

A METHOD OF FINDING THE DISTANCE BETWEEN TWO PLACES ON EARTH

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I don't claim to have originated this method. I found this material in a book quite a few years ago and made photocopies of the charts, but forgot to copy down the name of the book.

A nomograph is a chart which saves you the trouble of using a mathematical formula to find something. All you have to do is line up two pieces of information on two lines and you automatically can find the desired information. In this case, if we know the longitude and latitude of two cities, we can find the distance between them.

The nomograph method won't give a completely accurate indication of distance down to the nearest mile, but it will be accurate to within 50 miles approximately.

The easiest way of trying to explain how to use the nomograph is by using an example. Suppose we want to find the distance between Boulder, CO ($40^{\circ}2' N$, $105^{\circ}19' W$) and Dakar, Senegal ($14^{\circ}40' N$, $17^{\circ}18' W$).

1. Find the sum of the latitudes: $40^{\circ}2' + 14^{\circ}40' = 54^{\circ}42'$.
2. Find the difference of the latitudes:
 $40^{\circ}2' - 14^{\circ}40' = 25^{\circ}22'$.
3. Find the difference of the longitudes:
 $105^{\circ}19' - 17^{\circ}18' = 88^{\circ}01'$.
4. On the nomograph locate $54^{\circ}42'$ (or as close as you can get) on the "Latitude Sum" line on the left.
5. Locate $25^{\circ}22'$ (again, as close as possible) on the "Latitude Difference" line on the right.
6. Connect these two points with a line.
7. Find $88^{\circ}01'$ on the horizontal scale running across the middle of the diagram. Draw a vertical line. This line will intersect the diagonal line you already drew. From the point of intersection, move sideways to the scale in the center of the chart. In this case, the center scale reading should be about 8.65. Multiply this by 1000 to get the distance in kilometers; multiply this by 0.62 to get the distance in miles. In this case the distance is about 5350 miles.

There is an example already on the chart, where the latitude sum is 17° and the latitude difference is 83° . For a longitude difference of 57.5° , the distance is 10,600 km.

8. When both locations are south of the equator, the sum and difference of latitudes will be negative, since both latitudes (South) are considered to be negative. Use the nomograph as if both were positive.
9. If one place is in the northern hemisphere and the other is in the southern hemisphere, then add and subtract algebraically, i.e., treat the southern hemisphere as negative. The same is true if one is in the eastern hemisphere and the other is in the western hemisphere. Treat the eastern hemisphere as negative.

Example: San Diego, CA $32^{\circ}N$ $117^{\circ}W$
Emerald, Australia $28.5^{\circ}S$ $148^{\circ}E$
(-28.5 -148)

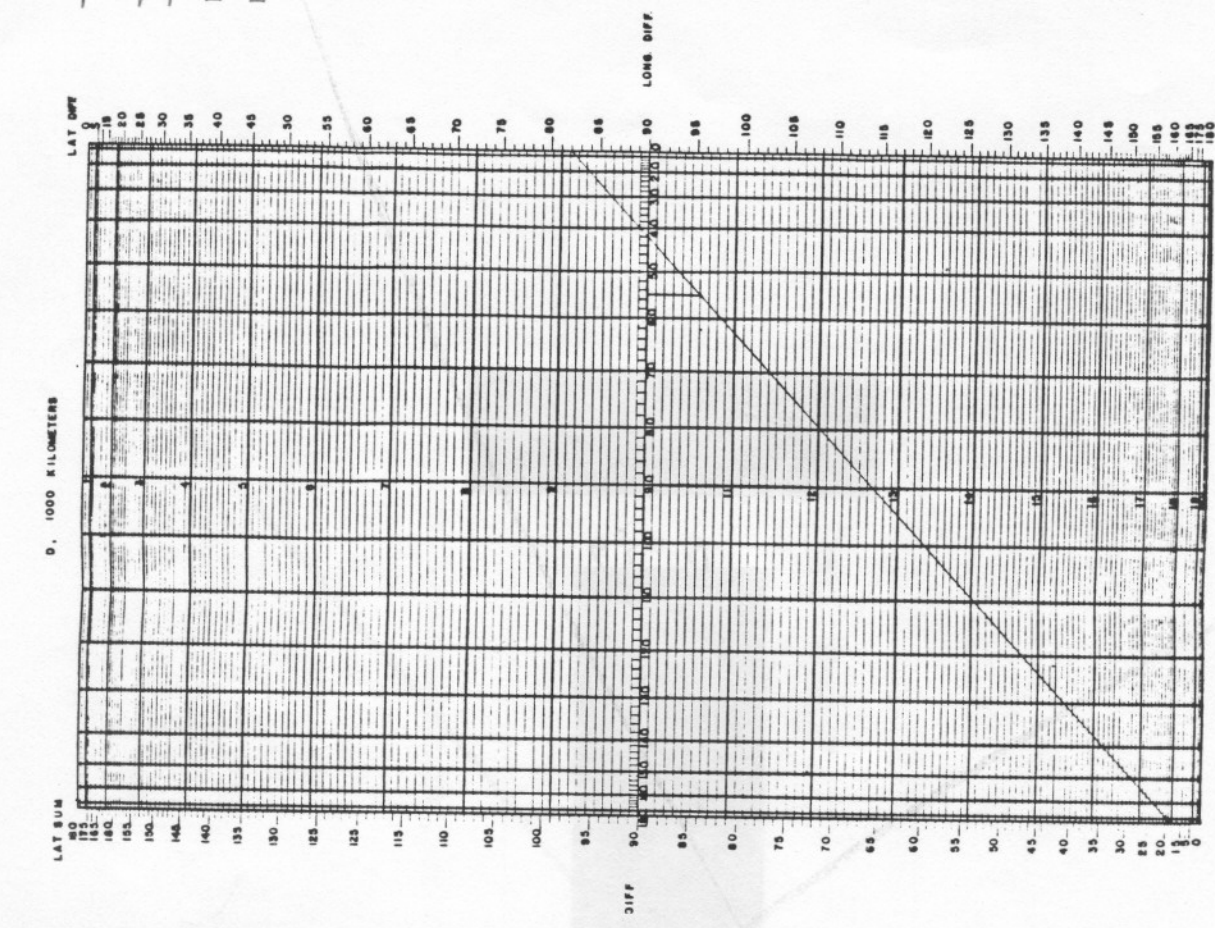
Latitude sum: $32^{\circ} + (-28.5) = 3.5$
Latitude difference: $32^{\circ} - (-28.5) = 60.5^{\circ}$
Longitude difference: $117 - (-148) = 265^{\circ}$

If either number comes out negative, for instance $17 + (-21) = -4$, treat the answer as positive, that is, use a latitude sum of +4.

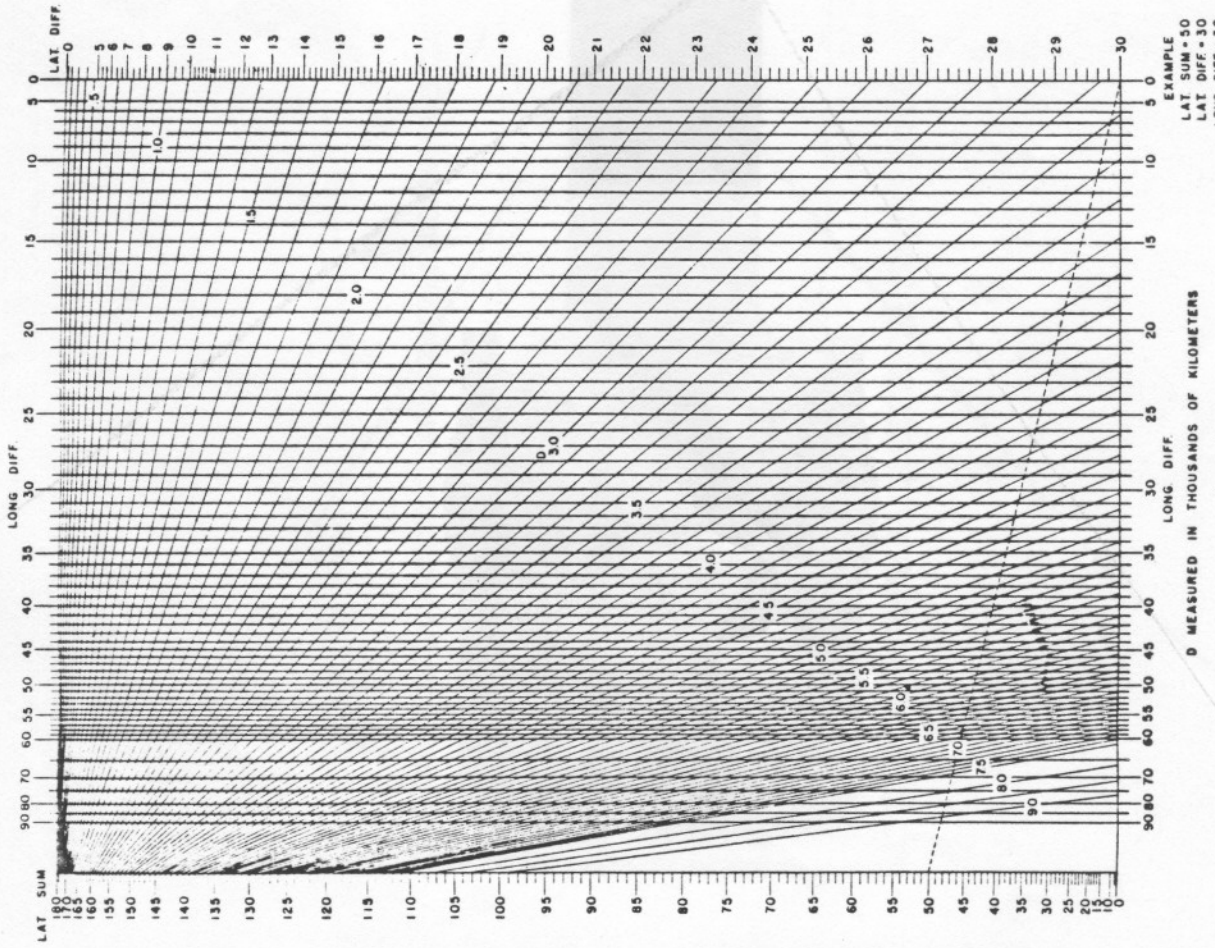
If the longitude difference comes out greater than 180° then subtract that number from 360. For instance, in the San Diego-Emerald example, $360 - 265 = 95$.

In the San Diego-Emerald example the distance comes out to about 8750 km.

In cases where the latitude difference is less than 30° , use the other nomograph. Essentially this is the same, except that the latitude difference scale has been expanded to make it easier to work with. The longitude difference scales are now tilted instead of being perfectly horizontal. The example which is on the chart indicates that for a latitude sum of 50° and a latitude difference of 30° , with a longitude difference of 30° , the distance is 4,460 km.



Distance Nomogram.



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