

## Metrication and the Nautical Mile

R. Turner

THIS country, and the marine industry in particular, is in the throes of a change that it has been decided shall be called metrication. It is evident from what is both written and spoken that not everyone is aware of what metrication means, that many people assume that it is simply a change from imperial units to metric units. However, what is really intended is the adoption of the S.I. system of units and this implies much more than just the use of metric dimensions. The two main points of the S.I. system are (i) that every dimension is measured in decimal multiples of a basic unit and (ii) that the system of units is a coherent one. The educational advantages of such a system are too well known to require re-stating here. Antagonists of change usually point out that time does not conform to condition (i) and while this is true, nevertheless the S.I. system will be a great improvement on our present one and the non-conformity of time should not be used as an excuse for other non-conformities.

In this context it is just not good enough for the Hydrographic Department<sup>1</sup> to arbitrarily decide that, since the International Nautical Mile is defined as 1852 metres, it is a metric unit and should thus remain in use. Moreover the British Standard Nautical Mile used to be 6080 ft.<sup>2</sup> When was the decision taken to change from 6080 ft. to 1852 metres? Was a Notice to Mariners promulgated and were instrument manufacturers and writers of textbooks told of this change?

The nautical mile is not an S.I. unit and therefore should not be used when the S.I. system has been adopted. The usual argument put forward for the retention of the nautical mile (apart from the spurious one of not wanting to change anyway)<sup>3</sup> is that it is approximately the distance on the surface of the Earth subtended by an angle of 1' at the Earth's centre and that this is convenient for astronomical navigation: in fact the astronomical navigator would not be inconvenienced by using the S.I. unit of length. In any case in the marine field astronomical navigation has reached the stage of obsolescence and radio navigation is of increasing importance. In most radio systems the speed at which the signals travel, and hence the associated wave length, is of crucial importance and in the non-marine field the speed of electromagnetic radiation is measured in S.I. units. The student navigator, brought up exclusively on S.I. units at school and elsewhere, will have his difficulties unnecessarily increased if he is forced to think in terms of nautical miles when trying to grasp the complexities of, for instance, Decca Navigator lane widths and the consequent accuracy and reliability of such a system.

It has also been suggested that rhumb-line and great-circle track computations would be complicated by the abolition of the nautical mile. As has been shown<sup>4</sup> this need not be so for rhumb-line tracks; great-circle tracks would be complicated by a conversion factor.

It is belatedly being realized in the marine field that navigation is not just a collection of craft techniques: that it is in fact an academic discipline in its own right but draws heavily on other disciplines, notably mathematics. It is not, therefore, at first sight appropriate for navigation to retain outdated and unusual

units of measurement. Moreover, the marine navigator is even less in isolation than he used to be. He is concerned with only one part of the whole process of transporting goods and people; but it is essential that he see himself as an integral part of the transport industry. If the marine operator insists on not conforming many anomalies will occur. For instance we shall have a container shipper estimating his costs at so much a kilometre for the land part of the shipment and at so much a mile for the sea part—an unnecessary and tedious complication.

It is vitally important that the full implications and advantages of the S.I. system of units are realized. It is evident that this is not so at the moment and that private metric systems are being proposed.<sup>5</sup> Marine navigators should not lightly decide to accept anything less than the S.I. system and a decision to retain the nautical mile should only be taken after proper discussion followed by a specific statement of why the retention of the nautical mile will be more advantageous than a proper change to S.I. units. The marine industry already has a reputation (largely undeserved) for conservatism. Does it really want to be identified as one of those quaint organizations that uses antiquated units such as rods, poles and perches?

Finally, if the nautical mile is preserved it will be the only mile in use and therefore there will be no need to retain the word 'nautical'.

#### REFERENCES

- 1 Hydrographic Department, Ministry of Defence (1969). The Admiralty Chart—IV. *This Journal*, 22, 419.
- 2 *Admiralty Manual of Navigation*.
- 3 Cotter C. H. (1968). The metrication of navigation. *This Journal*, 21, 366.
- 4 Turner R. J. (1970). Rhumb-line sailing with a computer. *This Journal*, 23, 233.
- 5 *The Adoption of the Metric System in the Marine Industry: Report, Basic Programme and Guide*. (P.D. 6430), British Standards Institution.

*Rear-Admiral G. S. Ritchie, Hydrographer of the Navy, comments:*

Your correspondent R. Turner suggests that significance attaches to the difference between the British Standard Nautical Mile (6080 ft.) and the International Nautical Mile (1852 m.); I question whether this is so. The International Nautical Mile, as has been pointed out<sup>2</sup>, is the shorter of the two by some 0.06 per cent. However, either value is an approximate mean of lengths which vary, in reality, from 6046 ft. (1843 m.) at the equator to 6108 ft. (1862 m.) at the poles. An error of up to about ten times the difference in question may therefore occur in reading, as nautical miles, the distance in minutes from the latitude scale of a Mercator chart, whichever standard is used.

6080 ft. was a convenient round figure, in Imperial Units, for British navigators to adopt for sailing in middle latitudes. The International Hydrographic Bureau similarly resolved, in 1929, that a convenient figure in metres was 1852.

One of the reasons for metrication which is not mentioned by Mr. Turner is that of international standardization. Now that this country is going metric, it is timely to conform to the IHB resolution of 1929 that 'the length represented by 1852 times that of the international prototype of the metre shall be the International Nautical Mile'<sup>3</sup>, a standard already accepted by the large majority of States Members of the Bureau.

Whether the nautical mile should be abandoned altogether in favour of S.I. units is another question. For the nautical kilometre to supplant the nautical mile it would seem to be a prerequisite that a geographical reference system based on the grade be adopted. A nautical kilometre would then be the meridional arc subtended by an angle of one centigrade at the centre of curvature. There would seem to be no possibility of this gaining general acceptance. Moreover, the acceptance of the nautical kilometre would remove none of the imprecision of the nautical mile: both vary with latitude, and both depend on an assumed figure of the Earth.

The introduction of the measurement of depths and heights on the Admiralty chart in the metric system, whilst retaining the horizontal use of the nautical mile, may be said to result in a 'semi-metric chart'. Nevertheless, such a chart brings us a giant's step nearer to the day, to which all marine cartographers are looking forward, when the world's charts are all on the same horizontal and vertical systems of measurement.

To adopt the grade and the nautical kilometre would make the Admiralty chart the odd man out, and I doubt if any navigator would ever speak to the Hydrographer of the Navy again.

#### REFERENCES

- 1 Cotter, C. H. (1968). The metrication of navigation. *This Journal*, 21, 366.
- 2 International Hydrographic Conference (1929). 1st Supp. R/P Part 2B, No. 45, p. 251.