TELESOUNDING — A REPLY

A LETTER TO THE EDITOR

from Captain D.W. Haslam
Hydrographic Department (UK)

Sir,

The article "Telesounding — A method of wide-swathe depth measurement" [1] in the January 1974 International Hydrographic Review has been studied with much interest. There is no doubt that such a system has great potential in the marine geological field but I suggest that more emphasis might have been given to the authors' statement, at the end of their abstract, that further development is needed before this particular system would be acceptable for hydrographic surveying.

But what sort of system *is* needed for hydrographic surveying ? For purely charting purposes, I would suggest that a suitable definition of our task could be "to obtain and record the least depth of water — to an accuracy of ± 1 metre — over the whole area being surveyed, including the depths over all objects (natural and man-made) standing more than 1 metre above the sea-bed". This is perhaps an ideal aim and very few surveyors can cross their hearts and say that they have achieved it (either regularly or, indeed, ever) but it is, I suggest, what all Hydrographic Offices should now be striving to achieve, at least along and near to the routes of deep-draught vessels and recommended routes in areas of critical depths.

With proven equipment at present available to most of us, the current practice involves first covering the whole area with echosounders along lines spaced close enough together to give a good general indication of the bottom topography. At present, lines are usually 5 mm (0.2 inch) apart on the sounding board and the scale of the survey is chosen with regard to the general depth and the complexity of topography expected. For an area with reasonably uniform depths of from 30-50 metres, a scale of 1/50 000 might be accepted and basic sounding lines would be 250 metres apart; as the cone covered by an echosounder beam in 50 metres of water is only about 7 metres either side of the track, there is a gap of some 236 metres between lines which is not covered — even assuming that the vessel follows a perfect course and leaves no wider gaps. Even when bumpy areas are interlined by echosounder at intervals of 2.5 mm on the sounding board, there are still unsounded gaps of about 111 metres, in which irregularities of the bottom, wrecks or solid bits of jetsam may lie undetected by the echosounder.

However, most surveyors now use *some* form of sonar — either of the searchlight or side-scan type — to investigate the gap between echosounder lines; when the sonar cannot be used concurrently with the echosounder, due to mutual interference of their transmissions, the whole area must be traversed a second time and, unless the sonar can give a sufficiently accurate depth over all obstructions to either side of the track, any obstructions found must then be investigated individually and eventually swept by some form of wire sweep to find the least depth over them.

In practice, the time taken to carry out the basic sounding lines is usually equal to — and often less than — the time needed for subsequent interlining, location, investigation and sweeping over the various obstructions found and/or previously reported.

Obviously, therefore, all practical surveyors would welcome a means of speeding up their work — indeed it is essential that such a tool, or series of tools, should be developed and fully tested as a matter of the utmost urgency. Even comparatively recent surveys (pre- about 1965) were based on the assumption that the maximum draught ship was likely to be less than about 18 metres and that operators would not accept an under-keel clearance of less than about 3 metres. Irregularities on the sea-bed likely to be deeper than about 20 metres were not investigated. Vast areas of the continental shelf still have not been even surveyed by echosounder let alone covered by modern precise surveys with a thorough echosounding search.

I suggest that all Hydrographic Offices should be reviewing the adequacy of *all* their past surveys in relation to present draught vessels and under-keel clearances in order to assess how much needs to be done, and indeed re-done, to bring them up to date and to keep them up to date in areas known to be unstable or to have numerous wrecks.

With present equipment and resources, the new task is enormous but we need to be practical about the methods to be used to cope with the task. Although automatic recording of ordinary echosounder depths along the track is now generally available and accepted as a means of dealing with the 24-hour a day input now possible with electronic position fixing systems, my own simple surveying mind boggles at the thought of the off-line work of calculating the depth from the one million slant-ranges available per day from the system described by the authors of the paper under review. Even with computers this would be a daunting task.

Luckily, however, such a plethora of data is not essential for a hydrographic survey for charting purposes since we can afford to be concerned, not with a map showing in precise detail every minute undulation of the sea-bed, but only with the "least depths" affecting the safety of navigation. It may seem illogical for a hydrographic surveyor to suggest that Hydrographic Offices do not need the most comprehensive equipment but, surely, in view of the enormity of our sudden new tasks, our first thought should be to cater for our immediate needs only and leave the more detailed mapping of fairly limited areas required by our civil engineers, marine geologists, etc., to be tackled by us later on or by them.

What we chart-making surveyors need is equipment to allow us to record the depths along the track followed, as well as any significant differences in depth in the gaps between the lines of soundings. The greater the range of this equipment, the wider apart our basic lines can be and if it can detect and height any significant irregularities at the same time as the basic sounding line, then the time taken to cover a given area will be considerably reduced. We do not need to record a mass of data on either side of the track if this does not affect the safety of shipping, nor do we want to be faced with additional computer systems and kilometres of data-tapes which we cannot process in real-time. But we *do* need to be sure that any new system can detect an object, about 1 metre in size, without any null-points between beams and that it is simple to operate and to maintain.

The advanced acoustic scanning equipment referred to [2] by the authors in their paper is now being developed by the UK Department of Industry, in conjunction with the Hydrographer of the Navy and others, primarily as a surveying sector-scanning sonar. This system will give a profile of the sea-bed to one side of the track from which a cursor can take off least depths of significant features down to 1 metre in height without the need for off-line analysis. It is hoped eventually to develop a fully automated depth measuring system as envisaged by MACKAY, 1972 [3].

I hope that an updating article describing this system will be available to the *Review* and that equal publicity may be given to any other systems designed to meet the chart-makers' immediate needs as described above.

1 August 1974 (signed) D.W. HASLAM

REFERENCES

[1] STUBBS, A.R., MCCARTNEY, B.S., LEGG, J.G. (1974) : Telesounding, a method of wide swathe depth measurement. *Int. Hydr. Rev.*, Vol. LI, No. 1, pp. 23-59.

[2] VOGLIS, G.M. and COOK, J.C. (1966) : Underwater applications of an advanced acoustic scanning equipment. *Ultrasonics*, 4, (1), pp. 1-9.

[3] MACKAY, J.M. (1972) : Automation of hydrographic surveying. *Int. Hydr. Rev.*, Vol. XLIX, No. 2, pp. 149-166.