

# Standing Wave Ratio

Standing wave ratio is a term you'll often hear when talking about antennas and feedline. In general terms, standing wave ratio (SWR) is a measure of how well a load is matched to a transmission line. (T7C03) In this context, the "load" is the antenna. When we say that an antenna is matched to a transmission line, we mean that the impedance of the transmission line is equal to the impedance of the antenna. The reason it is important to have a low SWR in an antenna system that uses coaxial cable feedline is to allow the efficient transfer of power and reduce losses. (T9B01) The bigger the mismatch is between the feedline and the load, the higher the SWR will be, and the more power you will lose in the feedline. Power lost in a feedline is converted into heat. (T7C07) Power converted into heat is not radiated by the antenna, meaning your radiated signal will be weaker.

You can measure the SWR of your antenna system with an SWR meter. An in-line SWR meter should be connected in series with the feed line, between the transmitter and antenna to monitor the standing wave ratio of the station antenna system. (T4A05) You usually connect an SWR meter near the output of your transmitter because it is convenient to do so and because most transmitters will reduce power if the SWR at the transmitter output is too high. To maximize the efficiency of your antenna system, however, you should connect it between the feedline and the antenna.

An SWR meter is not the only way to measure SWR. A directional wattmeter is an instrument other than an SWR meter that you could use to determine if a feedline and antenna are properly matched. (T7C08) When using a directional wattmeter, you first measure the forward power, then the reflected power, and from those two values, calculate the SWR. One to one is the reading on an SWR meter indicates a perfect impedance match between the antenna and the feedline. (T7C04) 2 to 1 is the approximate SWR value above which the protection circuits in most solid-state transmitters begin to reduce transmitter power. (T7C05) An SWR reading of 4:1 means that there is an impedance mismatch. (T7C06)

One way to ensure that the impedance of the antenna system matches the output impedance of transmitter is to use an antenna tuner. An antenna tuner matches the antenna system impedance to the transceiver's output impedance. (T9B04)

In addition to the SWR meter and the directional wattmeter, there are a couple of other types of test instruments commonly found in an amateur's "shack." One instrument that every shack should have is the dummy load. A dummy load consists of a non-inductive resistor and a heat sink. (T7C13) The primary purpose of a dummy load is to prevent the radiation of signals when making tests. (T7C01)

Another common test instrument is the antenna analyzer. An antenna analyzer is an instrument that can be used to determine if an antenna is resonant at the desired operating frequency. (T7C02) You can also make a number of other measurements that will help you set up an antenna system, such as SWR, capacitive reactance, and inductive reactance.

## QUESTION POOL (12)

T7C03	T9B01	T7C07	T4A05	T7C08	T7C04
T7C05	T7C06	T9B04	T7C13	T7C01	T7C02