

## **Newcomers and Elmers Net: Listening in to Radio**      **5-11-14**

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I would venture to say that most, if not all of us, first found our love of all things radio through *listening*.

-- For me I started with AM radio. Whether it was the natural competitive nature many boys have at an early age or just a natural curiosity to see "what's out there," it wasn't long after receiving my first radio that I started listening for distant stations.

-- Perhaps, like me, you have some fond memories tuning around the dial at night trying to pull in stations from New York or Chicago or Atlanta, or whatever major cities happened to be in your region.

Radio isn't just about amateur radio for many of us; it really is a mindset about capturing signals of all kinds, and sending out our own signals when we can

One year I received a shortwave radio for my birthday, and that changed everything. I could actually sit in my little bedroom with a wire dangling out the window and hear stations from around the world!

-- London, Russia, the Netherlands, Germany and beyond – they all came into my little "window on the world." Oh, and there were those weird-sounding Amateur Radio operators who sounded like Donald Duck until I fiddled with my tuning knob? Those were some fun times, to be sure.

### **Listening**

They were also the start of my education in the art of listening. Those of you who have been listening to radio for years know what I am talking about.

-- Listening is at least as much an art as it is science, if not more so.

-- Extreme patience and persistence is required to make the most of your efforts, and nowadays these qualities seem to be in short supply.

-- In a world of instant MP3 downloads, iPods and iTunes, YouTube and live streaming Internet radio—perhaps the art of listening for and tuning in a difficult shortwave station or distant AM/FM station is destined to go the way of the Dodo bird. But I hope not.

-- Shortwave listening in particular can be a real education in radio wave propagation, and it is often the door to a lifetime of radio enjoyment.

-- Sometime back I listened to a discussion about Alzheimer's research funding in Australia on a broadcast of *Radio Australia* around noon local time.

-- Not only was the content interesting, but I was surprised by how well I was receiving the signal. Usually atmospheric conditions and being close to the city make listening to shortwave difficult during the day, but this station was coming in quite nicely.

I still find it hard to believe that I can pull up the 35" antenna on my radio and listen to a transmission originating in Malaysia while sitting on my bed in America.

-- To me this is almost magical, despite all the math and science which explain what is happening.

-- With nothing more than the telescopic whip on my portable I used to hear stations like *Radio Croatia* coming into my office loud and clear, just as if they were down the street. Amazing!

Still, with all of the broadcasting stations around the world and all of the Amateur Radio operators on the ham bands, many people feel as though they must be doing something wrong when they search up and down the bands and don't hear anything worthwhile.

-- Don't despair! Unless you have something actually wrong with your equipment, even the most inexpensive radio will receive an abundance of signals with a bit of work

-- you just have to know some basics about radio wave propagation and what you can expect to hear on any given day.

### **Listening In**

Many factors come into play when it comes to receiving transmissions, not the least of which are transmission strength, location, local interference and propagation issues.

-- Radio signals are directional in nature and they are impacted by atmospheric as well as terrestrial conditions.

-- If a signal is strong enough or close enough, the direction of your antenna probably doesn't matter much; power output alone will allow you to hear the station even under difficult conditions.

-- The further away the station you are listening to, the more likely direction will play a part in the quality of your reception.

When indoors the building you are in can also impact reception. Steel reinforced concrete structures offer challenges and limitations not found in timber-framed houses.

- Strong electrical interference from generators, transformers, computer equipment and wiring not up to code can all give off spurious signals which can make listening to your radio difficult.
- Interference in your immediate surroundings usually causes the most problems, but it is not uncommon for interference to be caused by sources many miles away. All of this is part and parcel of the challenges you face as you pursue the hobby.
- The good news is that interference is also usually directional. Sometimes just a slight shift in another direction is all it takes to reduce the interference to a manageable level.

By far the biggest factor affecting reception is propagation. Propagation is defined as how radio waves react as they travel between two points, and this determines to a great extent how well they will be heard.

- Different radio wavelengths have different propagation characteristics, and so you need to know the general properties of the signal you are trying to receive.

### **Some Basic Propagation Characteristics (In No Particular Order!)**

FM frequencies fall in the VHF (Very High Frequency) bandwidth and are probably the most well-known of the radio spectrum.

- As long as you are in the line-of-sight for an FM station your reception will be clear.
- Because the propagation of FM is line-of-sight, distance reception tends to be limited to several hundred miles.
- However under the right circumstances you may encounter atmospheric "skip" which can allow you to hear stations from several thousand miles away.

AM station signals, which reside in the Medium frequency band, propagate both along the ground (groundwave propagation) and through the upper regions of the atmosphere as they are reflected/refracted off the ionosphere (skywave propagation).

- AM signals transmitted during the daylight hours are mostly absorbed by the ionosphere and are thus limited to following along the earth's surface. As you might imagine, this greatly limits the distance the signal will travel given the relatively poor conductivity of the ground.

- Storms and man-made interference significantly influence AM reception, and you will commonly experience fading as you change locations if mobile.

- Propagation is enhanced at night (as I am sure most of you have experienced) as changes in the atmosphere cause AM signals to bend back down to earth.
- Skywave propagation allows for much greater reception ranges, and because signals are being scattered by the atmosphere in sometimes unpredictable ways, AM DX hunting can be a lot of fun.
- On exceptionally clear nights strong AM stations can be heard for literally thousands of miles; that same station during the day might not even register above the ground noise more than a few hundred miles away.

Shortwave signals get even more interesting as they can be received over much greater distances than Medium wave signals, mainly because they do not have to depend on groundwave propagation.

- Shortwave signals belong to the HF (High Frequency) part of the band, and these waves rely almost totally on atmospheric conditions for the quality of reception and the distance traveled.
- However, they can be (and usually are) greatly affected by natural and man-made noise in the atmosphere, as well as by absorption into the lower layers of the ionosphere during the day.
- Seasonal variations also impact the quality and range of shortwave signals, as the sun heats and cools the atmosphere
- I will save a more technical discussion of this for another day; for now just be aware that there are many reasons why signals that are strong one day may be gone the next, and that there are seasonal patterns to the quality of signal transmissions.

Even with all of the variables affecting Shortwave/HF signals, individuals and nations alike depend on this segment of the band to get their broadcasts out to the world, and this makes for some exciting listening.

- Not only can you receive news, music, and cultural information from many different countries, you can also hear clandestine broadcasts of a political nature designed to give a voice to opposing parties.
- While some of these broadcasts are allowed by the ruling political party, oftentimes these "rebel" broadcasts are constantly on the move to avoid detection. Radio, and shortwave radio in particular, remains as the only means of widespread communication not able to be squelched by government control.

### **So Many Stations, So Little Time**

In one sense radio listening is like buying or selling property—location, location, location. High elevation, low interference, and the best antenna you can use will make a lot of difference in what you are able

to receive. Having said that, most of us live with one or more limiting factors which we cannot readily change. I have two such factors: I live near a moderately large city, and I live down in a valley surrounded by hills. I simply will not receive as many good signals as someone who lives in the mountains of Colorado (sigh).

The good news is, just because you may not have the best location that doesn't mean you can't have a whole lot of fun hearing signals from around the world wherever you are!

-- Don't underestimate the ability of your built-in antenna to have decent reception. I have already mentioned several countries that some people find hard to hear that have come in loud and clear on my whip antenna.

-- The fact is, sometimes I just want to enjoy the convenience of being able to go wherever I want in the house with my radio, without worrying about hooking up an antenna.

-- And of course, sometimes it's fun to see just what you can get with the most basic of antennas.

### **Random Wire Antenna**

Your listening options will go up dramatically with the addition of a long wire attached to your radio, and these can be hung up inside the house or out-of-doors for even greater effect.

-- Some portables come with a reel or spool of wire designed to be clipped onto the antenna mast and these will work fine, but their length is usually limited to about twenty-five feet—usable to be sure, but longer is better if you have the room.

-- Some portable units, and virtually all tabletop shortwave radios, have a means of connecting an external antenna to the unit by means of a screw terminal or coax connector.

-- 50-70' of wire works quite well for most radios, although lower quality units may get overloaded easily if you have several strong signals adjacent to one another, or if the noise level is particularly high in your area.

When putting up an outdoor antenna try to get it as high off the ground as possible—the higher the better. Inverted "V's" and inverted "L's" perform quite well if you don't have the room for a dipole.

-- End-feed or center-feed (fan) multi-band antennas can be constructed to give even better results for particular bands, and many commercial shortwave antennas are available as well.

-- You can get as fancy as your interests and budget will allow, but keep in mind a long random wire will work quite well, and you

probably have some old speaker wire sitting around already, so it won't cost you anything to get started.

I cannot stress enough that almost anything you use for an external antenna will greatly help your shortwave reception.

-- If space is an issue, get creative. Try wrapping 16 or 18 gauge wire around the house or around the ceiling if indoors. People with covenant restrictions have run antenna wires under eaves or attached a wire to rain gutters.

-- Attics make very useful stealth antenna spaces, but if you don't have an attic, try running a random wire around the baseboard under the carpet to keep the room looking neat.

Since you are only receiving with this antenna, almost any metal surface can serve as an antenna, including the metal screen in your window. Just make sure whatever antenna you use gets disconnected from your radio when not in use.

-- Radios, and especially inexpensive radios, are very susceptible to static electricity (charged particles) in the atmosphere, and if lightning is present your radio is likely to get damaged.

-- Ground your radio whenever possible, and use common sense. Storms are hardly the best time to chase DX stations, so protect your radio and yourself by disconnecting the antenna whenever needed.

### **Active and Passive Loop Antennas**

For those of you who may be limited by space or who want the convenience of mobility but who also want better reception than a built-in antenna can give, you may want to consider an *active loop* antenna

-- The main purpose of an active antenna is to boost reception electronically, while maintaining an acceptable signal-to-noise ratio.

-- One of the advantages of an active (or passive) loop antenna is the ability to *null* or tune out interference by pointing the loop away from the interference source.

-- Some interference is just too strong to get rid of completely, but a loop antenna should help you hear most weaker signals better than your built-in antenna. Every antenna is a compromise, and the active loop is no different.

-- Most of the time a random length wire will outperform an active antenna, but for times when you just can't use the wire, the active loop does a nice job.

-- Try to position the loop near a window if possible, and if you have a corner room with adjacent windows you can rotate the antenna by ninety degrees and often reduce the noise level.

Regardless of the antenna you use most stations are going to come in better at night, and in fact many stations follow a broadcast schedule to take advantage of that fact.

- Some stations only stay on for an hour or two, and some only broadcast certain nights of the week or certain months of the year. There are several excellent guides available in book form to give you an idea of which stations are on at any given time
- one of the best is The Spectrum Monitor; every month there is a wealth of information on listening possibilities

Listening at night allows you to get the feel of how your antenna/radio combination is working, as well as giving you an idea of what you can expect to hear.

- By all means, however, expand your horizons by listening during the day, on weekends, and during special times of the year when opportunities such as summertime Sporadic-E openings exist which add to the challenge and excitement of station chasing.
- There are plenty of stations active during the day, and depending on your location and the local interference, you will hear signals during the day that just won't come in at night, particularly in the upper frequencies. While Spring and Fall are optimum times for Shortwave listening (SWL), each season offers unique reception opportunities.

### **Checking Conditions**

SWL and Ham operators in America have for years used the signals from WWV as a means of checking propagation conditions.

- The time signals from WWV are broadcast on 2.5, 5, 10, 15, and 20 MHz, and can therefore provide an idea of reception conditions on each of the bands at different times of the day.
- Maritime signals, radio beacons and DX cluster sites on the Internet all provide clues to propagation conditions around the world, and a regular check of these sources should help you form a reasonable picture of what you can expect to hear.
- All of this falls under the heading of patience and persistence—the time you put in learning about the hobby directly corresponds to the amount of enjoyment you will receive from the hobby!
- Tenacity and a spirit of adventure will reap great rewards, and you will learn a lot along the way not only about propagation and signal reception, but also about the world around us.