# Chapter 5



## Finding the Position of a Traveling Vessel

Celestial navigation on a traveling vessel requires special measures to correct for the change in position between different observations unless the latter are performed in rapid succession or simultaneously, e. g., by a second observer.

If speed and course over ground are known, position line navigation provides a very simple graphic solution to the problem.

Assuming that we make our first observation at the time $T_1$ and our second observation at $T_2$, the distance, d, traveled during the time interval $T_2$-$T_1$ is

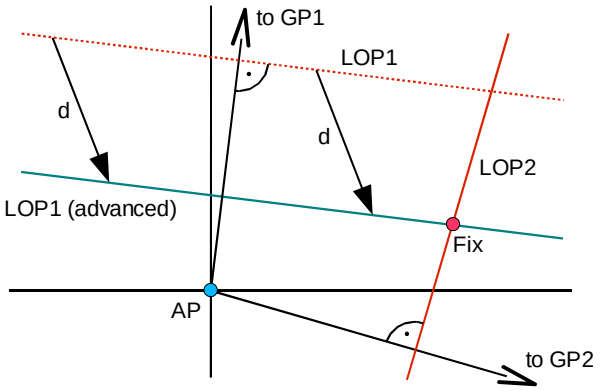
$$d\,[nm] = (T_2\,[h] - T_1\,[h]) \cdot v\,[kn]$$

1 kn (knot) = 1 nm/h

The course, C, is measured with a magnetic compass or with a gyro compass. Thus, we know our new position relative to the old one.

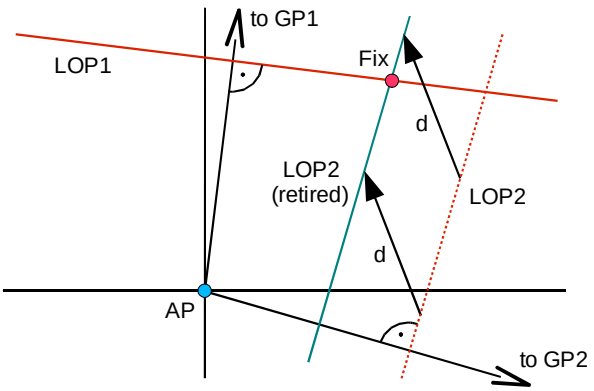
We begin as usual and plot both lines of position as illustrated in *Fig. 4-3* or *Fig. 4-6* (chapter 4). We choose a point of the first position line (resulting from the observation at $T_1$) and advance this point according to our course and the distance traveled between $T_1$ and $T_2$. Then, we plot a parallel of the first position line through the point thus located. The point where this **advanced position line** intersects the second line of position (resulting from the observation at $T_2$) marks our position at $\mathbf{T_2}$. A position obtained in this fashion is called **running fix** (*Fig. 5-1*).

Fig. 5-1




In a similar manner, we can obtain our position at $\mathbf{T_1}$ by **retiring** the second position line (*Fig. 5-2*).

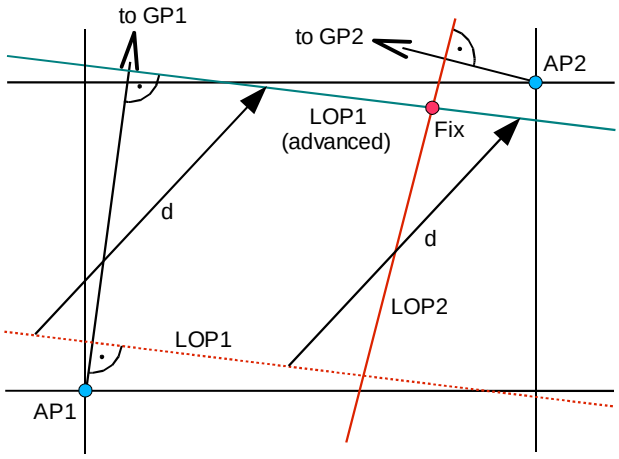
Fig. 5-2




Terrestrial lines of position may be advanced or retired in the same way as astronomical position lines.

The procedure gives good results when traveling short distances (up to approx. 50 nm) between the observations. When traveling a larger distance, it may be useful to choose two different APs, not too far away from each estimated position (*Fig. 5-3*).

Fig. 5-3




In practice, course and speed over ground can only be estimated since the exact effects of current and wind are not known in most cases. Further, the error caused by the curvature of the position lines may be greater than usual. Therefore, a running fix is generally not as accurate as a stationary fix.