telescopic topmasts and the complicated protocol concerning meetings with long extinct China tea-clippers.

Captain C. H. Cotter comments:

IT is unusual, but nevertheless refreshing, to find a serving shipmaster complaining about Ministry of Transport examiners and Nautical School teachers. It is largely due to a complacent attitude of too many qualified Master Mariners, in respect of these matters, that the system of training in Senior Colleges of Navigation has fallen into the degenerate state that it now finds itself.

I agree wholeheartedly with the view that the intercept method, being general in its application, provides the best method for sight reduction, so that if a navigator wishes to solve his PZX triangles he would be well-advised to discard all methods except the intercept method.

Captain Stephenson is not correct in saying that only one of the three methods of sight reduction is in general use today. A very large number of Merchant Naval officers use the 'longitude method' for their morning Sun sights; and it appears that some use the same method for reducing star sights as well. Other remarks made by him are also untrue: these, however, are of trivial importance compared with that of the real issue he raises.

Captain Stephenson appears to lay part of the blame for the perpetuation of archaic methods of navigation and seamanship on the shoulders of teachers in Nautical Schools. It is true that teachers in Senior Schools of Navigation insist upon their students learning—or at least remembering on the day of their examination—all that the Ministry of Transport examiner requires of them. But this is not a matter of their choice. Nautical instruction in these schools is geared entirely to Ministry of Transport examinations. The emphasis is on the passing of the examination instead of on the course of instruction that should lead up to the examination. It is for this reason that many of our nautical colleges are cramshops of the worst category.

As time goes on nautical instruction given in Senior Schools of Navigation is becoming more and more out of phase with the practical requirements of the modern shipmaster. It will not be until our system of nautical education and training is rationalized, and realistic courses of instruction appropriate to the age in which we live replace the present ridiculous arrangements (which appear to satisfy employers), that teachers like myself will be able to play a significant and useful role in instructing officers of a service on which depends, in no small measure, the prosperity of the nation at large.

Grid Navigation

from J. Garbasz

THE use of the Greenaway grid (curved) lines has enabled us to measure grid directions correctly on a Lambert chart (in middle latitudes). However, due to the fact that some charts are printed with only straight grid lines (such as the

NAT 3071), a transport rate correction was devised which is supposed to combine both the correction for Earth rotation and the correction required because of the straight grid lines.

Whilst the idea is an interesting one, a basic mistake is introduced which leads to serious errors in grid direction measurement. The fact that chart convergency error increases with increase of longitude way from the prime grid meridian is ignored. For instance, at 60°N., 60°W., the straight grid line is in error six times the amount that it is at 60°N., 10°W. To put it differently, a Greenaway grid line at 60°N., 60°W. would curve away from a straight grid line six times the amount it would at 60°N., 10°W.

As an illustration, let us assume a one-hour flight from 60°N., 65°W. to 60°N., 55°W. By the transport rate correction method:

correction for Earth rotation	$+ 13^{\circ}$
transport rate correction for 10° of longitude at 60°N.	$+ 1^{\circ}2$
total correction for corrector	$+ 14^{\circ}2$

This implies that the error due to a straight grid at 60°N. for the longitude 65°W. to 55°W. (10° of longitude) is $1^{\circ}2$. This is obviously an error; calculating the difference between Earth and chart convergency between Greenwich and 60°W. meridian at latitude 60°N., we get an approximate error of 8°.

A practical way to solve this problem would be to correct only for Earth rotation on the rate correction scale, and to use a table, perhaps of the kind shown, to correct the direction measured.

N. latitude

W. longitude	42°	45°	48°	50°	52°	54°	56°	58°	60°
°	°	°	°	°	°	°	°	°	°
10	$-\frac{1}{2}$	$-\frac{1}{2}$	0	$+\frac{1}{2}$	$+\frac{1}{2}$	$+\frac{1}{2}$	$+1$	$+1$	$+1\frac{1}{2}$
20	$-1\frac{1}{2}$	-1	0	$+\frac{1}{2}$	$+1$	$+1\frac{1}{2}$	$+2$	$+2$	$+2\frac{1}{2}$
30	-2	-1	0	$+1$	$+1\frac{1}{2}$	$+2$	$+3$	$+3\frac{1}{2}$	$+4$
40	-3	$-1\frac{1}{2}$	0	$+1$	$+2$	$+3$	$+3\frac{1}{2}$	$+4\frac{1}{2}$	$+5$
50	$-3\frac{1}{2}$	-2	0	$+1\frac{1}{2}$	$+2\frac{1}{2}$	$+3\frac{1}{2}$	$+4\frac{1}{2}$	$+5\frac{1}{2}$	$+6\frac{1}{2}$
60	-4	$-2\frac{1}{2}$	0	$+2$	$+3$	$+4$	$+5\frac{1}{2}$	$+6\frac{1}{2}$	$+8$

To use this table, enter with mean latitude and longitude and apply the correction to the direction measured according to the sign shown. The above is, of course, true of all Lambert charts in middle latitudes. The inherent error of this method is small enough to be ignored in practice. Distances greater than 10° of longitude shall be split and corrections applied as required.