21-534

OWNER'S MANUAL

Please read before using this equipment.

CB/High-Frequency Ham Power SWR Meter

RadioShack®

INTRODUCTION

Your RadioShack CB/High-Frequency Ham Power SWR Meter helps you tune your CB or amateur radio system for the best performance.

CB and amateur radio systems work best when the antenna system's impedance closely matches the transmitter's output impedance. The meter's standing wave ratio (SWR) function helps you trim your antenna to the precise length that produces the maximum transmit power. The meter's power meter function measures your radio's peak envelope power (PEP) or average power.

Carefully read all of these instructions to get the best use from this meter.

Warning: You can use this meter to make measurements on equipment that uses high voltages. Carefully observe all safety precautions provided with the equipment you are testing.

Note: You need a separate 50-ohm coaxial cable (such as RG-58U) with a PL-259 connector connected to both ends (not supplied), long enough to reach from your radio's antenna jack to the back of the meter.

CONTENTS

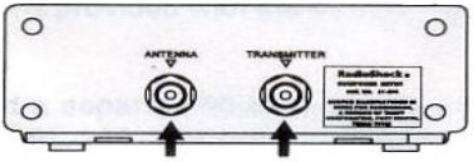
MEASURING SWR

Measuring SWR shows you how much of your radio's transmit power is reflected from the antenna back into the antenna cable, generating heat and wasting power. With this information, you can adjust the length of your antenna or antenna cable so your antenna and radio combination can produce the maximum power they are capable of producing.

CONNECTING THE METER

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

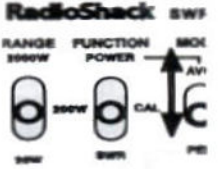
Follow these steps to connect the meter to your radio and antenna.



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.

CALIBRATING THE METER/ MEASURING SWR

1. Turn on your radio. Then set **FUNCTION** on the front of the meter to **CAL**.

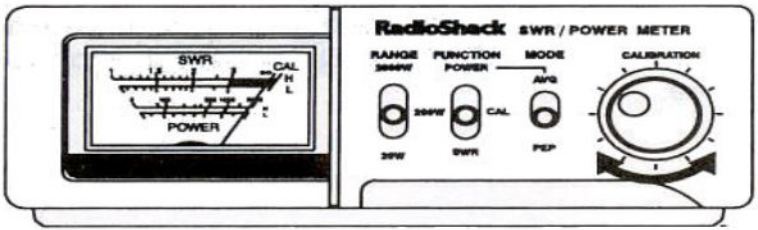


2. Select a channel or frequency on your transmitter and hold down its transmit key. Do *not* speak into the microphone.

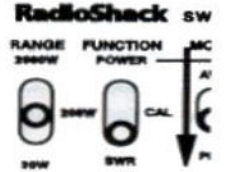
Notes:

- An SWR reading will be different for different frequencies (channels). If you transmit on one channel more often than any other, select that channel. 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, because it is midway between Channel 1 and Channel 40.)
- 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.

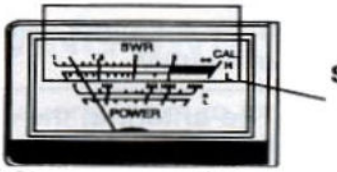
3. While you hold down the transmit key, rotate **CALIBRATION** on the front of the meter until the needle points to CAL.



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)



SWR Scales

INTERPRETING SWR READINGS

An 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 your radio and antenna's owner's manuals.

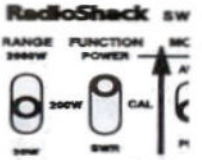
MEASURING POWER

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" on Page 4) 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.

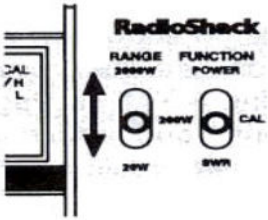
Important: To accurately measure power using SSB, you must connect a low-frequency oscillator (not supplied) capable of generating a 1000–1500 Hz tone signal to the transmitter. *This procedure should be performed by a qualified technician.*

Follow these steps to measure your transmitter's power output.

1. Set **FUNCTION** to **POWER**.

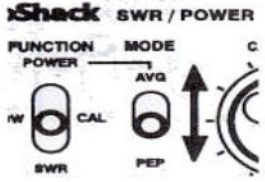


2. Set **RANGE** on the front of the meter to the correct range for your transmitter.



- 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.

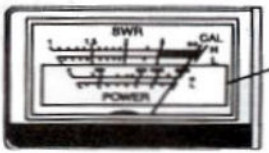


- If your transmitter uses SSB or CW, set **MODE** to **PEP** to measure peak envelope power.
- If your transmitter uses another type of output, set **MODE** to **AVG** to measure average power.

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.



POWER Scales

- If you set **RANGE** to **20W** in Step 2, read the lower scale (marked with an L on its right side)
- If you set **RANGE** to **200W** or **2000W** in Step 2, read the upper scale (marked with an H on its right side)

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

Your RadioShack CB/High-Frequency Ham Power SWR Meter is an example of superior design and craftsmanship. The following suggestions will help you care for your meter so you can enjoy it for years.

Keep the meter dry. If it gets wet, wipe it dry immediately. Liquids can contain minerals that can corrode the electronic circuits.

Handle the meter gently and carefully. Dropping it can damage circuit boards and cases and can cause the meter to work improperly.

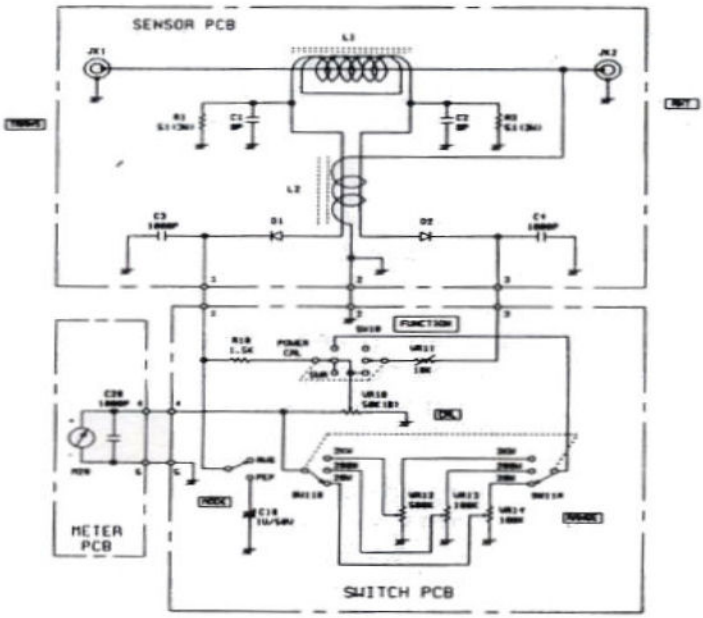
Use and store the meter only in normal temperature environments. Temperature extremes can shorten the life of electronic devices and distort or melt plastic parts.

Keep the meter away from dust and dirt, which can cause premature wear of parts.

Wipe the meter with a damp cloth occasionally to keep it looking new. Do not use harsh chemicals, cleaning solvents, or strong detergents to clean the meter.

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/Tandy store for assistance.

SCHEMATIC DIAGRAM



Notes:

1. All resistance values are indicated in "OHM" (K=10 ^{3}OHM).
2. All capacitance values are indicated in "μF" (P=10 $^{-6}$ μF).
3. All diodes (⊣◁⊢) indicated in 1K100-350.

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 (HWD)	64 × 165 × 102 mm ($2\,^{17}/_{32} \times 6\,^{15}/_{32} \times 4\,^{1}/_{16}$ Inches)
Weight	310 g (10.9 oz)

Specifications are typical; individual units might vary. Specifications are subject to change and improvement without notice.

InterTAN WARRANTY

InterTAN warrants that this product will be free from defects in materials and workmanship for a period of one (1) year from the date of purchase. Within this period, simply take the product and your proof of purchase to any InterTAN store or dealer and the product will be repaired without charge for parts and labour. InterTAN reserves the right to charge for transportation. Any product which has been subject to misuse or accidental damage is excluded from this warranty.

This warranty is only applicable to a product purchased through InterTAN's company owned stores and dealers and to a product that is presented for repair in a country where InterTAN offers the product for sale. While this warranty does not confer any legal rights other than those set out above, you may have additional statutory rights which will vary under the laws of the various countries, states, provinces and other governmental entities in which InterTAN operates. This warranty is subject to all statutory rights you may have in the country of purchase.

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