

RECEIVER SENSITIVITY CHECK (Refer to Fig. 10)

This check measures the weakest usable signal level at which the receiver will operate. It is the best overall check of receiver performance that can be made. It should be performed immediately after the RECEIVER AUDIO POWER CHECK, as all the equipment is connected and set up as required for the sensitivity check. The sensitivity check is applicable to all types of receivers listed for the previous RECEIVER AUDIO POWER CHECK.

Receiver sensitivity is expressed as signal level required to produce a 10 dB signal-to-noise ratio (or to be more technically accurate, signal-plus-noise to noise ratio). For example, $1\mu\text{V}$ for 10 dB (S+N)/N. This means that a 1-microvolt modulated signal into the receiver antenna input should produce an audio output at least 10 dB above the receiver noise level obtained with a 1-microvolt input signal without modulation. Many radio specifications include the condition that the 10 dB (S+N)/N sensitivity be obtained at some minimum audio output power; for example, $1\mu\text{V}$ for 10 dB (S+N)/N at $\frac{1}{2}$ -watt audio. This is a good specification for overall receiver sensitivity.

1. After performing the RECEIVER AUDIO POWER CHECK leave all connections and control settings as at the conclusion of that check. The RF generator should already be set to the receiver frequency with $1000\mu\text{V}$ output and internal modulation of 30%.
2. Turn the receiver volume control to maximum and set the receiver squelch control fully unsquelched (fully counterclockwise).
3. Reduce the RF generator output level to a convenient low level such as 5 microvolts. If you think the receiver sensitivity may be normal, set it even lower, even as low as the receiver manufacturer's specification which is usually 1 microvolt or less. However, if the receiver sensitivity is poor, it may be necessary to start with a higher value such as 5 microvolts to obtain a reading in the following steps.
4. Reset the RF generator precisely on frequency. This is very important. If the RF generator is slightly off frequency it will cause serious error in the sensitivity measurement, appearing as very poor sensitivity. Rock the fine tuning dial of the RF generator back and forth very slowly as the output level is reduced and carefully adjust for peak reading on the receiver audio output meter (1). The oscilloscope display will also peak at maximum amplitude, and peak volume will be heard from speaker (12). For most RF generators, the frequency must be re-peaked after each change in the attenuator (level control) setting. The attenuator tends to have some pulling effect on the frequency.

If no meter reading can be obtained with a 5-microvolt signal, receiver sensitivity is very poor and troubleshooting is required.

5. Set the RECEIVER FUNCTION switch (4) to the 10 WATTS or 1 WATT position, whichever gives the highest meter (1) reading without going off scale. Note the meter reading on the dB scale.

6. Switch the RF generator from internal modulation to unmodulated carrier (CW).
7. The meter (1) reading will drop. If the receiver has normal sensitivity and a 5-microvolt signal is used, the meter reading should drop more than 10 dB from the step 5 reading. (See NOTES ON USE OF dB SCALE at the end of this procedure.)
8. Return the RF generator to internal modulation operation. Repeat steps 3 thru 7 at progressively lower RF generator output levels until there is a 10 dB difference in meter readings between step 5 and step 7.
9. Note the setting of the attenuator on the RF generator. This setting, in microvolts, is the receiver sensitivity for 10 dB (S+N)/N. It should be equal to or lower than the receiver manufacturer's specification (for example, it should be $1\mu\text{V}$ or less for a specification of $1\mu\text{V}$ for 10 dB (S+N)/N at $\frac{1}{2}$ -watt audio).
10. Note the final step 5 reading in watts. It should equal or exceed the manufacturer's specification if provided (for example, the meter should read at least $\frac{1}{2}$ watt for a specification of $1\mu\text{V}$ for 10 dB (S+N)/N at $\frac{1}{2}$ -watt audio).
11. The full receiver sensitivity check needs to be performed on only one channel. However, proper operation on all other channels can be checked rapidly as follows:
 - a. Leave RF generator attenuator set at the 10 dB sensitivity level of step 9.
 - b. With 30% internal modulation, note the meter (1) reading.
 - c. Select each receiver channel, in turn.
 - d. Tune the RF generator to each channel frequency and fine tune for peak meter (1) reading. The same reading should be obtained for all channels.
12. In most cases, it is only necessary to know if the receiver meets or exceeds the manufacturer's specification for sensitivity. To do this,
 - a. Set the signal generator output at the specified sensitivity level with 30% modulation; for example: $1\mu\text{V}$ with 30% modulation.
 - b. Set the receiver volume control to a convenient level as observed on the meter (1). A .5 watt reading is convenient as it corresponds to the zero dB point.
 - c. Remove generator modulation and observe the meter reading. If it drops 10 dB, or more, the receiver sensitivity is equal to, or better than, the $1\mu\text{V}$ specification.