

# WHEELHOUSE DESIGN IN HYDROGRAPHIC LAUNCHES

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This article discusses the design and layout of the wheelhouse of a fairly typical survey launch of about 100-ft length but certain aspects are of course applicable to vessels of other sizes. It is admitted that a particular slant has been made towards the requirements of a vessel engaged in regular survey work in the approaches to large established ports where there is time and money available for a full and permanent set-up.

What is suggested as the best solution to the problem of design is shown in the drawing, and the point which will arouse the most disagreement will be the positioning of the coxswain. But the object is to stimulate discussion on the whole layout, with a view to establishing principles of design that would be acceptable to most parties, whether they have all or only some of the instruments considered here.

Before embarking on the discussion, it is necessary to bear in mind that hydrographic surveying has one great characteristic : it is a live, moving, ever-changing process. The momentum of a survey in progress is such that there is no time to check a doubtful figure. This means that all information reaching those employed in the control and execution of that survey must be in its clearest form and easily available. This information falls into two groups, internal and external and is in many forms, as follows :

## **Internal**

Plotting figures from instruments.

The relevant plotting sheets.

Previously charted information.

Track plotter allied to electronic position fixing system.

The picture presented by the echo sounder (as opposed to the depth at any one time, a further requirement).

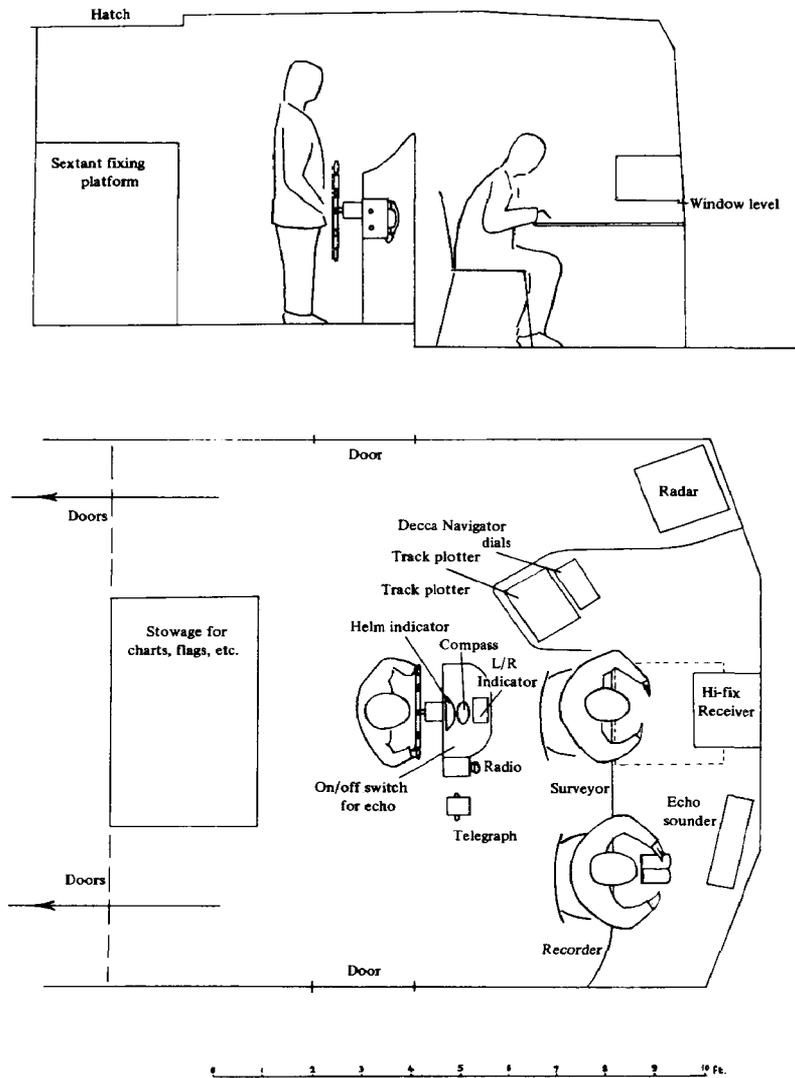
Helm indicator.

Compass.

Radar.

Sonar.

Communications.



### External

Fixing points for sextant work.

The general aspect from the surveyor's point of view.

The general aspect from the coxswain's point of view.

The deck of the vessel.

To this must be added access to other parts of the vessel, since a certain amount of information may be required from elsewhere on board.

To a large extent the requirements of the coxswain and surveyor overlap, but obviously one or two items are necessary to one or the other only — for instance, the helm indicator; but where the information must be available to both, the problem of display is difficult. The sources of

information must in themselves be accessible in that they need to be visible to those who use them, and this may be qualified by their being "readily" accessible, i.e., normally passive but available when wanted, and "constantly" accessible, which is self explanatory.

Perhaps at this stage it is best to consider the instruments likely to be found on a modern survey launch. This will, of course, vary from vessel to vessel but a reasonable installation might well include the following :

- Decca Navigator
- Hi-fix receiver
- Hi-fix track plotter
- Left/right indicator
- Echo sounder
- Compass
- Helm indicator
- Sonar
- Radio
- Radar
- The recording book

(Another item to be considered — although not an instrument — is the "immediate" plotting table; that is one which is used apart from another larger table in a plotting room proper).

The object is to bring all of these together in the most efficient way, bearing in mind that the coxswain is bound to stay at the wheel and that the surveyor, while not totally bound to stay in one position, does not want to keep moving from the plotting sheet or fixing platform to one instrument or another for closer examination or adjustment. At the same time, consideration should be given to the fact that many instruments with their controls at the front are very susceptible to accidental alteration by people brushing past. Many make very convenient points on which to lean oneself and even to place cups of tea — indeed the recessed top of the Hi-fix receiver seems to be designed to take a two course meal, and keep it warm into the bargain !

To design for the surveyor who is fixing by sextant is not easy because he is combining precise external and internal information and to obtain the particularly clear view he requires in what seems like all directions at once, the best place for him is with his head and shoulders clear of the wheelhouse top. His primary requirement from inside is for information from the echo sounder, but the development of hydrographic surveying techniques over the last five or ten years has meant that he spends less time so placed and, no doubt with the high output of surveys of such accuracy as a result, this development will continue. Therefore the primary consideration must be for the case of a survey based on an electronic position fixing system, Hi-fix for example.

One assumption that will be made at the start is that the wheel will be placed on the fore and aft line of the vessel. There is no doubt that it heightens the sense of feel of the vessel by the coxswain and for this reason

alone is worthwhile. But it does not follow that it should be right forward in the wheelhouse.

Each unit will now be considered separately as to its use and display aspect, starting at the coxswain's position.

### **The compass**

To have a magnetic compass at what must be a focal point in a wheelhouse introduces difficulties with safe distances of electrical equipment that can easily be overcome by the use of a gyro compass or a repeater of a more suitably placed magnetic type, or indeed a deckhead compass, and so long as the reading point of this last is within the system of instrument grouping, this may well be the best choice. The gyro has a distinct advantage over the magnetic type in that it is clearly more responsive, but of course the cost is high. A responsive compass does mean that a better survey line will be steered, so giving a better control, which in itself constitutes a saving of time, apart from gains in other ways. Obviously this is to be placed squarely in front of the helm.

### **The helm indicator**

This instrument has greater use made of it than its commonly small size and poor display design would suggest. This needs to be bold—so bold, in fact, that the coxswain is aware of his rudder angle without having to specifically seek out the pointer and read it. This, too, then must be close in front of the helm.

### **The left/right indicator**

Many Hi-fix systems, since they are individually planned to meet users requirements, are convenient for the sounding to be carried out along the Hi-fix pattern lines. In the case where this is so, the left/right indicator will be of equal, if not greater, value than the track plotter and, of course, would demand a similar position to the compass and helm indicator.

Each of these preceding instruments is continually in use during a survey, and therefore it is undesirable to have them lying flat as is normal with a compass or helm indicator, since it is not within the coxswain's natural angle of sight to look at anything so placed. They all need to be elevated slightly on the helm console. (This, of course, brings out a further disadvantage of the simple magnetic compass.) All three have a positive link with the left/right sense of the coxswain, and a position on the centre line of the vessel enhances their value considerably.

### **The track plotter**

It could be said similarly that it was to advantage to have the track plotter so placed, but obviously one cannot go on forever in such a vein, and

it appears that to have the plotter at a half left or half right slant constitutes a satisfactory arrangement. In fact it is possibly an advantage not to have this centrally aligned in that for much of the time the plotter's display is conveying a contrary left/right sense to that of the coxswain, and the offset position is, in a way, a first step away from his natural response. Probably a comfortable angle is at about 20° from the fore and aft line. It must, of course, be set at a reasonable height and be readily accessible to the surveyor for control and inspection.

### **Decca Navigator**

Where fitted and used as a control system, then, it is sufficient to have the Decca Navigator constantly accessible to the coxswain only. If the dials alone are employed for this, the main point to bear in mind is that they have to be within five feet of the coxswain and at a comfortable viewing angle for him. If, however, the system is used more fully than this, the dials need to be constantly accessible to the surveyor also. The small size of each dial makes it difficult to choose a position that is satisfactory to both members of the team, and it is suggested that either a duplicate set of dials be installed or that a track plotter be provided on a replacement basis with the Hi-fix plotter. This means having two such units, the type which is to be used being set in position, although this does have the disadvantage of causing instruments to be shifted and plugs to be opened and joined. This is not a good policy as they become more complex and beyond the repair capabilities of those not fully trained in their circuitry.

### **The echo sounder**

This instrument is called upon for information at times other than during survey operations. It could be said that it is needed quickly at times, but there is one vital difference between the surveyor's requirements and those of the coxswain and that is in the quality and precision of the echo trace. Generally speaking the coxswain wishes only to be able to switch it on easily and to be able to read it to the nearest foot or so (ready access only). The surveyor, however, wants to be able to inspect it closely, and to adjust or annotate it for much of the survey periods. It follows therefore that this unit must be placed close to the surveyor's position yet visible to the coxswain. This may well mean that the on/off switch is not within the coxswain's reach while he remains at the wheel, in which case an extension to the switch must be made to his wheel console.

### **The Hi-fix receiver**

In the same way that other complex devices cannot be used unquestionably all day, so it is with Hi-fix, even though it is known to have been set up correctly in the first place. Such a system calls for an attentive watch at the receiving end right throughout the survey, particularly during adverse

weather conditions. It obviously needs to be sited so that the surveyor's eyes fall upon it naturally, but not too close, because to look quickly from one pattern video to the other at frequent intervals requires considerable ocular effort. In addition to this, the surveyor may well be plotting the fixes at the same time, so the precise concentration that is required should be given every consideration, and the surveyor should be comfortably placed. There are advantages to the dials being visible to the coxswain also in that he may steer a Hi-fix line by using the track plotter as his main reference but may also look for early warning of deviation from the selected line in the dials themselves. It also means that another experienced watch, however cursory, is kept upon the instrument.

Clearly the repeater dials available cannot have the same value as the complete receiver, and though a repeater can be extremely useful, its place is not so much at the survey control centre as at a separate plotting station, and no doubt this is its designed purpose.

### **The search sonar**

Although ships are entering ports with less water under their keel, echo sounding surveys cannot economically be made so dense that no chance can exist of shoal patches between the survey lines. Also a port cannot afford to close its channels to shipping any longer than absolutely necessary while a search is made for a vessel reported to have sunk but whose position is not precisely known. This means that a search sonar is now necessary. Its probable place is on the survey vessel in view of its search control capabilities. It is not expected to be in such frequent use that a permanent site for the receiver has to be found for it in the wheel-house. It requires a surveyor to operate and interpret, and at the same time a surveyor to control the search, therefore a position close to the Hi-fix is necessary in order to ensure a close relationship between the two. Referring to the drawing, it would be most expedient to move the recorder and his book to a temporary seat near the radar and for the sonar to be used at his table.

### **The plotting table**

It is reasonable that the "immediate" plotting table be given a place relative to the Hi-fix receiver and, in fact, relative to all those instruments which should be constantly accessible to the surveyor. The arrangement shown in the drawing has the receiver six inches or so off the table in order to make use of the area that it would otherwise take up. It is often to advantage to have more than one chart available for reference or plotting during the survey, and to cater for this requirement, a suitably shaped table would allow for the main reference chart to be in front of the surveyor and for the auxiliary chart to be at hand on one side. Its size should be such that the controls of the instruments over the table are within the reasonable reach of the surveyor. Its underside should be kept free of shelves and such things that may obstruct the legs of those sitting at it.

### **The recording book**

Provision has to be made for the recording book and for the man writing in it. This needs to be readily accessible to the surveyor and close to the echo sounder to enable the recorder to annotate the trace as required.

### **Radar**

Perhaps not specifically a recording instrument, radar is practically essential in this day and age where maximum use is to be made of the capital laid out in a vessel. Its position relative to other sources of information is not critical, since its proper use involves more than one person and information displayed by it can be spoken across.

### **Radio**

Again, radio may not be specifically for surveying, but it is often very useful during a survey and therefore should be to hand for both the coxswain and the surveyor. A site on the side of the helm console is suggested.

### **Lighting**

Most of the instruments considered have at times to be used during periods of darkness, and consideration should be given to adequate illumination of them without causing undue strain on the coxswain by unwanted reflections.

### **The general aspect**

It is no doubt agreed that the coxswain should have a clear view outwards and that it is desirable that the surveyor should also. The two most common obstructions to this end are the thickness of the pillars between windows and other people's heads. The initial design of the wheelhouse can overcome the former, and the problem of other people is solved by keeping their number to a minimum and by giving the coxswain's position some advantage over those others who take part in the survey. By having a properly planned layout, the surveyor and recorder can remain seated for much of the time, and this simplifies matters to a certain extent, but if the surveyor, too, is to see out, windows must be cut low. This gives a ready view of the deck also to the coxswain, particularly useful during sweeping or buoy laying operations.

The arrangement given in the drawing shows the coxswain's position set well back from the forward windows. A result of this is that adequate fittings must be made for the clearance of such windows of spray and rain outside and of mist on the inside, even going so far as to have automatic

window washers fitted, similar to those used on cars. There are excellent wipers now available, and the clearance of mist inside is merely a matter of initial design.

Sextant fixing will always be with us, for here is a method which contains and projects part of the surveyor himself and is completely within his comprehension. Therefore, provision must be made for a fixing platform, but unlike the position for reading Hi-fix, it has to be over the echo tranceiving units, high enough to give clear lines of sight over obstructions on the wheelhouse roof, yet sufficiently within the wheelhouse that contact is not lost with the sources of information inside it.

Ready access to the deck has obvious advantages, not only from the ship handling point of view but also at times when the launch may be engaged in other than straightforward sounding, when instruments are to be operated from the deck, and so on.

### **Conclusion**

All those employed in the design of capital plant which has an anticipated life of twenty years or more are faced with trying to cater for the development of new techniques and new instruments which are bound to occur during that length of time. How can this problem be approached as it applies to survey launch design, the wheelhouse in particular ?

It would appear that small improvements in accuracy or facility are not enough to discard one method or instrument for another. With increased technology comes increased cost of instrument units, and, to be accepted, such units probably constitute such a radical approach that their form cannot be predicted even nearly well enough for provision to be made for them in designs of vessels today. It may well be that automation will throw a smaller load of plotting-after-sounding on to the surveyor, so putting more emphasis on the wheelhouse and away from the plotting room. In this way the designer would feel freer to employ what may be the only answer to the problem of planning for the future, and that is to have a larger wheelhouse than might be considered acceptable or necessary at the present time.

Perhaps even to speak of wheelhouses and launches in the same breath as hydrography and surveyors dooms one to be thought old fashioned by those for whom we try to design today.