T21-2-1

A SIMPLE METHOD OF FINDING THE GREAT CIRCLE PATH AND DISTANCE

Father Jack Pejza

Most of the methods which have been given for figuring out the shortest distance and direction (Great Circle Distances and Bearings) between two points involve trigonometry. While there are relatively simple ways of finding the distances by approximations (cf. DX Monitor, May 4, 1974, Vol. 11, No. 30, pg. 10), there are some DXers who don't feel at home with trig or who don't have a table of trig functions and therefore never bother to find such distances.

Some time ago I came across a relatively simple method of finding the Great Circle Distance and Bearing. The method is entirely graphical; all that you need, besides the diagrams which follow, are a sheet of tracing paper (or transparent plastic) and a protractor. The method comes from D.H. Menzel, Elementary Manual of Radio Propagation, N.Y., Prentice-Hall, Inc., 1948.

First place a piece of tracing paper on top of the world map (Figure 1). With a pen trace the equator. Put dots on the paper showing the location of the two places that you want to find the distance between.

Move the piece of tracing paper onto Figure 2. Line up the equator you traced with the straight center line on Figure 2. Slide your paper sideways, keeping the two lines together, until the two dots fall on the same curve (or are in the same space between two lines). If one of the dots is in the southern hemisphere, then follow the line through the point where they all cross the equator. Trace the line between the two dots. On your tracing paper, draw line Q-Q'.

Move the tracing paper onto Figure 3 and line up the equator with the straight center line. Slide the tracing paper sideways until line Q-Q' lines up with line Q-Q' on Figure 3. Follow the curve you have drawn between your two dots, counting each line you cross. Multiply the number by 1000 to get the distance in kilometers. Multiply this by .62 to convert to miles. For instance, San Diego and Emerald, Australia fall close to the seventh line away from the equator in Figure 2; the line between them crosses 11 lines; therefore the distance is somewhat more than 11000 km, or about 7000 miles.

Put the tracing paper back on top of Figure 1, lining up the equator and the two dots again. The curve you drew will show the great circle path between the two dots. To get the bearing, draw a North-South line at right angles to the equator through your location; use a protractor to measure the angle between the N-S line and the path. For instance, for the path between San Diego and Emerald the bearing is about 210°.

This method is not as accurate as other trig methods of determining the GCD and GCB, but it should at least give a DXer a rough idea of the distance and bearing of a distant station.

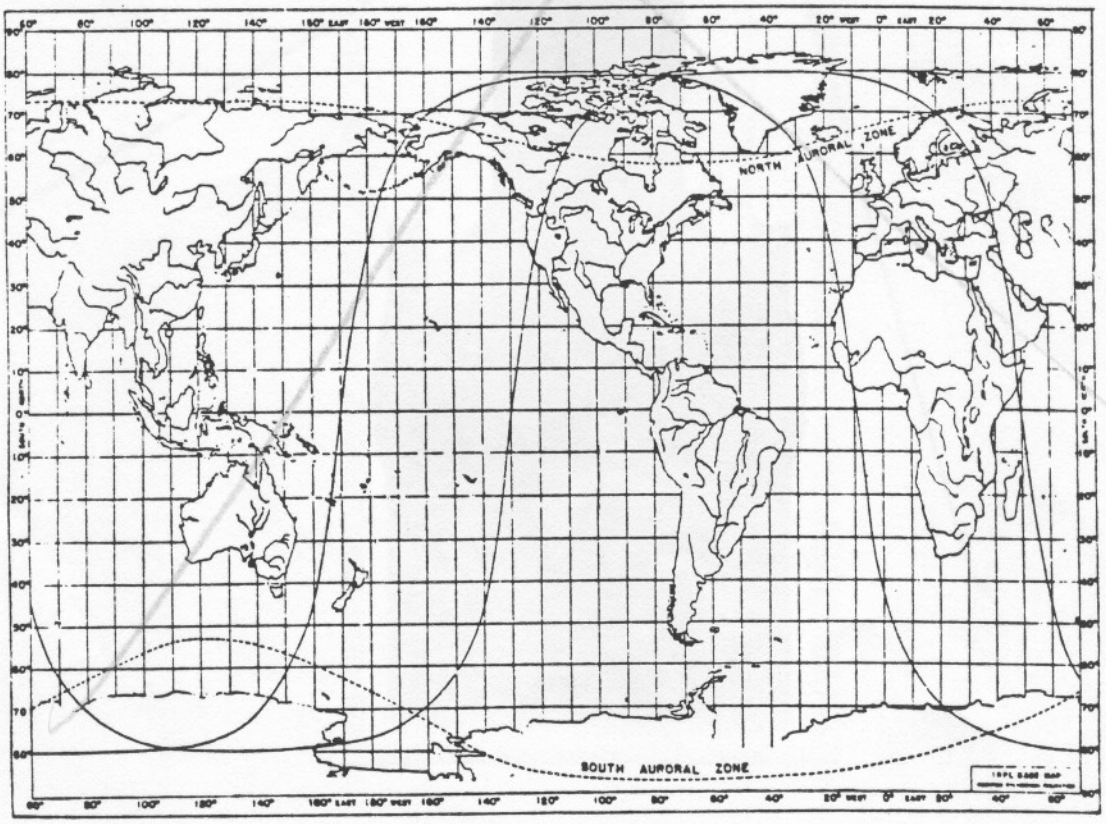

Fig. 1 World Map Showing Zones Covered by Predicted Charts, and Auroral Zones.

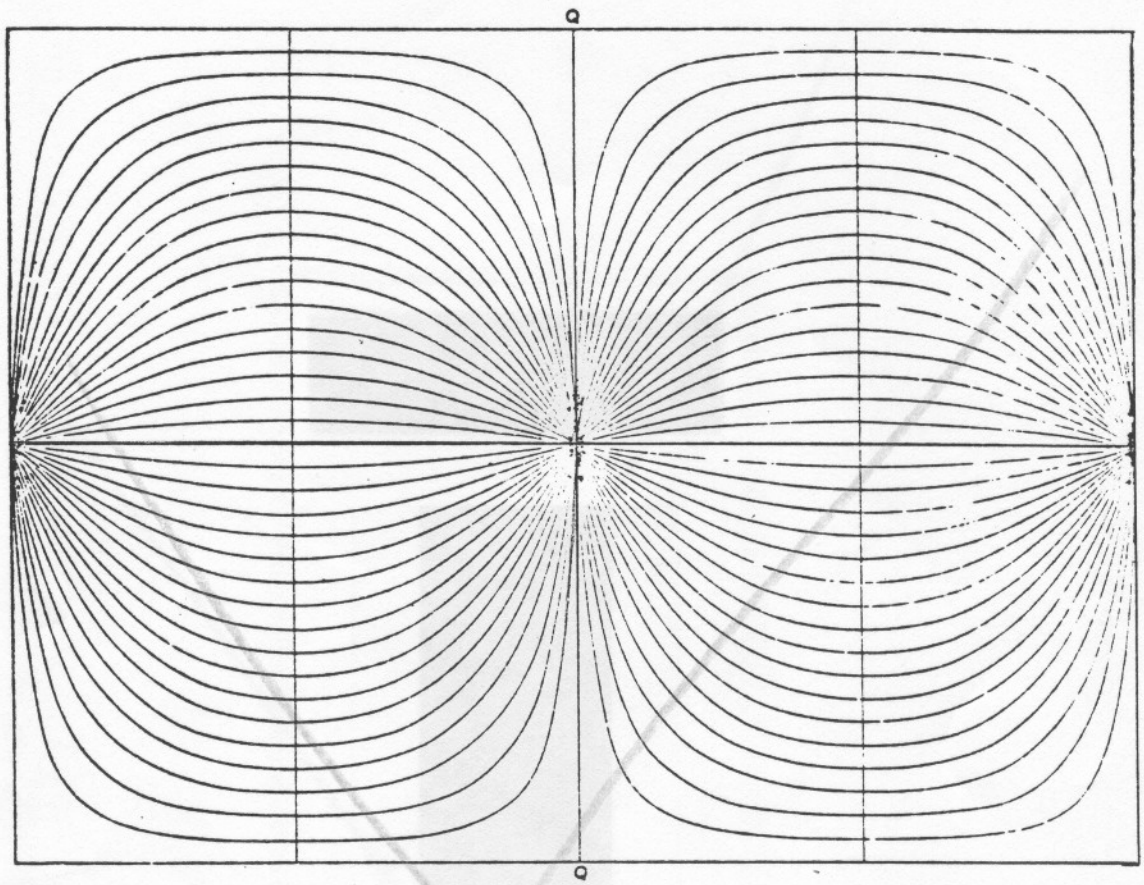

Fig. 2 Great Circle Map.

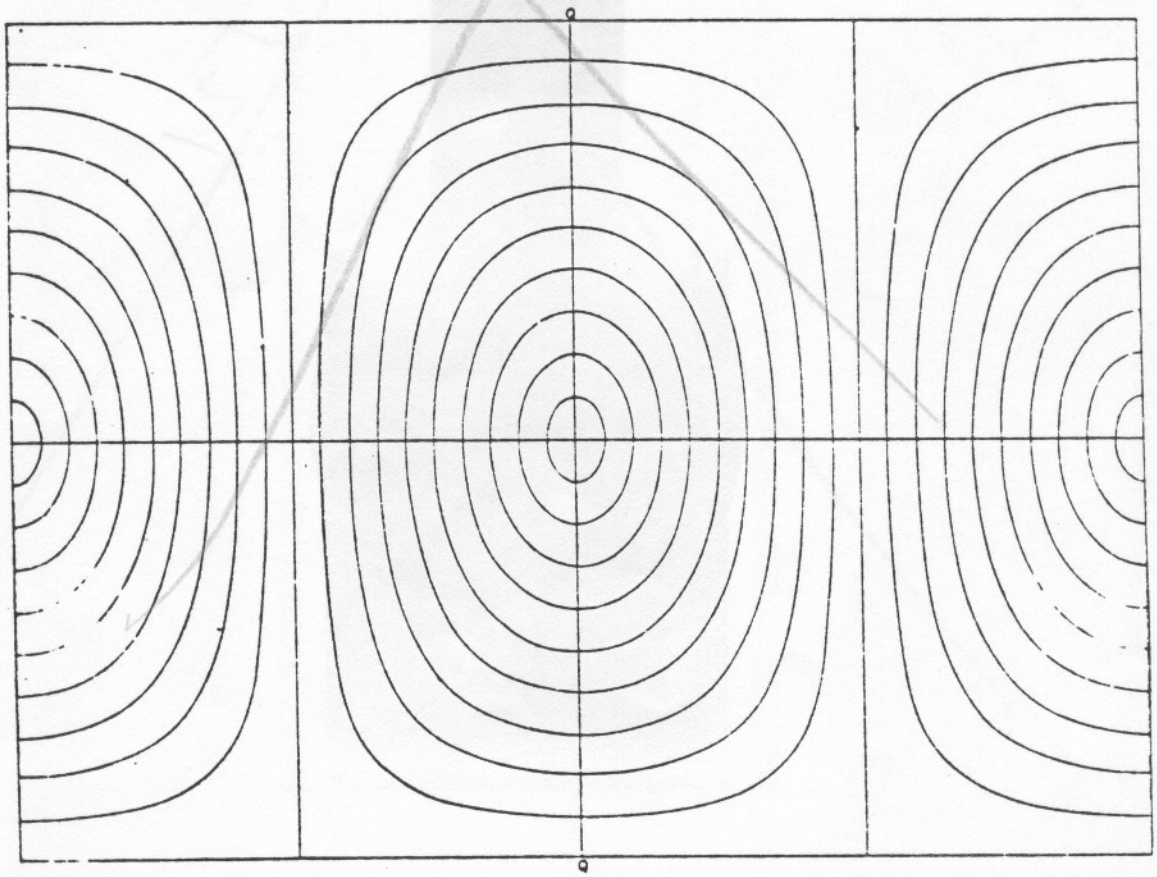

Fig. 3 Distance Circle Map.