RadioShack®

21-534

Power/SWR Meter

CALIBRATION
Turn to calibrate the meter.

RANGE
Slide to select a power range **20W/200W/2000W** to match the power of your radio.

FUNCTION
Slide **FUNCTION** to **POWER/CAL/SWR** to select different function mode.

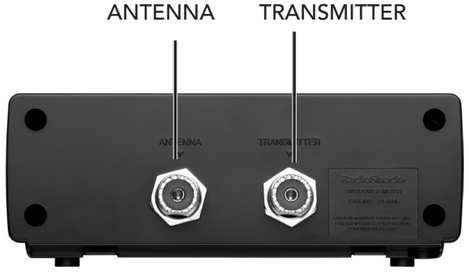
MODE
Slide to set **MODE** to **PEP/AVG** to measure peak envelope power or average power of your radio.

Setting the Meter

Connecting the Meter

To connect the meter to your CB or amateur radio and your antenna, you need a RG-58U coaxial cable (not supplied) with PL-259 connectors on both ends. The cable must reach from the back of the meter to your radio's antenna jack.

1. Turn off your radio, then disconnect the antenna from the radio and plug it into **ANTENNA** on the back of the meter.
2. Plug the coaxial cable into the radio's antenna jack and into **TRANSMITTER** on the back of the meter.



Back View

Calibrating the Meter/Measuring SWR

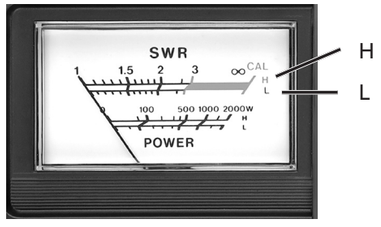
1. Turn on your radio (transmitter). Then set **FUNCTION** on the meter to **CAL**.
2. Select a channel or frequency on your transmitter and hold down its transmit key. Do not speak into the microphone.

Notes:

- An SWR reading will be different for different frequencies (channels). If you transmit on one channel more often than others, select that channel for the reading. If you transmit on several channels, choose a frequency in the middle of the range of channels you use. (For example, if you transmit on all 40 CB channels, choose Channel 20.)
- If you use a CB that has sideband modes (SSB), do not select any of these modes. (Use only AM for SWR measurements.)
- If you have an amateur radio, select the continuous wave (CW) or tuning mode to check the SWR.

3. While you hold down the transmit key, rotate **CALIBRATION** on the front of the meter until the needle points to **CAL**.
4. Release the transmit key, then set **FUNCTION** to **SWR**.
5. Press the transmit key again, then find the **SWR** by reading the appropriate scale on the meter.

- If your transmitter's power is less than 20 watts, read the lower scale (marked with an **L** on its right side)
- If your transmitter's power is more than 20 watts, read the upper scale (marked with an **H** on its right side)



Thank you for purchasing your Power/SWR Meter from ***RadioShack***. Measuring SWR shows you how much of your radio's transmit power is reflected from the antenna back into the antenna cable and lost. With this information, you can adjust the length of your antenna or antenna cable so your antenna and radio combination can operate at maximum power. Please read this user's guide before installing, setting up and using your new meter.

What's Included

Power/SWR meter User's Guide

Specifications

Measurable RF Power ..... 1 – 2000 Watts
SWR:
  at 25 Ohms load impedance 2.0
  at 50 Ohms load impedance 1.1
  at 100 Ohms load impedance 2.0
Impedance ..... 50 Ohms
Frequency Range ..... 3 – 30 MHz
Minimum Input Power for Calibration ..... 1 Watt
Power Meter Accuracy (at 50 Ohms load impedance):
  5 Watts ..... +/– 0.5 Watt
  50 Watts ..... +/– 5 Watts
  500 Watts ..... +/– 50 Watts
Dimensions (H×W×D) ..... $2^{17}/_{32} \times 6^{15}/_{32} \times 4^{1}/_{16}$ in
.....(64 × 165 × 102 mm)
Weight ..... 10.9 oz (310 g)

Specifications are subject to change and improvement without notice. Actual product may vary from the images found in this document.

Limited Warranty

This product is warranted by ***RadioShack*** against manufacturing defects in material and workmanship under normal use for ninety (90) days from the date of purchase from ***RadioShack*** company-owned stores and authorized ***RadioShack*** franchisees and dealers. EXCEPT AS PROVIDED HEREIN, ***RadioShack*** MAKES NO EXPRESS WARRANTIES AND ANY IMPLIED WARRANTIES, INCLUDING THOSE OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED IN DURATION TO THE DURATION OF THE WRITTEN LIMITED WARRANTIES CONTAINED HEREIN. EXCEPT AS PROVIDED HEREIN, ***RadioShack*** SHALL HAVE NO LIABILITY OR RESPONSIBILITY TO CUSTOMER OR ANY OTHER PERSON OR ENTITY WITH RESPECT TO ANY LIABILITY, LOSS OR DAMAGE CAUSED DIRECTLY OR INDIRECTLY BY USE OR PERFORMANCE OF THE PRODUCT OR ARISING OUT OF ANY BREACH OF THIS WARRANTY, INCLUDING, BUT NOT LIMITED TO, ANY DAMAGES RESULTING FROM INCONVENIENCE, LOSS OF TIME, DATA, PROPERTY, REVENUE, OR PROFIT OR ANY INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, EVEN IF ***RadioShack*** HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

Some states do not allow limitations on how long an implied warranty lasts or the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you.

In the event of a product defect during the warranty period, take the product and the ***RadioShack*** sales receipt as proof of purchase date to any ***RadioShack*** store. ***RadioShack*** will, at its option, unless otherwise provided by law: (a) correct the defect by product repair without charge for parts and labor; (b) replace the product with one of the same or similar design; or (c) refund the purchase price. All replaced parts and products, and products on which a refund is made, become the property of ***RadioShack***. New or reconditioned parts and products may be used in the performance of warranty service. Repaired or replaced parts and products are warranted for the remainder of the original warranty period. You will be charged for repair or replacement of the product made after the expiration of the warranty period.

This warranty does not cover: (a) damage or failure caused by or attributable to acts of God, abuse, accident, misuse, improper or abnormal usage, failure to follow instructions, improper installation or maintenance, alteration, lightning or other incidence of excess voltage or current; (b) any repairs other than those provided by a ***RadioShack*** Authorized Service Facility; (c) consumables such as fuses or batteries; (d) cosmetic damage; (e) transportation, shipping or insurance costs; or (f) costs of product removal, installation, set-up service adjustment or reinstallation.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

RadioShack Customer Relations
300 RadioShack Circle, Fort Worth, TX 76102 12/99

www.radioshack.com

Protect the environment by recycling used electronics. Go to www.ecyclingcentral.com to find a recycle location near you.

AO0310AAA1
05A08
21-534
Printed in China

Interpreting SWR Readings

The ideal SWR reading is 1.0, but this reading is usually possible only under laboratory conditions or with a dummy load. Actual antenna installations have higher readings. The information below will help you interpret the readings you get.

SWR	Efficiency	Interpretation
1.0 to 1.5	Excellent	The antenna cable and the antenna length match the transmitter's output requirements almost perfectly.
1.5 to 2.0	Very good	The antenna, the cable, and the transmitter operate very efficiently.
2.0 to 3.0	Acceptable	The antenna, the cable, and the transmitter operate with some loss. If possible, adjust your antenna or antenna mounting system to improve.
Above 3.0	Inefficient	Adjust your antenna or antenna mounting system to improve efficiency.

When you measure SWR, use this chart to determine the percentage of power that is wasted through reflection of the signal back to the radio.

SWR	1.0	1.1	1.2	1.5	2.0	2.5	3.0
Ref. Power (%)	0	0.22	0.8	4.0	11.1	18.4	25.0

For example, an SWR reading of 1.5 also means that 4% of your signal power is lost. However, 96% of the radio's power is more than enough for almost all applications.

Improving SWR

There are several ways to improve the SWR of your radio/antenna combination. Try these first.

- Be sure you are using the type of cable recommended for your equipment. If the manufacturer recommends a 50-ohm cable, do not substitute another type that has a different impedance.
- Confirm that you mounted your antenna according to the manufacturer's instructions. The angle and the base arrangement can affect the SWR reading.
- Adjust the length of your antenna according to the instructions provided by the manufacturer. A change of as little as 1/8 inch can make a measurable difference.
- See the owner's manuals for your radio and antenna.

Measuring Power

You can use your meter to show how much power your radio is transmitting. You can use this information with the SWR reading (see "**Measuring SWR**") to determine the efficiency of your antenna and radio combination, or to make sure that your antenna and radio combination are operating within legal limits.

For more information about measuring power, see the *ARRL Handbook*, available through www.arrl.org or at your local library.

To measure your transmitter's power output.

1. Set **FUNCTION** to **POWER**.
2. Set **RANGE** on the front of the meter to the correct range for your transmitter.
   - If your transmitter's power is 20 watts or less, set **RANGE** to 20W.
   - If your transmitter's power is more than 20 watts but 200 watts or less, set **RANGE** to 200W.
   - If your transmitter's power is more than 200 watts, or you do not know the transmitter's power, set **RANGE** to 2000W.
3. Set **MODE** on the front of the meter to the correct setting for your transmitter
   - If your transmitter uses SSB or CW, set **MODE** to **PEP** to measure peak envelope power.
   - If your transmitter uses another type of output, set **MODE** to **AVG** to measure average power.
4. If your transmitter does not use SSB, select a channel or frequency on your transmitter and hold down its transmit key. Do not speak into the microphone.
   - If your transmitter uses SSB, input a 1000 – 1500 Hz tone signal from the low frequency oscillator you connected to the transmitter. Then, select a channel or frequency on your transmitter and hold down its transmit key. Do not speak into the microphone.
5. Read the power level by noting the needle's position on the correct **POWER** scale.
   - If you set **RANGE** to **20W** in Step 2, read the lower scale (marked with an **L** on the right side)
   - If you set **RANGE** to **200W** or **2000W** in Step 2, read the upper scale (marked with an **H** on the right side)

Important:

To accurately measure power using SSB, you must connect a low-frequency oscillator (not supplied) capable of generating a 1000 – 1500 Hz tone signal to the transmitter. This procedure should be performed by a qualified technician.

Note: If the power level is extremely low within the range you selected, set **RANGE** to a lower setting and repeat Steps 4 and 5.

Care and Maintenance

- Keep the meter dry. If it gets wet, wipe it dry immediately.
- Use and store the meter only in normal temperature environments only.
- Keep the meter away from dust and dirt.
- Wipe the meter with a damp cloth occasionally to keep it looking new.
- Modifying or tampering with your meter's internal components can cause a malfunction and might invalidate the meter's warranty. If your meter is not operating as it should, take it to your local *RadioShack* store for assistance.