

## Placing a depth sounder transducer

2023 03 08 Sounder Transducer Placement

### Transducer in the forefoot

When determining the location for a depth sounder's transducer, one is quickly inclined to choose a place in the forefoot of the ship: You are quicker to react when the water depth decreases.

This was also the case with the motorboat we bought (photo: Nasa clipper transducer in pipe)



### Disadvantage of the forefoot in case of a shallow draft vessel

When approaching shallower water (for instance to anchor) the depth measurement on our motorboat became unreliable at a water depths less than 1.5 m. The problem is the minimum measuring range of the depth sounder

With the sounders that we have used, the readout becomes unreliable at a transducer distance of less than 80 cm to the bottom. In the case described above, the transducer was only 30 cm above the keel plane so we no longer received reliable depth information for the last 50 cm before a possible grounding.

With the sailing yachts, which we owned before this motorboat, the placement in the forefoot caused no problems. They had a fixed keel and due to their greater draught there always was a distance of more than 80 cm from the transducer to the bottom. The reading therefore remained reliable up to and including a possibly running aground.

### A better alternative to shallow draft vessels



(photo: Navman transducer for the Raymarine sonar)

After placing a transducer in our engine room, at 30 cm below the waterline, the sounder remains usable down to a water depth of 1.10 m.

Care should be given to a minimum distance of 1 m from the propeller area – otherwise I would have placed the transducer further aft (higher) at 20 cm below the waterline.

### **Advise**

Before placing a transducer, it is wise to check first how shallow the sonar still indicates a correct distance to the bottom. Then place the transducer preferably at least the distance found above the keel plane. Your depth information will always remain reliable even when aground.

The approximately 70 cm blind distances of our Raymarine and Clipper sounders have been determined experimentally. They are not factory specifications.

For a Seafarer Mk 8 sonar I did come across a factory specification (range 0.8 - 100 m).

### **Transducer cable tip**

Keep the cable of a transducer a bit "loosely" for example in a pipe and don't tie it too tightly. Denting the insulation between signal wire and the shielding, as well as buckling in too sharp turns, can reduce performance. (The same applies to antenna cables)

### **Some background on measuring water depths**

A depth sounder sends a short pulse to the bottom and measures the length of time it takes back and forth. From the measured duration, the depth can be calculated:

At a speed of sound under water of 1480 m/s, the depth in meters is:  $1480 \times \text{duration} / 2$

The maximum measurable depth will depend, among other things, on the power of the pulse, the hardness of the soil but also on the available time until the next pulse is sent.

For example, a Nasa Clipper sonar sends a pulse to the bottom 7 times per second. A pulse can travel a distance of 211 meters in the available time of 1/7 of a second. The maximum measurable depth will therefore not exceed 105 meters.

*(In the past, before the yacht radar and GPS, larger deep measurements also played an important role for us when approaching a coasts or following a certain depth line in poor visibility.)*

For the minimum measurable depth, the pulse length and a possible blackout time during transmission, (during which it's not possible to receive) may play a role. I can't figure out exactly how the various sounders measure, but as an idea here: At a pulse duration of 300  $\mu\text{s}$  (0.0003 s), a pulse itself is already 44 cm long.

With a self-built mobile depth recorder for a dinghy (tuned for shallow water), I was able to measure shallower than the aforementioned sounders and I came to a minimum depth of 45 cm.

The measurement method used is explained in the relevant report in the section "Electronics & data", "Mobile Depth sounder for survey". .