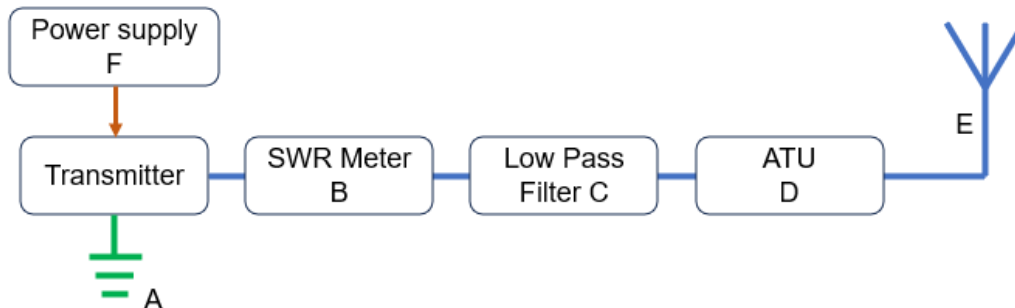


## Section 17 - 19

### SWR and Power.

[Revise Foundation material at Chapter 5-3](#)



#### Transmitter power measurement and adjustment.

**Task.** Demonstrate the measurement of output power of a transmitter. Adjust the transmitter power to within legal limits. This may be done using an Amateur Radio station connected to a dummy load. No modulating sources other than voice are required. No modulation depth monitoring is required. Estimation of power only is required. No complex PEP measurements. Estimate made using a commercial power measuring device. The power meter should preferably be an external instrument. This measurement should be done on **SSB and FM**. Candidate demonstrates the ability to make simple power measurements and adjustment using a commercial wattmeter.

Transmit a tone or carrier and read the power from the meter (SWR meter is also the power meter).

#### Measurement of SWR

**Task.** Preferably with the use of an Amateur Radio station connected to an antenna, the candidate should demonstrate the ability to make a simple SWR measurement. This task may be completed off air with simulated mismatched loads. Candidate should be able to disclose to the assessor if the reading obtained is satisfactory (equal to or less than 1.5:1) The task should be **repeated 2-3 times**. Candidate demonstrates the correct technique (including identification of transmission if conducted on-air) for making a simple SWR measurement. Candidate can interpret if the reading is within acceptable limits (equal to or less than 1.5:1)

Standing Wave Ratio (SWR) is a measure of impedance matching of loads to the characteristic impedance of a transmission line or waveguide. Impedance mismatches result in standing waves along the transmission line, and SWR is defined as the ratio of the partial standing wave's amplitude at an antinode (maximum) to the amplitude at a node (minimum) along the line.

- Calibrate the SWR meter.
- Measure Forward power.
- Measure the Reverse power.
- Calculate the Standing Wave Ratio (SWR)

If the antenna is new and used for the first time, the high SWR may indicate the antenna needs tuning correctly.

### Correcting high SWR

**Task.** Using oral questioning the candidate is asked on methods available to correct an antenna system that may have a high SWR. Examples use an antenna tuner or correct an antenna fault or adjust the antenna. Specific adjustments or tuning are not required in this assessment task. Candidate orally describes what remedial action may be taken to rectify a high SWR problem.

Some causes for high SWR can be:

- Broken wires
- Faulty antenna
- Damaged antenna
- Untuned antenna

If the antenna is new and used for the first time, the high SWR may indicate the antenna needs tuning correctly.

When an antenna is not of the proper length, the source will see something other than the pure resistance, which is present at the resonant point. If the antenna is too short, capacitive reactance is present. If it is too long, inductive reactance will be present.

This can also be corrected by inserting an antenna tuner. But this only matches the feedline impedance to the transmitter and does not alter the antenna.

### Action:

1. Know the limits and measurements of power level for Foundation transmissions. **10 W PEP** (Peak envelope power (PEP) is the average power over a single radio frequency cycle at the crest of the modulation.)
2. [Revise Chapter 5-3 SWR in the Foundation material.](#)
3. Understand the relationship between frequency and antenna length.
4. Understand the effect the insertion of an ATU has on the setup.
5. Understand how the ATU impacts the transmitter.

*Have fun and stay safe.*