

“GUSTAV AF KLINT”,
A NEW OLD SWEDISH SURVEY SHIP
WITH NEW SURVEY BOATS

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The parallel sounding technique

This technique, with an absolutely positioned unit in the middle- and side-units, running on parallel courses but positioned only relative to the unit in the middle, has been described on various occasions. We have applied it in Sweden to a great extent both in offshore and inshore work, but mainly with rather traditional ships and boats. To gain further experience, especially about higher speed, we have also bought a number of ex-private pleasure boats of various types.

Our experience has been quite good. Of course weather conditions have always to be carefully watched, and sometimes the weather, or the sea, is too rough to permit this technique to be applied.

Some doubts, expressed from time to time about the applicability of this technique in other waters, may be partly based on some misunderstandings. It is to be observed :

1. No real survey operations are performed in the sideboats. Their only task is to transport a depth recorder on a course parallel with the main course at a fixed distance, which as a matter of fact, does not have to be so very accurate. Through VHF communication with the ship or boat in the middle (the middle-unit) simultaneous position-markings on the fathogram are recorded.

2. Air under a hull, with the depth recorder transducer mounted in the bottom, very often cuts off the echo. By applying an outboard transducer, (as used in a U.S. Coast and Geodetic Survey shallow-water survey boat seen there by the author in 1957), but streamlining it and placing it near the stern and about 15 cm outside the hull, we always get a good return signal.

3. The limited task of the sideboats makes it possible to man them with not more than two ordinary seamen and no foreman or officer. Sometimes it may be advantageous to add one man, perhaps a foreman, in the extreme outboard sideboats.

4. Small boats, especially of the modern rather broad type, are very safe in rough sea if the speed is chosen with regard to sea-conditions. They

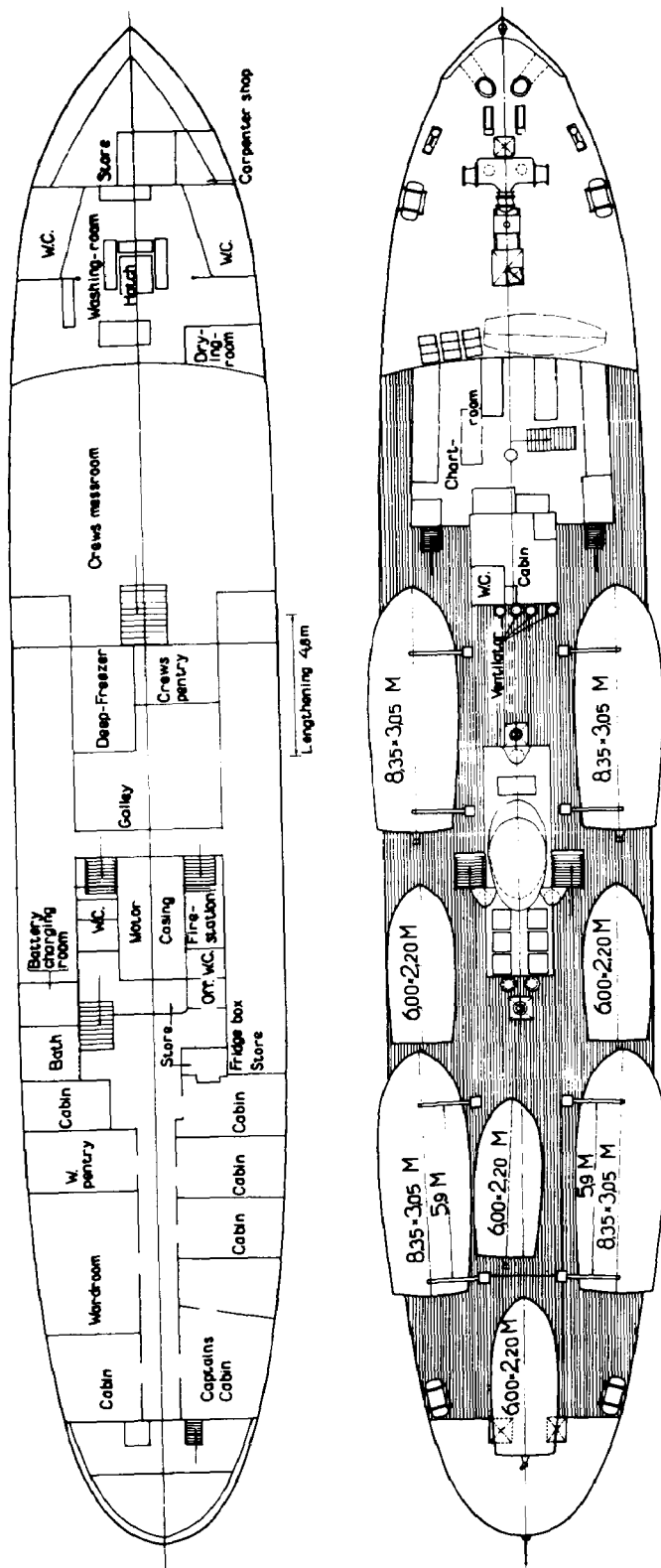


Fig. 1. — *Gustav of Klint* after lengthening.

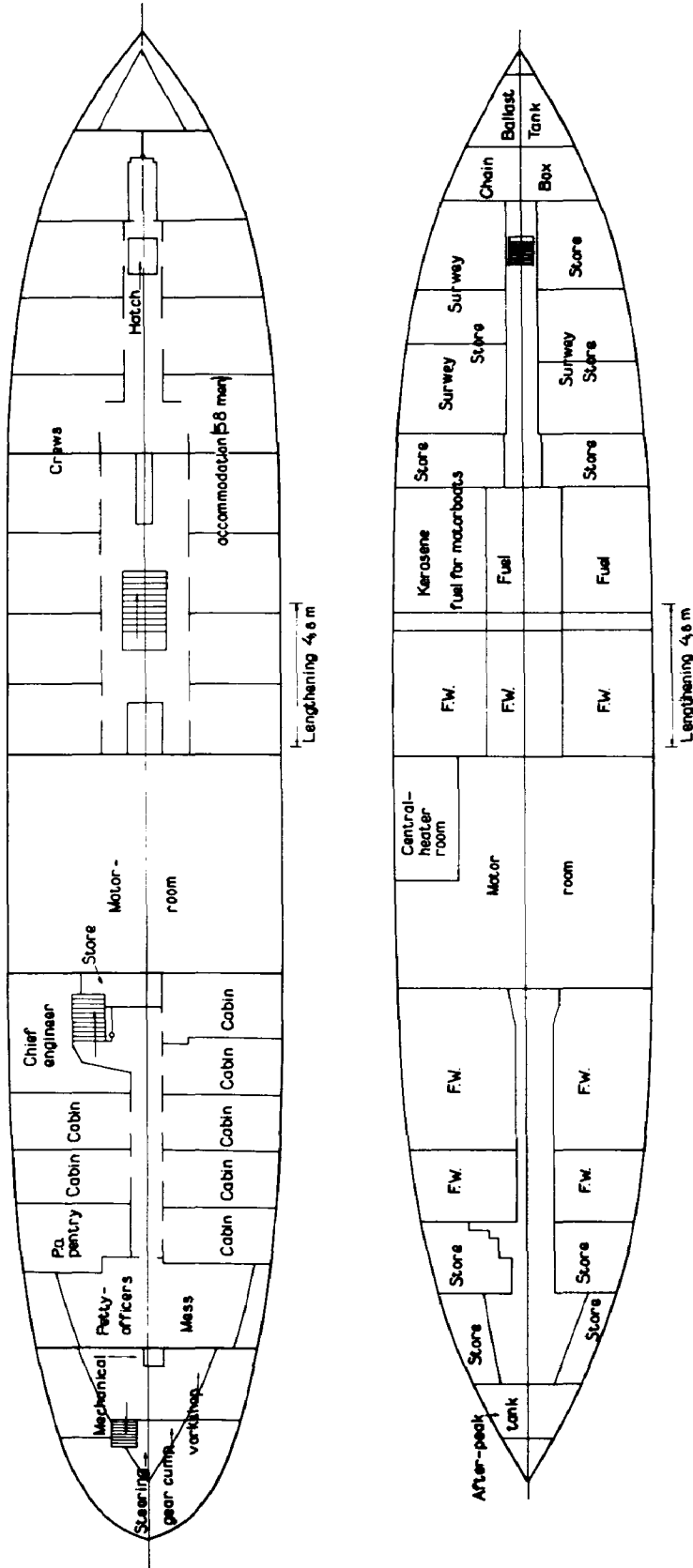


FIG. 2. — *Gustav of Klint* after lengthening.

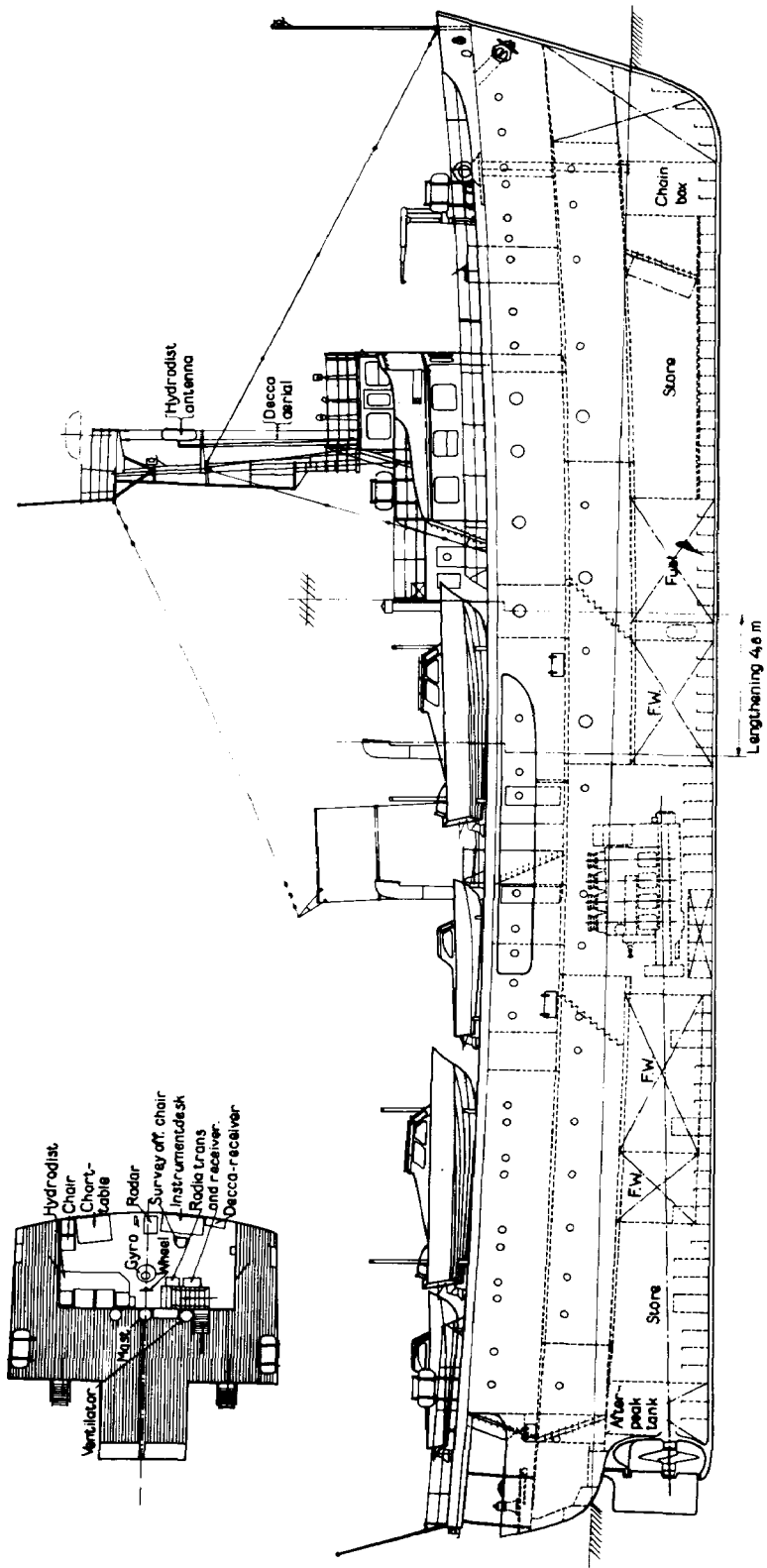


FIG. 3. — *Gustav of Klint* after lengthening.

are most certainly sometimes rather unpleasant and tiresome, especially for those accustomed to ships and classical small boats.

5. As the task of the sideboats only needs very limited " observation ", namely the distance checking with a prism (vertical base on the middle-unit), the crew and equipment can be well sheltered which means that spray is of no consequence.

6. Small boats (length about 5-8 metres) can be built of plastic to a rather high degree of strength, without being so heavy that they cannot make good speed and become difficult to hoist and handle when the sea becomes rough for survey work.

7. The limited size and weight of the small boats makes it possible to " store " them rather high up on a ship without taking up much valuable space and not affecting stability appreciably.

This parallel-sounding technique multiplies, when weather permits its use, thus increasing the sounding capacity for a low extra cost. In order to be able to process all the fathograms, which are produced when applying this technique we have developed a semi-automatic apparatus for translation of the fathograms into punchtape ashore and *not* on board. We hope in future to transfer them to magnetic tape. These punchtapes are processed in an automatic data processing machine and automatically plotted. But that is another story which will be published in the near future.

The rebuilding of *Gustav af Klint*

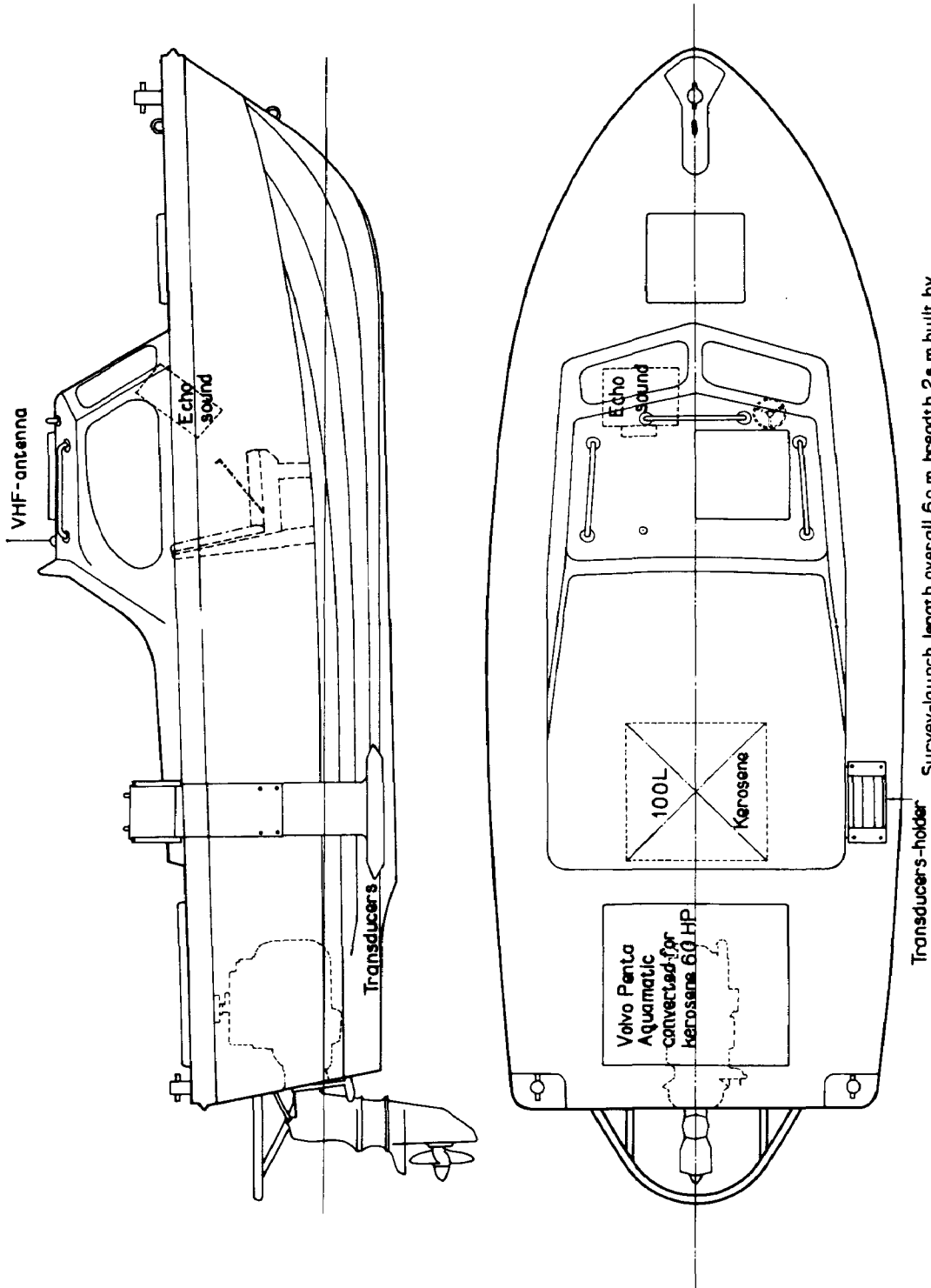
When making operational trials with available equipment we found that the sideboats must have some speed margin relative to the middle-unit. When the middle-unit was *Gustav af Klint* (10-11 knots) the sideboats should be able to make at least 12-13 knots. When the middle-unit was, for example survey launch No. 81 (a 14-m motor-yacht able to make 15 knots) the sideboats should make 17 knots.

Gustav af Klint carried two classical survey launches capable of making a maximum of 9 knots speed and one experimental boat of 22 knots. The crew accommodation was also rather limited.

It was decided to lengthen the ship 5 metres and to clear the boat-deck to get space for 8 boats and to enlarge the crew's compartment in order to be able to carry a crew for at least 2 watches with all 8 boats running. This work was finished last winter (1962/63) and the ship has been in operation about 5 months during 1963. The general arrangement can be seen in the appended drawings.

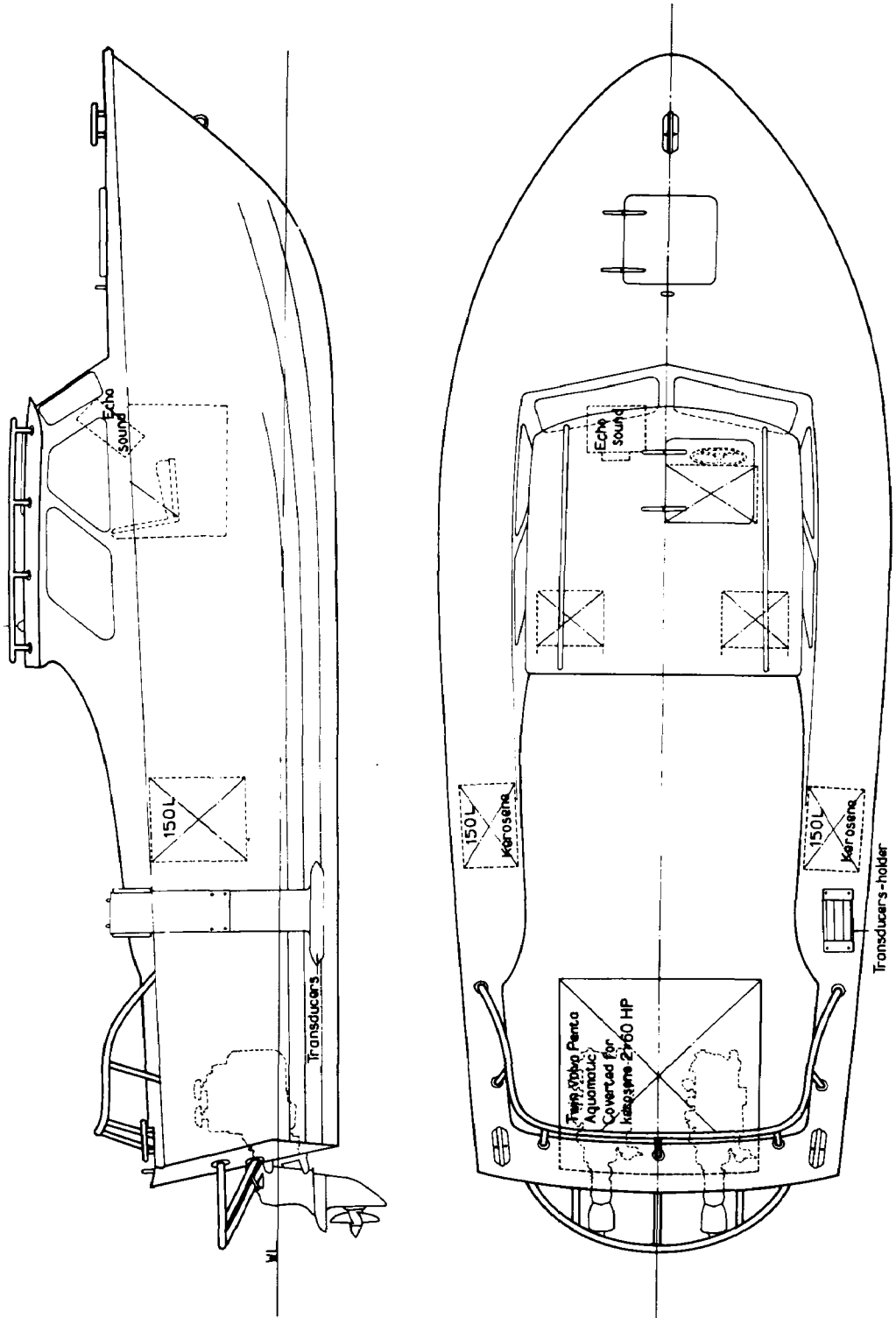
The ship's data are now the following :

Length	52.05 metres
Breadth	8.7 metres
Displacement	748 tons
Draught	4.2 metres
Speed	12 knots
Officers	7
Crew	58
Survey boats	8



Survey-launch, length overall 6,0 m, breadth 2,6 m built by Fiskströ AB boat-yard Sweden

Fig. 1



Survey-launch length overall 8.1 m, breadth 3.05 m built by Österskärns boat-yard Sweden

Fig. 5

For positioning of the ship in offshore surveys the navigational decca chains are used, but with an extra monitor station arranged. Within sight of land hydrodist is used. The hydrodist could, in decca surveys, also be used for checking the distance to the outside-units. The hydrodist of the ship is easily transferred to survey launches for work in those waters where it is not advisable or practical to use the ship as middle-unit.

The new types of survey boats

Trials during various weather conditions and at various speeds brought us to the conclusion that our new boats should at least be able to make 15 knots, if possible 17. Further it was found feasible to concentrate on three sizes :

- 1) One rather small (5.5-6 metres) primarily for parallel-sounding, mainly inshore but also for offshore work in fair weather.
- 2) One medium size (8-8.5 metres), for positioning (middle unit) in inshore parallel-sounding and various other inshore jobs, but also as side boat in offshore work.
- 3) One large size (11-14 metres), as electronic positioned middle-unit in inshore as well as in offshore work. This one only exists on the drawing board, but will be built in 1964.

Good experience with plastic material led to the decision that the first two types of boats mentioned above should be all-plastic, with almost no wood. It was also decided that they should be unsinkable, which is provided for by the use of plastic foam filling in non-usable compartments and in the bottom. A V-shaped bottom both fore and aft, with underwater strakes running from stern to stern, was selected in order to avoid too much pounding in rough seas, and to ensure a better course stability.

The Volvo-Penta aquamatic inboard-outboard motor installation has been successfully in use in some experimental survey boats during the last years. As the motor and/or the drive unit can be exchanged quite easily and there are other maintenance and operational benefits, and as the installation saves space very efficiently, the only major drawback was the very inflammable and costly gasoline. Now motors converted for kerosene are in use, but the reduction in horsepower to about two thirds has slowed down the speed to below 15 knots. In 1964 we shall try a Peugeot-Penta diesel engine in a few boats. Trial runs in January 1964 with this motor in one 6-metre and one 8-metre survey boat were promising. Further details about the boats can be found in the drawings which follow. We have had 4 boats of the 8-metre type, and 16 of the 6-metre type, in operation in 1963. It should also be mentioned that 4 slightly modified 8-metre boats are ordered for the pilot service as fair-weather pilot-boats.

*It should be especially observed, that we do not have unlimited funds at our disposal. We are on the contrary working under exacting economic pressure, and we have to create the money for our new equipment through strict economizing in other parts of our activity. Our total budget for maintenance, repairs, buying of new equipment for our survey operations, fuel, etc., does not exceed 2 million Swedish crowns a year (less than 400 000 U.S. Dollars). For the rebuilding of *Gustav af Klint* we received 900 000 Swedish crowns (180 000 U.S. Dollars) extra.*