

# Forum

## Land Navigation

A short account of the Conference on Land Navigation and a list of the papers presented is printed in the Record. The two papers printed below are the President's opening address to the Conference and Captain Maybourn's summing up of the conclusions.

### Overcoming the Market and Technology Mismatch

J. E. D. Williams

The title of this address could perhaps more positively be: 'Exploiting the available technologies to satisfy the operational requirement in the best way'. It is a very old and familiar problem in navigation and location. Take position finding at sea before radio, for example. As the Earth is rotating, if you do not know the time you cannot determine, astronomically, your own longitude. So, before the chronometer, sailors took their shots of the Sun at local apparent noon to find latitude, and homed along the parallel of their destination.

When the marine chronometer was invented in the middle of the eighteenth century it would have been obvious to any astronomer who thought about it that the information available at sea from any one celestial observation is a line of position at right angles to the azimuth of the body and that the unique way of calculating the position line without solving more than one spherical triangle is what we now call the intercept method. What happened in fact was that sailors went on as before finding the latitude at noon but using the chronometer with morning or evening sights to find longitude. The position line was discovered generations after the chronometer by a New England sea captain, empirically and almost by accident. The intercept method was eventually developed by a French naval officer in 1875. The operational technology was lagging the potential technology by nearly a century.

The point of my anecdote, and its relevance to this conference, is that it would have been as unreasonable to expect eighteenth-century astronomers to divine what seamen needed (as opposed to what they thought they wanted) as it would be to expect seamen to know what astronomers could devise. In this problem of discovering how best to apply the state of many arts to an operational process we have gone a long way since those days. Particularly since the middle of the second World War there have been two main thrusts. One is improved methods of analysing the real nature of the operational requirement, expressing it in scientific terms and, where appropriate, applying the methods of operational research to the solution.

The other main thrust is improved communication between the operational practitioners and those who profess some discipline which might contribute to a better