DEPTH CHECKING IN FAIRWAYS

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The Swedish Hydrographic Office, a department within the National Administration of Shipping and Navigation, has recently introduced a new type of sweeping bar for definitive checking of minimum depths in fairways as well as for detailed investigations of shoals and determination of any topographic features that could limit the width of the fairway. This new equipment is invaluable when precise hydrographic data are required.

This new type sweeping bar has been specially designed to satisfy the ever-growing depths requirement for fairways. A swept depth of 21.7 m was required for the newly dredged deep channel to the new oil jetties in Gothenburg. An oil refinery is under construction in Brofjorden Fjord and at the narrow entrance to the fjord the new bar equipment has been used to determine the 30 m contour.

The bar itself has to be very heavy in order to keep it in the same position in relation to the platform supporting it, and consequently at a fixed depth. The bar we use weighs 1350 kg. It must also generate auto-

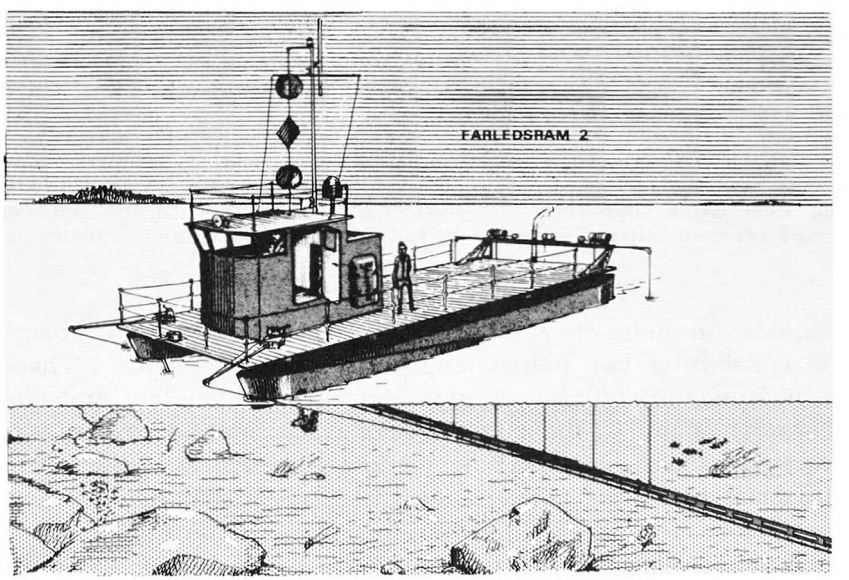

FIG. 1. — The working platform with its wheelhouse and equipment is mounted on a light alloy catamaran 10 m in length. The catamaran, fully equipped, displaces approximately 10 tons.

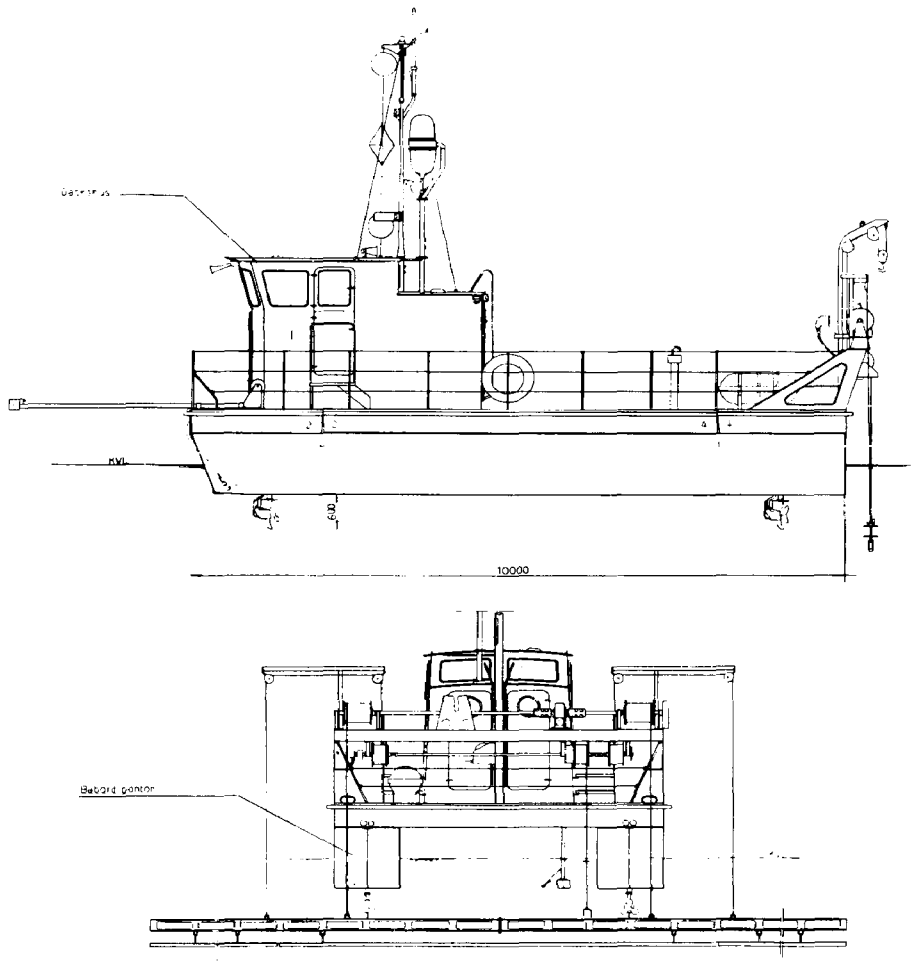

FIG. 2. — The upper drawing shows one of the extensible booms to which are fixed the forward guys with which the sweeping bar is towed and steered.

In the lower drawing the platform is seen from aft, and shows the position of the echo sounder transducer and the log-rotator on a retractable mounting near the starboard hull. The outermost wire on the right is marked in decimetres and is used to check the depth of the sweeping bar. The next wire, to the left, is one of the two 8 mm steel wires supporting the sweeping bar. Further to the left is a 4-core electric cable for transmitting pulses from the bottom contacts to the instrument panel.

matic signals on contact with the bottom. The sweeping bar is 20 m long and consists of two bolted lengths of He-220A girder. Three 6.65 m lengths of iron rod, 60 mm in diameter, are suspended underneath the bar. These rods are so fixed as to hang free and to move in a fore-and-aft direction; each has its own lever switch which is cable connected to an indicator light in the wheelhouse where an alarm bell common to all three sections is also installed. On contact with the bottom the relevant section of rod is caused to deviate from the vertical, and when this deviation attains about 5° a signal is automatically generated and indicated on the wheelhouse panel.

The sweeping bar is suspended on two 8 mm steel wires and is set

to the correct depth by means of an electric counter. For maximum accuracy the depth can be checked by two lead-lines marked in decimetres.

A 25 HP Volvo Penta diesel engine is housed in each hull. These provide pressurized oil to the hydraulic pumps for driving the propellers — which are situated one forward and one aft — as well as for the sweeping bar's two winches. Each propeller and its mounting can be turned through 90° to port or to starboard and can also be retracted into the hull.

The drums for the lead lines and the electric cable are mounted on a common axle, the lines being held taut by means of a motor providing a tension of about 20 kgf (1 kg force = 9.807 newtons).

In the wheelhouse all the control levers for propulsion, steering and the manœuvring of the bottom bar are assembled on one instrument panel. The bell and the indicator lights for bottom contact, together with controls for the list compensation pump, are also positioned here. The panel also carries instruments for position fixing, VHF, echosounder, log, compass, rudder indicator, hydraulic oil pressure gauges, and the engine control instruments with their tachometers.

To increase the accuracy of surveying operations with the use of this sweeping bar, a mercury level switch has been introduced, in order to assure that the catamaran is maintained strictly horizontal. If there is a list of more than 0.3° — that is to say when there is a 5 cm change of depth at either extremity of the bar — then the mercury switch auto-

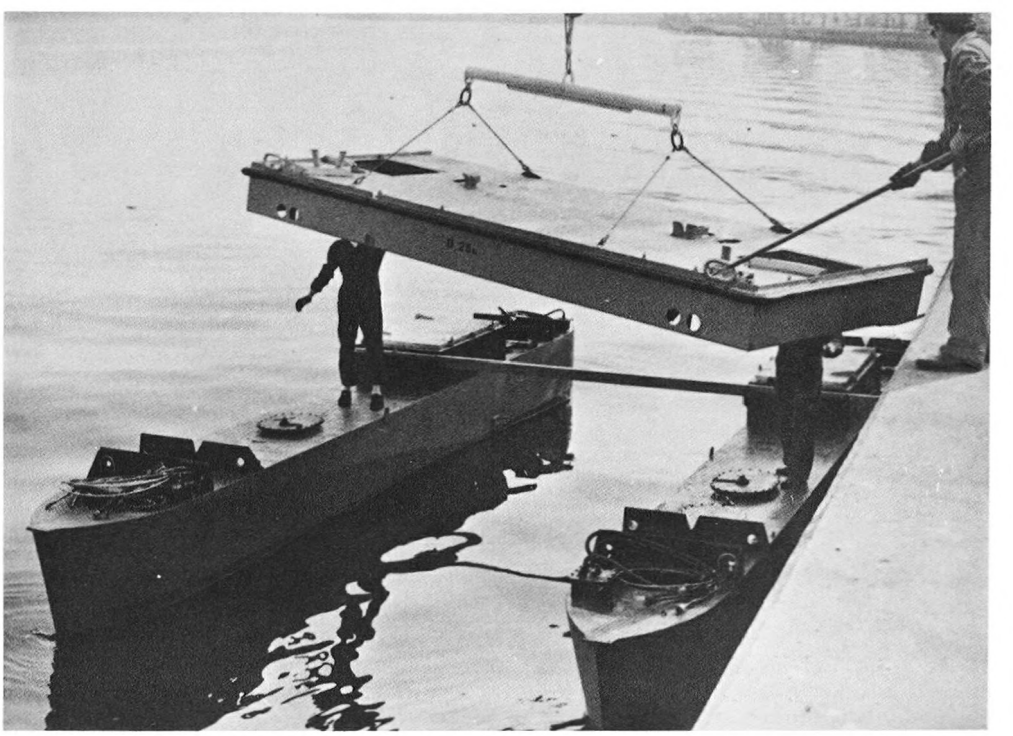

FIG. 3. — The fairway sweeping platform being assembled with the aid of a small crane. The rod between the hulls is used to hold them at the correct distance apart. The forward section is being lowered for assembly.

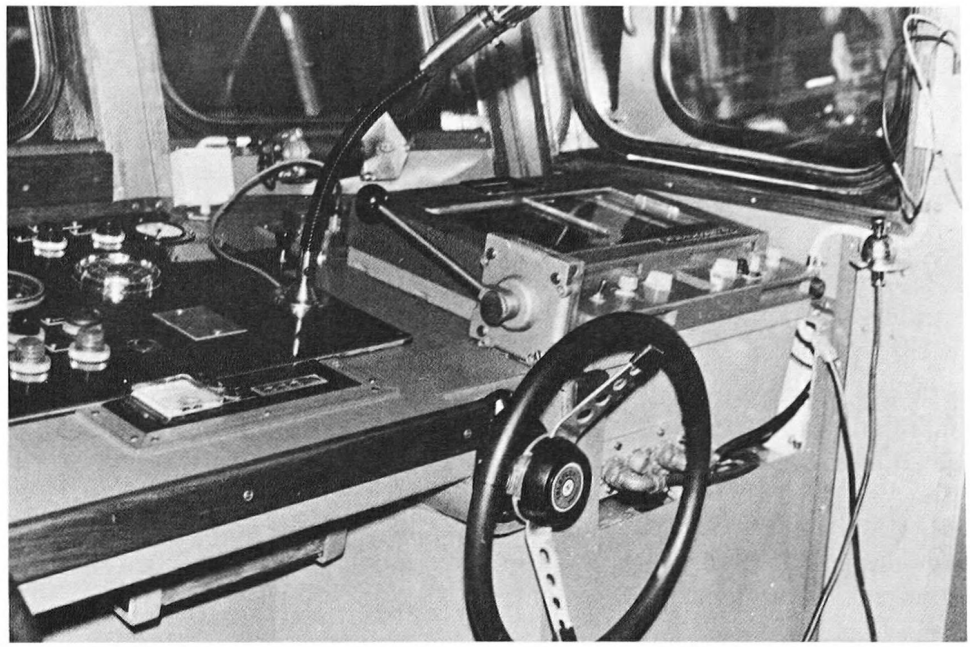

FIG. 4. — Steering and control station. On the starboard side, the Hydrodist repeater instruments, the echo sounder, the VHF and the log, together with the control lever and wheel for the aft starboard propeller assembly.

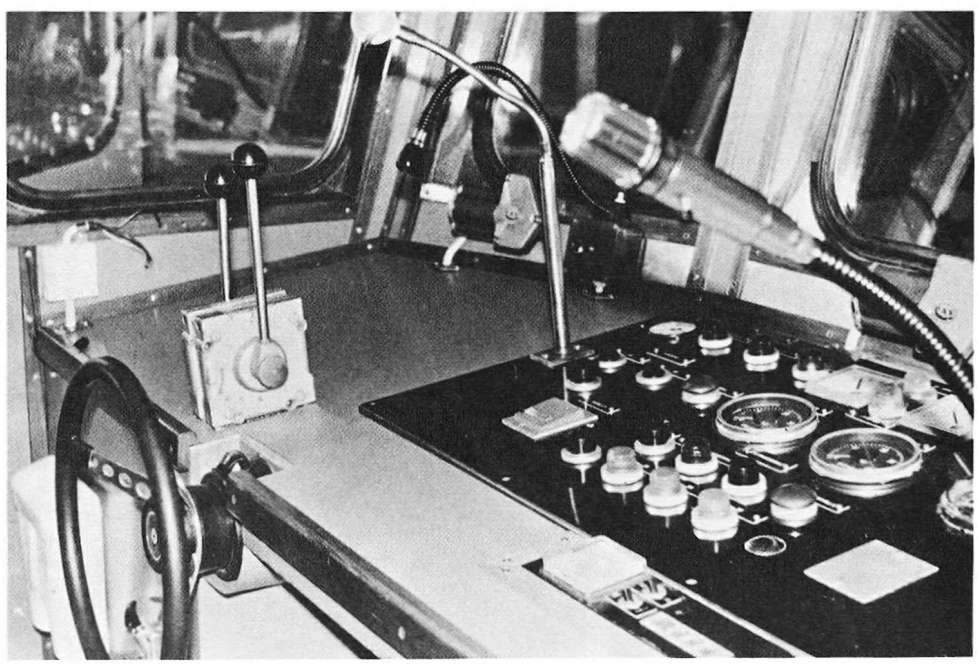

FIG. 5. — The instrument panel. The uppermost row of lights and dials are for engine control. In the second row and on the left are the automatic and manual controls for the pump used for even trim of the keel. The large dials are the tachometers for the two diesel engines. At the bottom left, the counter for bar depth, followed by indicator lights for bottom contact and reset button for the bell. Furthest to port are the sweeping bar control lever and the lever and wheel for the forward port propeller assembly.

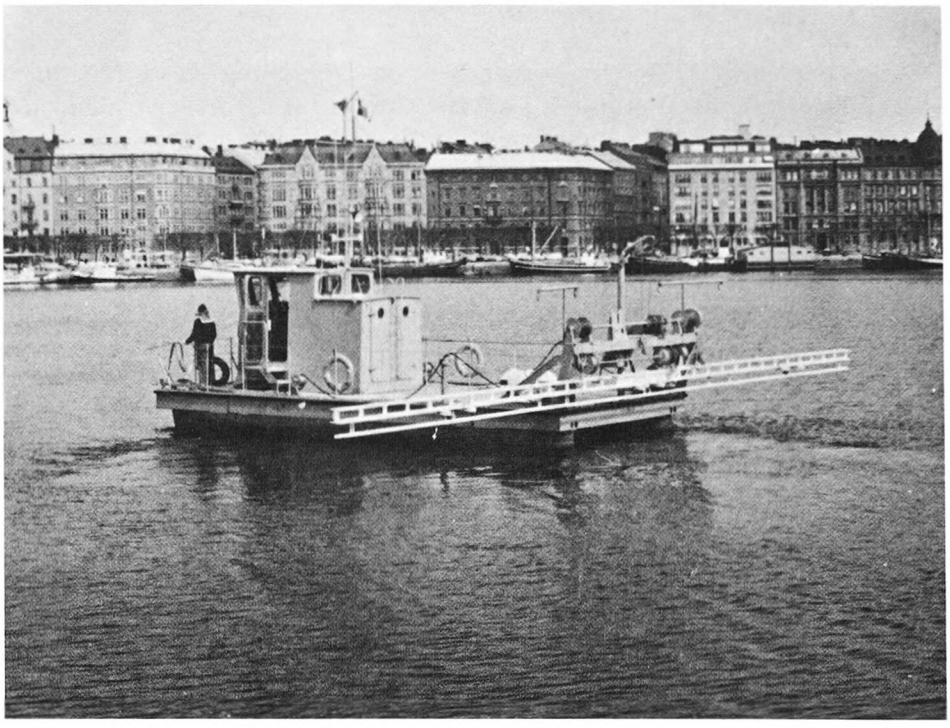

FIG. 6. — The sweeping bar assembled ready for use.

matically starts up a pump which transfers water from the ballast tank in one hull to the tank in the other hull until a horizontal position is restored. A delay relay ensures that the pump is not activated during momentary displacements of the bar.

The two main propellers are positioned one forward in one hull, and the other aft in the other hull. This makes manœuvring in all directions possible — even sideways movements. A straight course can easily be kept during surveying operations with the bar, even under difficult wind and tide conditions. The maximum speed with the bar lowered is two knots.

When check sweeping, an area of about 100×250 m can be swept in an hour if no contact with the bottom is made. When sweeping perpendicular to a particular depth contour line until the bar touches the bottom, about 200 m of contour line is likely to be achieved.

The platform can be positioned with great accuracy by using the Hydrodist electronic distance measuring system combined with theodolite angles from ashore. The theodolite measurements can also be supplemented by sextant angles. Each passage of the sweeping bar can be marked out with buoys.

This fairway sweeping bar has now been in service for a whole surveying season with very satisfactory results. A particular advantage of the equipment is that the whole unit can be quickly dismantled and transported by lorry to a new working area. When dismantled no individual part of the unit weighs more than 1.5 tons. The time required for

assembling or dismantling with a team of a foreman and four men is about five hours.

A second unit from the same boatyard is being delivered in mid 1973. Improvements to minor details have been incorporated. More powerful engines (75 HP) have been chosen in order to increase cruising speed, with the bar in the raised position, from the present 4.5 knots — which calls for a towing vessel — to about 6.5 knots.

(Manuscript submitted in English by Swedish author).