theorists and operators, through such media as the Institute, might well improve the legislation.

from M. Gwin

I READ with interest Captain Gillman's excellent paper on performance standards for 'A' category aircraft.

At the risk of 'splitting hairs' I feel that one point may well have caused confusion to those readers unfamiliar with the type of performance graphs illustrated.

Captain Gillman refers to the extraction of *V1* speeds from the emergency distance, take-off distance and take-off run graphs, for the purpose of cross plotting against various weights in order to obtain optimum *V1* speed.

Inspection of the graphs reproduced as Figs. 1 and 3 will show that in fact a direct *V1* speed is not extracted but rather a ratio of *V1*/*V2* speeds. In my experience, normal practice is to extract *V1*/*V2 ratios* and plot a series of ratios against all-up weight. That is, as shown in Fig. 4 but reading *V1*/*V2* rather than *V1* speed in knots. Having determined maximum T.O.W. from this plot, the *V1* speed at this weight can be determined by application of the appropriate *V1*/*V2* ratio. *V2* speed is determined from the flight manual by reference to weight only; having found *V2*, application of the ratio gives *V1*.

Captain R. E. Gillman comments:

I agree entirely with Captain Lee's remarks on the inadequacy of the existing legislation. It does need amplification on certain issues, but one must bear in mind, that no amount of regulations can replace sound airmanship, and the complication resulting from an attempt to cover all flight contingencies, would negate the advantages in so doing.

What is essential I think, is that pilots should have a good background knowledge of the rational concepts so that they can apply the system intelligently should circumstances exist which fall outside their present scope.

Actual *V1* speeds were used in the take-off weight plot for purposes of clarity, for it makes no difference to the result if *V1*/*V2* ratios are converted to speeds, before or after the plot.

Mariner's Astrolabes

from Commander W. E. May, R.N.

(*National Maritime Museum*)

IN Dr. Derek Price's most interesting article 'Two Mariner's Astrolabes'* he suggests that the heyday of this instrument was from 1530 to 1630. Some additional light is thrown on the closing date of the period of use of the astrolabe

* This *Journal*, 9, 338.

by Seller's *Practical Navigation*, a book which ran into many editions, the earlier ones being now somewhat rare. Successive editions of a book are usually of little value in giving a terminal date for the era of an instrument, for descriptions of it are only too often left in, unweeded long after the instrument is obsolete. Here, however, we have a description of the astrolabe inserted in the first edition of 1669 while it is omitted from the second edition of 1672. This later edition shows signs of careful rewriting and the fact that the author has expunged mention of some instruments, while retaining descriptions of others which never had much vogue, would seem to indicate that he thought that those which he had deleted would no longer be of value to the seaman.

The description which is given of the astrolabe is as follows:

> This Instrument is of very antient invention and use, but principally by the *Spaniards* and *Portugals*; the matter whereof it is made is Brass, the form round, being very solid and ponderous, and is thereby the more fit for the Observations intended thereby; upon the convexity thereof is fitted a Ring and Swivel for to hang it upon your finger, or elsewhere, and to turn to any verticle position required; The Superfecies of this Instrument is divided into 4 quadrants, the two upper being divided into 180 degrees, both numbred from the Horizon toward the Zenith, with 10, 20, 30, &c. which are to shew the Altitude either of Sun or Stars; and upon the Center of the Instrument there moveth an Index with two Sights placed thereon, and in the midst of which there are two holes for the transpeircing of the rayes of the Sun, also for the beholding the Stars through them; but that it may be the better understood, I have hereunto annexed the Figure thereof. [Fig. 1.]

The reference to the popularity of the astrolabe among the Iberian nations is of interest, as are some of the points in the accompanying illustration. It will be noted that the sight vanes are set close together, as Dr. Price observes that they are in all recorded astrolabes, and are not wide out as in the earlier illustrations; while the graduation is for both altitude and zenith distance, though the description refers to the former only.

Another example of a mention of the astrolabe being apparently deleted occurs in the *Ordonnance de Louis XIV Touchant la Marine* where in the instructions for Pilots in the 1681 edition we find:

> Le Pilote commandera à la route & se fournira de Cartes, Routiers, Arbalestes, Astrolabes, & de tous les Livres & Instrumens necessaires à son art.

I have not been able to consult in the original French the edition of 1689, which was extensively rewritten. In an English manuscript translation in the National Maritime Museum the paragraph appears: 'He shall be supplyed with Charts, Books and Forestaves & Instruments necessary'.

being divided into 180 degrees, both numbred from the Horizon toward the Zenith, with 10, 20, 30, &c. which are to shew the Altitude either of Sun or Stars; and upon the Center of the Instrument there moveth an Index with two Sights placed thereon, and in the midst of which there are two holes for the transpeircing of the rayes of the Sun, also for the beholding the Stars through them; but that it may be the better understood, I have hereunto annexed the Figure thereof.

The Figure of the Astralobe.

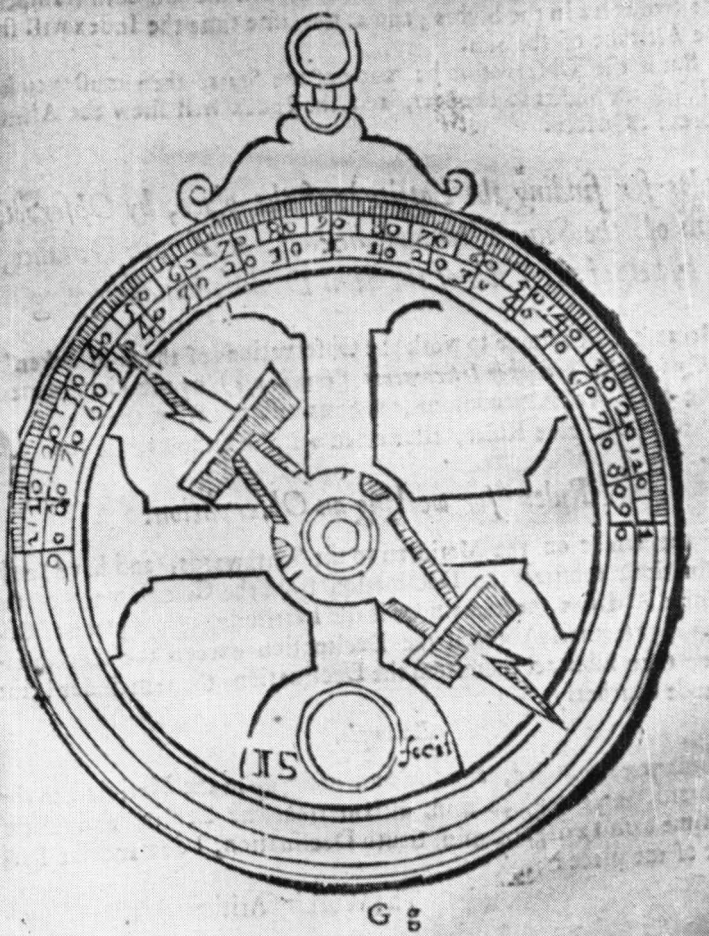

Fig. 1. The Mariner's Astrolabe illustrated in the 1669 edition of Seller's Practical Navigation.

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Mr. H. F. Schwarz (above) and Mr. W. J. O'Brien receiving their gold medals from the President.

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