

by the American ATC. In all these estimates the first and last turns of a route were ignored as they are generally at low altitude and speed.

The total saving in costs that could be achieved in the course of a year's operations by a fleet of aircraft may be estimated as in Table II.

TABLE II. TOTAL ANNUAL SAVING

Aircraft	Assumed saving (miles per mile flown)	Cruising cost per hour £	Planned hours	Fleet Saving £
BAC111-200	0.015	102	14,100	21,600
BAC111-500	0.015	119	33,000	58,900
B707	0.004	206	34,350	28,300
DC10	0.004	252	7400	7500
				116,300

Matthew Flinders and Ship Magnetism

W. F. J. Mörzer Bruyns

(*Nederlands Scheepvaart Museum*)

READERS of Captain Cotter's paper under this title in the April 1976 issue of the *Journal* may be interested in some evidence that Dutch seamen in the seventeenth century were aware of this phenomenon of ship magnetism.

Abraham de Graaf in *De seven Boecken van de Grootte Zeevaart*, published at Amsterdam in 1658, warns ships' officers taking bearings with the compass that metal objects in their clothing can seriously deflect the compass, and mentions iron buttons and buckles. This was an important contemporary work on navigation and de Graaf was an examiner of officers of the Dutch East Indies Company from 1679 to 1714.

From Pieter van Dam's *Beschryvinge van de Oost Indische Compagnie*, completed in 1701 (reprinted 1927-54), we find that large East Indies Company ships from 1671 onwards were armed with two bronze cannon near the compass. These were not the only bronze cannon on board, but it was clearly stated that the cannon near the compass had to be bronze and not iron. I have not made a study of the subject and there may be further evidence that some Dutch seaman in the second half of the seventeenth century was fully aware of the danger of iron near the compass.