Letters to the Editor

NAVIGATION IN HIGH LATITUDES

SIR,—I found Squadron Leader Bower's article 'Navigation on Recent R.A.F. Flights in High Latitudes' (this *Journal*, Vol. VI, p. 148) most interesting, although two points puzzle me.

First, I cannot understand why the crew of *Aries* selected the astrograph technique of homing to the Pole when they had been obtaining double-box fixes. I would have thought that with such a high order of fixing accuracy, coupled with relatively constant winds near the Pole, the better method would have been to wander slightly to starboard of the north-bound track to intercept the extension of the next track, thus using this line as a single-position line. By using this method, errors due to uncertainty of gyro drift, plus inaccuracies of the astro-heading reference system are virtually eliminated.

Secondly, I fail to understand why azimuth cannot be obtained from *Hughes' Tables* when the altitude is of negative sign. Perhaps what Squadron Leader Bower means is that azimuth is not critical and therefore the periscopic sextant method of determining the azimuth will suffice. But surely this argument could be used for all latitudes. When I use *Hughes' Tables* for negative altitudes, I employ two simple rules. These are:

(a) If $K \sim d$ is greater than 90°, altitude extracted from Table 2 is negative.
(b) Enter Table 3 with $180 - K \sim d$ and extract $180 - Z_2$.

With regard to Squadron Leader Bower's difficulty of observing the Moon through cirrus cloud with the Mk. IX sextant, I have found that the best solution is to use the No. 1 shade in the half-way position, thus seeing one-half of the bubble and one-half of the Moon.

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Yours faithfully,
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Squadron Leader BOWER writes: The *Aries* flight in question was a training mission and the astro-homing technique was used in preference to the more conventional methods purely for its training value. It is of course also true that the graphical method produces a more accurate result than the double-box fix since it in effect averages a series of individual observations. In this particular instance gyro wander was small and regular, hence all heading corrections could be made relative to the gyro itself and errors in the basic astro datum hardly entered into the picture. Again, use of the gyro graph appears to reduce the effect of random errors in the astro-heading observations.

Regarding the calculation of azimuth when the altitude is negative, it is of course incorrect to say that this cannot be done at all by *Hughes' Tables*, but there does not appear to be a short-cut method equivalent to that used for calculating zenith distance. Also I am not sure that the range of Table 3 is sufficient to permit the use of Squadron Leader Grocott's method in all cases, unless additional rules are invoked.

The practice was in fact adopted of using the No. 1 shade in the Mk. IX sextant in the half-way position, but it cannot be advocated as anything more

than a make-shift and the requirement remains for better control over bubble and background illumination.

GIORDANO BRUNO

SIR,—In an article 'Navigational Aspects of Gravity Determinations' (this *Journal*, Vol. V, p. 271) the following passage appears:

> 'For a long time it was believed that the Earth was perfectly round because it had been divinely created. Giordano Bruno, in 1690, suggested that it should be flattened at the poles, on account of its rotation, and was burned at the stake for his impiety.'

Lest readers should think that Bruno was martyred because he suggested that the Earth might be an oblate spheroid, may I please state that Bruno is not known to have made any such suggestion, and that there is no evidence that he was burned for anything other than heretical theological teaching.

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Yours faithfully,
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(Associate Professor of Surveying)

ERRATA

Method's of Conducting Ships' Speed Trials

EQUATION (2) in the paper by J. Th. Verstelle on page 300 of the July number of the *Journal* should read $m_v^2 = m_d^2\left(\frac{3600}{t}\right)^2 + d^2 m_t^2\left(\frac{3600}{t^2}\right)^2$. The formula quoted on p. 301 for deriving the mean square error in the distance made good should read $m_d = \sqrt{\{(0{\cdot}28)^2 + 2(0{\cdot}50)^2\}} = 0{\cdot}76$ metres.

Refraction at Sea

THE mean error quoted on line 8 of Captain Brett Hilder's paper (Vol. VI, p. 314) should read 1·2 miles, not 12 miles.