



WHAT IS SWR?

SWR is short for STANDING WAVE RATIO. It is a measure of how well the antenna is performing. Most problems with the antenna or antenna cable will show up during an SWR check.

Please note that the SWR is a measure of antenna performance. A poor SWR is caused by the antenna, the antenna cable, or a poor antenna installation. Poor SWR is not caused by the radio. Since the SWR is a function of the antenna system, changing radios will not affect the SWR.

WHY IS SWR IMPORTANT?

SWR readings typically have a range of about 1 through 10. The lower the number, the better the antenna is working. As the SWR climbs, both transmit and receive range will drop. An SWR of 1 is perfect, but it is not possible to get a perfect reading on all 40 channels. When the antenna is properly adjusted, the SWR is will be highest at the ends of the band, and lowest in the middle (channel 19).

The SWR reading must never exceed 3, otherwise the transmitter in the CB radio can overheat and eventually fail. Excessively high SWR can also cause other problems such as a squealing noise, or can cause interference with other electronic devices in the vehicle. An SWR below 2 is very good, and anything below 1.5 is excellent.

HOW CAN I MEASURE MY SWR?

SWR is measured using an SWR meter. Some higher-end CB radios have a built-in SWR meter, which is very convenient. Other models must use an external SWR meter and a short "patch cable". The SWR meter will have 2 connectors on the back. The antenna cable will screw onto the connector marked ANT. The patch cable will screw onto the other connector. The other end of the patch cable screws onto the antenna connector on the CB. The patch cable should be kept as short as possible, no longer than 3 feet in length.

WHERE CAN I GET AN SWR METER?

SWR meters can be found at places that sell CBs and CB accessories. This includes CB shops, truck stops, and Radio Shack.

WHAT IS THE PROCEDURE TO CHECK SWR?

The procedure for checking SWR is basically the same whether using a built-in meter or an external meter. Follow the instructions that come with the meter. Here is the basic procedure:

1. SWR must be checked in an open area. Park the vehicle away from buildings and trees, which can affect your readings. Do NOT check SWR inside a garage!
2. Close the doors, hood, and trunk lid.
3. Select the channel to check. It is recommended to check channels 1, 19, and 40.
4. Set the switch to the CAL or FORWARD position (depending on your meter).
5. Push the transmit button on the microphone, then adjust the calibrate knob so that the needle goes to the cal marker on the display. The cal marker is always located on the far right-hand side of the display (maximum deflection).
6. While still holding the transmit button, set the switch to the SWR or REFLECTED position.
7. Read the SWR on the meter.

When you switch to a different channel, you should always re-check the CAL setting (repeat steps 4 through 7).

HOW IS THE SWR ADJUSTED?

The object is to get the SWR the same on channels 1 and 40, AND below 3. This is accomplished by making small adjustments to the length of the antenna.

Begin by checking the SWR on channels 1 and 40, and then refer to the following:

- If the SWR is higher on channel 1, the antenna needs to be longer
- If the SWR is higher on channel 40, the antenna needs to be shorter

An adjustment is made to the antenna, then the SWR on channels 1 and 40 is re-checked. This process is repeated until the readings are about the same. Remember that the readings must also be below 3. When you are done, check the SWR on channel 19. It should be even less than what you got on channels 1 and 40.

Most antennas are adjustable. Refer to the instructions that came with your antenna or call the antenna manufacturer. Here are a few methods, which vary with manufacturer:

1. Antennas with a steel whip are usually adjusted by loosening a set screw and raising or lowering the whip. If you have a center-loaded antenna (fat section in the middle of the whip), adjust the top whip up and down. Even if the instructions do not refer to raising and lowering the whip, virtually all whip antennas can be adjusted in this manner.

2. Some models have a metal collar on the outside of the antenna load (at the base). The collar is turned to adjust the antenna. This method is not widely used.
3. If you have a fiberglass antenna and there are no visible means of adjustment, it can be adjusted as follows:
 - a. Remove the plastic cap from the tip of the antenna.
 - b. Slit the plastic cover to expose the top coils of wire.
 - c. To shorten the antenna, cut off the top coil.
 - d. To lengthen the antenna, pull the top coil up.
 - e. Replace the plastic cap.

It is best if you refer to the specific instructions for your antenna or call the antenna manufacturer. For instance, some fiberglass antennas have a sleeve which you slide up and down to adjust the antenna.

IF YOU CANNOT GET THE SWR BELOW 3

The whip is too long (steel whip antennas)

If you have pushed the steel whip all the way down and the SWR is still higher on channel 40, then the whip is too long. In this case, it is permissible to shorten the whip by cutting the end. If the whip is painted, scrape the paint away after cutting so that there is good electrical contact with the set screw. **DO NOT** cut more than 1/2 inch at a time. Before cutting, read all the way through this section. Your trouble might be an installation problem, not that the whip is too long. Be careful! If you cut too much, you may wind up with an antenna that is now too short.

The whip is too short (steel whip antennas)

If you have raised the whip as high as it can go and the SWR is still higher on channel 1, please contact the antenna manufacturer.

Very high SWR readings

If the needle is going all the way to the cal marker when you try to read the SWR, then the problem is either a damaged antenna cable or an incorrectly installed antenna.

- On mirror-mount installations, the antenna must **NOT** touch the mounting bracket. The antenna should screw up against a plastic insulator. Make sure that the plastic insulator is in place. If it is missing, the SWR will be very high. You can find replacement insulators at truck stops.

- On bumper-mount antennas, the most common problem is the antenna being shorted to ground due to an incorrectly installed mount. This results in a very high SWR. Make sure that the mount has been properly installed, using the supplied plastic insulators. The best thing to do is disassemble the antenna mount, then carefully re-assemble per the installation instructions.
- The easiest way to diagnose the antenna cable is to simply try a new one. You can connect it temporarily and run it through the window to the CB. If it solves the problem, then install the new cable permanently.

If you have an ohm meter then you can try the following:

1. Disconnect the antenna cable from the radio and measure between the center conductor and the connector shell. There should be NO continuity (you should not get a reading).
2. If you do get a reading, then disconnect the cable from the antenna and repeat the test.
3. If you still get a reading, then the cable is bad. If you no longer get a reading, then the mount is installed incorrectly.

The SWR is a little over 3 on all channels

- Mirror-mount installations must have good electrical contact with the frame of the vehicle. Try connecting a #12 ground wire from the antenna bracket to the door hinge.
- Mounting the antenna to an aluminum surface (tool box, etc.) may not provide a good ground. This is because aluminum is not a good conductor. A grounding problem can also occur if mounting to a luggage rack. Try running a #12 ground wire to the antenna bracket. If the SWR is still high, try relocating the antenna.

Wrong type of antenna

It is also possible that you are not using the right kind of antenna. Most CB antennas must be mounted to a metal surface ("ground plane") in order to operate properly. The metal body of the vehicle serves this purpose. On fiberglass or plastic body vehicles, a "no-ground-plane" antenna is needed. This type of antenna is specially designed to operate without a metal surface.