IRCA Technical Column

editor: Nick Hall-Patch
1538 Amphion St.
Victoria, B.C.
Canada V8R 4Z6

Use of Directional Maps to Track Radio Station Reception

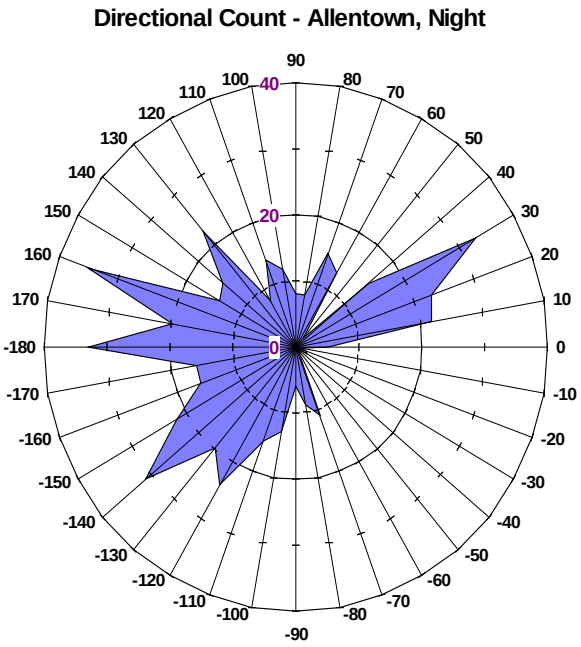
(or, "Where are all of those stations coming from?")

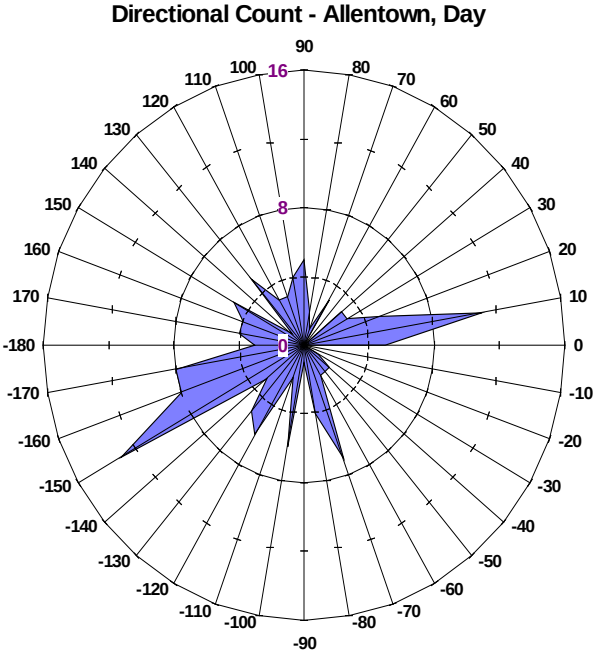
During the past several years of re-discovering my DX hobby, I always wondered, "Just where do those stations come from?" This wonderment lies both in the location of the DX, but also the direction and distance. For example, Toronto, Ontario is vaguely northwest of where I live now, in Allentown, PA. If you want to get technical, the 'great circle distance' between my house and a given radio station (for example, CBL at 740 KHz) is 305 miles, with an azimuth (or heading) of 135°, which just happens to be due Northwest.

Several year ago, I came across some Fortran code which calculates the 'great circle distance' and azimuth (direction) between 2 points, given the latitude and longitude of both. I programmed the code into Excel (Microsoft's spreadsheet program) and began to revise my DX Logs to include the distance and azimuth of stations that I have logged. The distances are calculated in miles, but can be calculated in kilometers. The azimuth is calculated as 0° as being due East, 90° being due North, -90° being due South and either 180° or -180° being due West. Recently, the FCC made a station database available over the Internet, and several ingenious people (like Werner Funkenhauser in Guelph, Ontario, Canada) have created database distillations and search programs which greatly simplify the FCC information. Werner's database contains the location of every station in the Western Hemisphere, and I refer to it to compute my loggings distance and azimuth. For stations that I receive from Europe or Africa, any good atlas will provide me with latitude and longitude.

Excel has a feature which can count the frequency of certain values with a given range of numbers. I applied this feature to my loggings database for several locations: 1) Allentown, PA (nighttime and daytime), 2) Houston, TX, 3) Wichita, KS, 4)Jacksonville, FL (places I have been fortunate enough to travel to on business), 5) Seneca Falls, NY and 6) Corning, NY (near the Finger Lakes for vacations). Excel also has the capability to radially map out these frequencies into graphs that kind of look like bulls-eyes (these are called 'Radar Groups'). When I apply such a radial map to a given logging location, the result is something that looks like a flower drawn by a computer. The number of loggings for given direction range (say an azimuth of 90° to 105°) are

indicated by the distance from the center of the radial map. The direction is indicated as a pie wedge. The figure below on the right presents the radial map for Allentown, PA nighttime and twilight receptions.



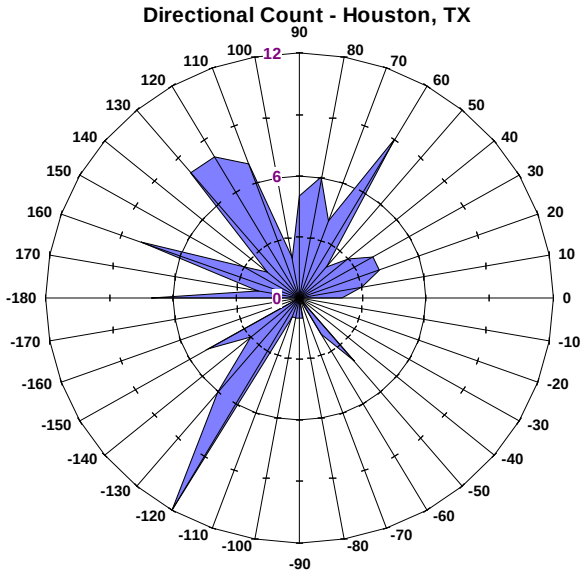


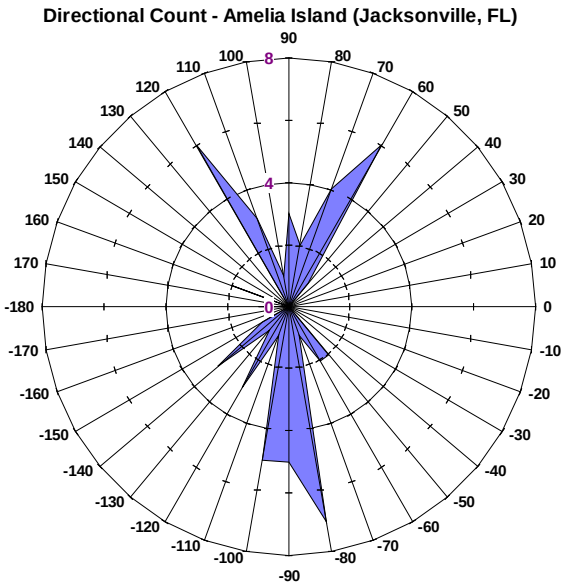
The nighttime Allentown radar map shows clusters of stations towards New York City, Boston (slightly North of East, 10° to 30°) and, natur ally Philadelphia (slightly East of South, -70°). Also present are clusters to the Northwest (135°, Toronto), slightly North of West (Cleveland, Detroit, Chicago) and Southwest (Baltimore and Washington, DC). A really interesting void is in the Southeast, which would be South New Jersey. Well, the Atlantic Ocean is also there, so I don't expect many signals from a bunch of water molecules! If we turn to Allentown during the day, the radar map looks like the figure above on the left. Once again, there is a big cluster for New York City (+10°) and another large one where the stations near Baltimore and Washington mix with local stations in the Reading/Lancaster, PA area.

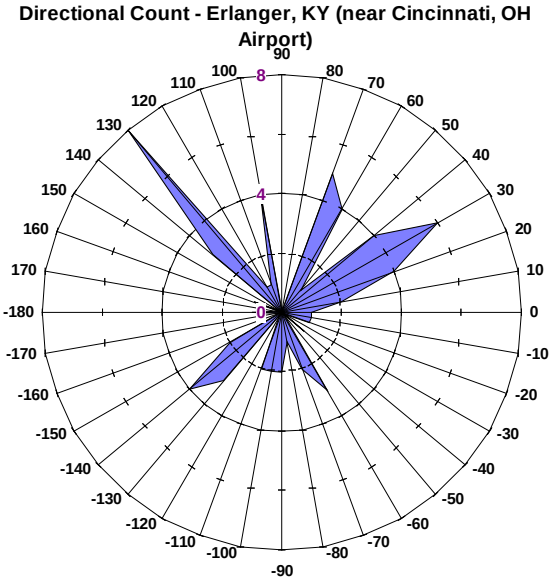
In my job, I travel to Houston, TX frequently. The nighttime radar map is most interesting, with big clusters towards Mexico (at least for stations that I can ID, which is tough since I do not speak Spanish) and towards Dallas and Chicago.

I have also created radar maps for Wichita, KS, Jacksonville, FL and Cincinnati, OH (actually Erlanger, KY - the airport Holiday Inn). These are presented below. I only spent one night in Wichita, but the radar map show clusters towards Kansas City, Chicago and down towards Oklahoma and Texas. The Jacksonville, FL map show a major cluster in the direction of Miami and Cuba and large clusters towards the major cities of the Northeast (new York and Philadelphia) and the direction of Atlanta (and eventually Chicago). The Cincinnati map shows a major cluster

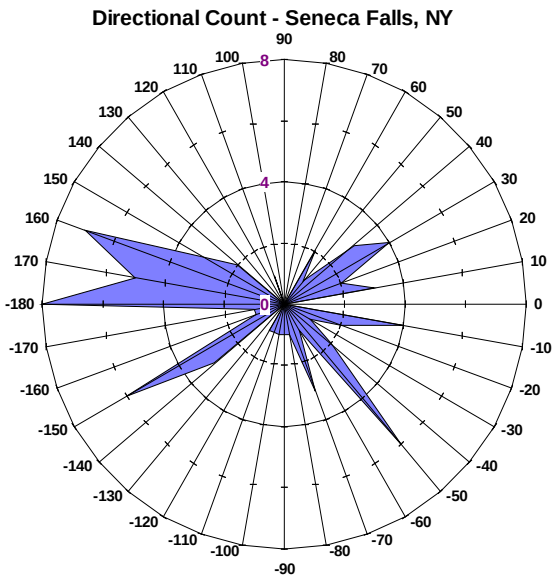
toward Chicago, with smaller clusters towards Michigan, Toronto and points south (some daytimers broadcasting full time during a hurricane hitting the Gulf Coast in July 1997).

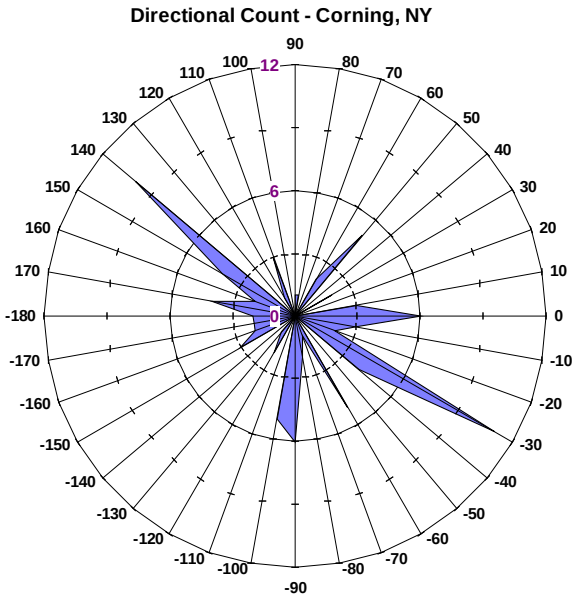






Some of my more interesting DX has occurred during vacations in upstate New York. Seneca Falls and Corning are about 60 miles apart in a North/South direction. If we compare the radar maps, we can see some similarities and differences. Both maps show big clusters towards Toronto and New York, but as one would expect the directions are different. Corning also shows a cluster of stations in Western/Central Pennsylvania which do not show up in the Seneca Falls map (a funny thing is that most were broadcasting a game for the Altoona Rail Kings minor league baseball team!)





I hope that you have enjoyed a different way of looking at one's loggings/database. If you would like to reach me to discuss some of the ideas I have presented or if you would like to have a copy of the Excel spreadsheet which calculates the distances and azimuths, you can email me at one of two addresses: boehmerp@apci.com (work) or RPBoehme@aol.com (home). Please identify what you are writing me for, as my account is prone to spam emails and I am prone to deleting ones in which the title is less than clear! You can also reach me by writing me at: Rich Boehme, 1722 Piccadilly Circle, Allentown, PA 18103.