

FORUM

Doppler Correction for Surface Movement

from Wing Commander D. F. H. Grocott, A.F.C.

A DOPPLER navigation system measures velocity relative to the surface of the Earth. If the surface is moving, as for example when flying over an ocean, the doppler will indicate a false ground-speed and/or drift, according to the direction of surface movement.

Trials carried out by the Experimental Navigation Division of the Aeroplane and Armament Experimental Establishment at Boscombe Down show that there is a positive correlation between doppler system error and the surface wind direction when flying over the sea in an aircraft which has an accurate heading reference system. The analysis of all data is by no means complete, but as the spread of errors is so small it is thought that users of doppler navigation systems may wish to see the trend of results and to accept a few simple rules to compensate for the surface movement.

The value of the surface movement for a doppler equipment having a 1 per cent correction for spectrum distortion is about 3 kt. for a surface wind velocity of 10 kt., 4 kt. for a wind velocity of 18 kt., 5 kt. for a wind velocity of 30 kt. and 6 kt. for a wind velocity of 50 kt. or more. The cardinal rule is that the doppler navigation system will indicate a position upwind of the correct position.

Clearly there is little point in applying an across-track correction of say 6 kt. when flying in a Boeing 707 at a speed of 500 kt., if the compass has an error of 2°, but doppler users may wish to apply a correction to the ground-speed component of say -6 kt. when the surface wind is on the nose and +6 kt. when the surface wind is dead astern. Those lucky operators who have an automatic sextant may wish to refine their electronic dead reckoning position by applying the surface movement vector downwind from the indicated doppler.

Notes on Heavy Weather in the Atlantic 1960 and North Sea 1961

from David H. Lewis, M.B., CH.B.

The following notes, from one of the contestants in the single-handed transatlantic race 1960, will be of great interest to a number of people concerned with wind and weather observations and the performance of small boats in heavy weather. Dr. Lewis's track in 1960 was by the great circle from Plymouth to New York, from New York up to St. John's, Newfoundland, and then back across the Atlantic to Lerwick in the Shetlands.