

FATHOMETER : ECHO-SOUNDING

A Fathometer is used in ocean sounding where the depth of water is too much, and to make a continuous and accurate record of the depth of water below the boat or ship at which it is installed. It is an *echo-sounding* instrument in which water depths are obtained by determining the time required for the sound waves to travel from a point near the surface of the water to the bottom and back. It is adjusted to read depth in accordance with the velocity of sound in the type of water in which it is being used. A fathometer may indicate the depth visually or indicate graphically on a roll which continuously goes on revolving and provide a virtual profile of the lake or sea.

What are the components of echo sounding instrument? Briefly explain the advantages of echo sounding.

The main parts of an echo-sounding apparatus are:

1. Transmitting and receiving oscillators.
2. Recorder unit.
3. Transmitter / Power unit.

Figure illustrates the principle of echo-sounding. It consists in recording the interval of time between the emission of a sound impulse direct to the bottom of the sea and the reception of the wave or echo, reflected from the bottom. If the speed of sound in that water is v and the time interval between the transmitter and receiver is t , the depth h is given by

$$h = \frac{1}{2} vt \quad \dots$$

Due to the small distance between the receiver and the transmitter, a slight correction is necessary in shallow waters. The error between the true depth and the recorded depth can be calculated very easily by simple geometry. If the error is plotted against the recorded depth, the true depth can be easily known. The recording of the sounding is produced by the action of a small current passing through chemically impregnated paper from a rotating stylus

to an anode plate. The stylus is fixed at one end of a radial arm which revolves at constant speed. The stylus makes a record on the paper at the instants when the sound impulse is transmitted and when the echo returns to the receiver.

Advantage of echo-sounding

Echo-sounding has the following advantages over the older method of lead line and rod:

1. It is more accurate as a truly vertical sounding is obtained. The speed of the vessel does deviate it appreciably from the vertical. Under normal water conditions, in ports and harbors an accuracy of 7.5 cm may be obtained.

2. It can be used when a strong current is running and when the weather is unsuitable for the soundings to be taken with the lead line.

3. It is more sensitive than the lead line.

4. A record of the depth is plotted immediately and provides a continuous record of the bottom as the vessel moves forward.

5. The speed of sounding and plotting is increased.

6. The error due to estimation of water level in a choppy sea is reduced owing to the instability of the boat.

7. Rock underlying softer material is recorded and this valuable information is obtained more cheaply than would be the case where sub-marine borings are taken.

Making the soundings

If the depth is less than 25 m, the soundings can be taken when the boat is in motion. In the case of soundings with rod the leadsman stands in the bow and plunges the rod at a forward angle, depending on the speed of the boat, such that the rod is vertical when the boat reaches the point at which soundings is being recorded. The rod should be read very quickly. The nature of the bottom should also be recorded at intervals in the note-book.

If the sounding is taken with a lead, the leadsman stands in the bow of the boat and casts the lead forward at such a distance that the line will become vertical and will reach the bottom at a point where sounding is required. The lead is withdrawn from the water after the reading is taken. If the depth is great, the lead is not withdrawn from the water, but is lifted between the soundings.