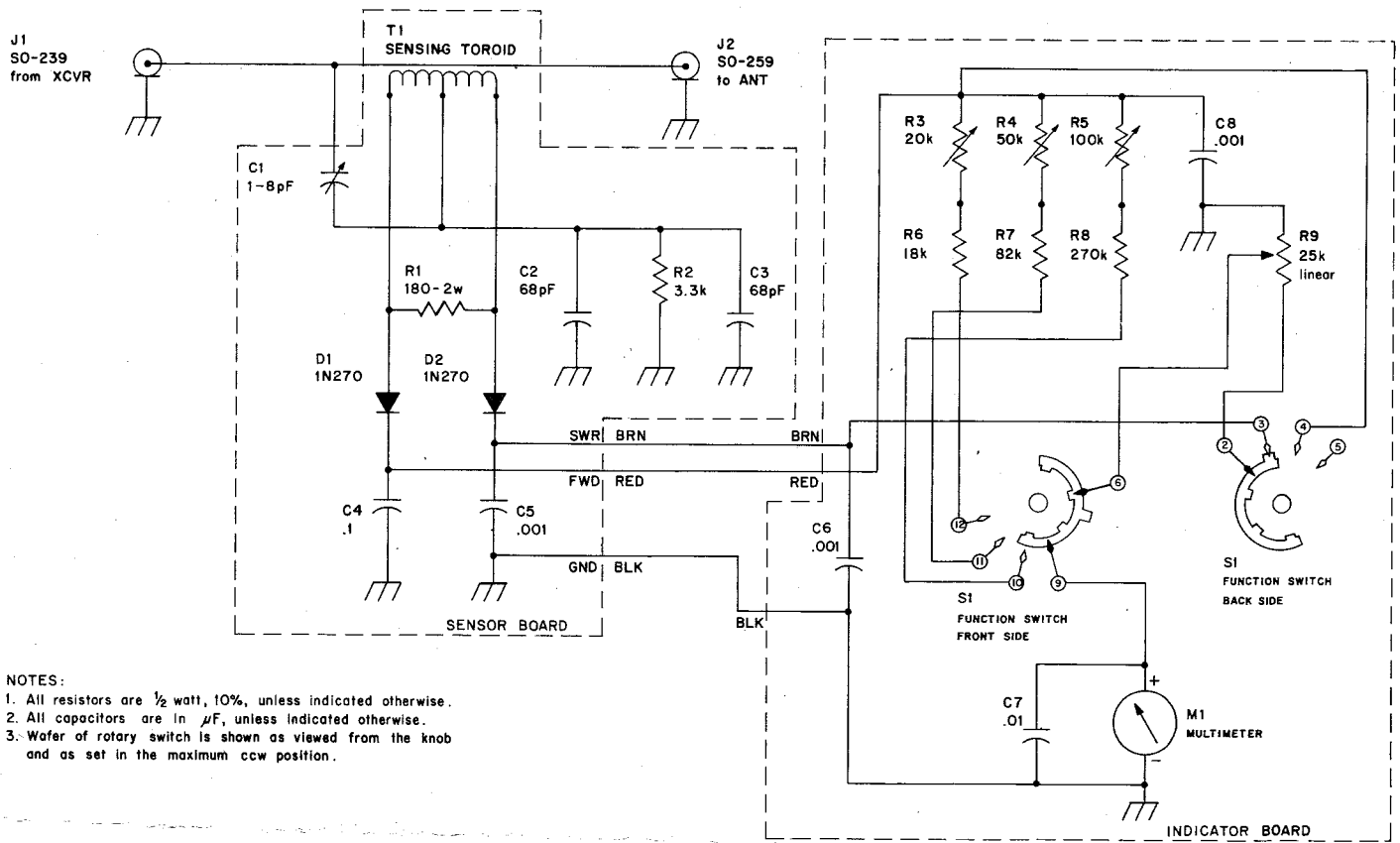
1. Switch the function switch to 2kW.
2. Connect the VTVM RF probe across the dummy load.
3. Key the transmitter and apply power until you receive a reading of 316V rms.
4. Adjust blue knob pot R5 to obtain a reading of "20" (2000W) on the power scale.
5. Unkey the transmitter.

If your transmitter is not capable of 2000W rms, follow steps 1 and 2 above and substitute the procedure below for the 2kW scale.

3. Key the transmitter and increase power until you receive a reading of 141V rms.
4. Adjust blue knob pot R5 to obtain a reading of "4" (400W) on the power scale.
5. Unkey the transmitter.
6. Switch the function switch to 200W.
7. Key the transmitter and apply transmitter power until you receive a reading of 100V rms.
8. Adjust blue knob pot R4 to obtain a reading of "20" (200W) on the power scale.
9. Unkey the transmitter.
10. Switch the function switch to 20W.
11. Key the transmitter and apply transmitter power until you receive a reading of 31.6V rms.
12. Adjust blue knob pot R3 to obtain a reading of "20" (20W) on the power scale.
13. Unkey the transmitter and turn it off.
14. Remove the dummy load and VTVM. Put the power meter cover back on.

SCHEMATIC DIAGRAM

EA-0421-C-001



- NOTES:
1. All resistors are 1/2 watt, 10%, unless indicated otherwise.
 2. All capacitors are in μF , unless indicated otherwise.
 3. Wafer of rotary switch is shown as viewed from the knob and as set in the maximum ccw position.

Parts List

Item	Part No.	Description	Qty	Item	Part No.	Description	Qty
	460065	case clip	2	D1	765722	1N270 germanium	1
	460066	molded case top	1	D2	765722	1N270 germanium	1
	460067	molder case bottom	1	J1	657570	S0-239 connector	1
	170272	front panel	1	J2	657570	S0-239 connector	1
	170275	rear panel	1	M1	790006	multifunction meter	1
	705669	function switch knob	1	R1	722223	180, 2 watt, 10%	1
	705670	calibrate knob	1	R2	721321	3.3k, 1/2 watt, 10%	1
C1	721861	1-8 pF trimmer	1	R3	721483	20 k, pcm, linear potentiometer	1
C2	721601	68 pF, 5%, NPO, ceramic disc	1	R4	721487	50 k, pcm, linear potentiometer	1
C3	721601	68 pF, 5%, NPO, ceramic disc	1	R5	720042	100 k, pcm, linear potentiometer	1
C4	721574	.1 uF, flat film	1	R6	721339	18 k, 1/2 watt, 10%	1
C5	721158	.001 uF, 1kV, ceramic disc	1	R7	721317	82 k, 1/2 watt, 10%	1
C6	721158	.001 uF, 1kV, ceramic disc	1	R8	721290	270 k, 1/2 watt, 10%	1
C7	721550	.01uF, 600V, ceramic disc	1	R9	722263	25 k, linear potentiometer	1
C8	721158	.001 uF, 1kV, ceramic disc	1	S1	700310	function switch, rotary	1
				T1	722077	sensing toriod	1



90-DAY LIMITED WARRANTY

Hy-Gain de Puerto Rico (HPR) warrants all products manufactured by it and bearing HPR model numbers to be free from defective material and workmanship under normal use and service and agrees to repair such products, if investigation discloses the defect to be the fault of our manufacture. HPR's obligation under this warranty is limited to repairing any such product which, upon our examination, proves to be so defective. All products repaired under such warranty must be returned to the nearest Field Warranty Service Station, transportation prepaid by the purchaser, within ninety days from the date of purchase.

This warranty applies only to the original purchaser. Upon receipt of equipment, the buyer is responsible for checking the contents for damage. Any shipping damage should be referred to the carrier.

This warranty does not apply to any HPR products which have been repaired, worked on, or altered by persons not authorized by HPR to do so, or products to which the repair has injured the stability or reliability of such product, or which has been the subject of mis-use, negligence, or accident, or the serial number of which has been removed, altered, effaced, or in any other way rendered unidentifiable. Neither does this warranty apply to any of our products which have been connected, installed, used, or otherwise adjusted other than in accordance with instruction furnished by HPR. Nor does HPR assume any liability for consequential damages, and in any event, our liability shall in no case exceed the original purchase price of the product.

Accessories supplied by, but not manufactured by HPR, shall carry only such warranty as is available from the manufacturer of such goods and are specifically excluded from HPR warranties.

This warranty is void if HPR shall inspect equipment and find it to have been modified, or improperly installed or used. This warranty is expressly in lieu of all other warranties, expressed or implied, and all other obligations or liabilities on the part of HPR. No person, including any dealer, agent, distributor, or representative of HPR is authorized to assume for HPR any liability on its behalf, or in its name, except to refer purchasers to this warranty.

All claims of defect or shortage should be addressed to firms on the attached Authorized Field Warranty Service Station list.

You must mail the warranty card in immediately. Then, in making a claim, you need only furnish model and serial numbers of the unit. However, if for some reason the card was not mailed, a copy of a document, such as a sales receipt, recording the date, place, and proof of purchase may, at the discretion of the service department, serve to establish your warranty. Your warranty claim letter should include all pertinent details, along with the part or item numbers involved. Do not return anything until requested to do so. You must supply the above information.

Any returned items must have prior authorization. Unexpected returns are greatly delayed in handling. These delays can be avoided by writing in advance and furnishing the necessary information.

HPR reserves the right to make changes in design and improvements on its products without assuming any obligation to install the same on any of its previously manufactured products. Further, HPR reserves the right to ship new and/or improved products which are similar to the form, fit, and function of products originally ordered.