

NET-DEPTH METERS FOR BETTER FISHING

T. K. Sivadas,
*Assistant Fishery Scientist,
Central Institute of Fisheries Technology,
Cochin-11*



Lack of knowledge of the exact position of the trawl net during operation results in insufficient control being maintained by the Skipper over the gear. This is particularly significant in the case of mid-water and pelagic trawls where the fish shoals distributed at random in the water, are to be caught by controlling the depth of operation of the net. Wherever the depths of operation of the net are not known, the operator leaves the net to take its natural position which is determined by calculations based on warp length released and speed of boat. This system does not prove to be very much reliable. A light and seaworthy instrument which can continuously and instantaneously measure the depth of operation of the net, can solve the problem and help the skipper to establish better control over the trawl net for a more efficient fishing with improved confidence.

The instruments commercially available abroad for this measurement include mechanical underwater recorders, electronic telemetering indicators and wireless ultrasonic transmit-

ters. Many of the instruments are too heavy and bulky for an average trawl net used in Indian coasts. In the absence of such direct reading instruments, an alternate method is sometimes adopted using fish finders. The transducer of the fish-finder is tied to the head rope of the trawl net directing the beam vertically downwards and the depth of water below it is measured by connecting the same to the recorder in the boat. The depth of water below the boat is measured by means of another transducer fixed to the boat. The difference in depths recorded by the two transducers, is the depth of operation of the net.

The use of the transducer of the fish finder in the trawl net requires either suitable hydrofoils or such special arrangements for keeping the transducer always directed vertically downwards. Further, the above method is not sufficiently accurate under certain occasions when either the ground is not sufficiently even or it is not parallel to the water surface.

Electronic operational-depth telemeter

The author has developed an electronic solid-state instrument (Fig. 1) for the measurement of the depth of operation of fishing gear. This portable self-contained instrument measures the

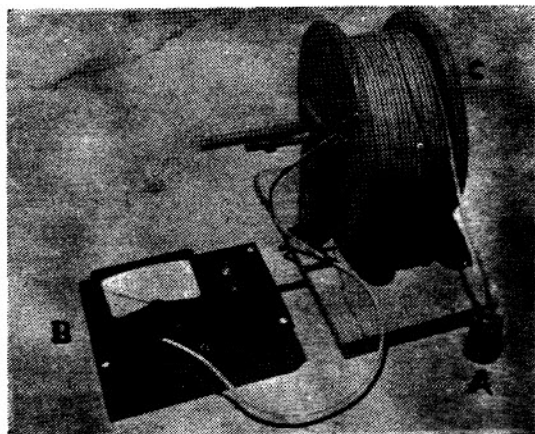


FIG. I

The photograph shows the electronic operational-depth meter developed by the author. A, water-depth transducer which is to be tied to the net; B, the transistorized electronic indicating meter which is to be kept on board the vessel and C, the two-core PVC electrical wire wound on a hand operated winch for conveying the signals from the net to the boat.

depth of operation instantaneously. It consists of an underwater unit (water depth transducer) and an indicating meter on board the vessel, the two being connected by an electric cable. The underwater unit which is tied to the net converts hydrostatic pressure (which is proportional to the depth of operation) into electrical signals. These signals are connected to the indicating meter through electric wire. The meter translates the signals into depth of operation. The instrument has been calibrated for

the operation in the range of 0 to 100 metres. A very significant advantage of this instrument is that the range of operation can be extended upto 1000 metres conveniently by simple adjustments in the instrument. The weight of the underwater unit is 650 gms. The accuracy of measurement is ± 1 metre. The readings are directly obtained from a dial in the wheel-house.

Electro-mechanical depth metre

The author has developed yet another instrument (Fig. 2) for the same measurement based on electro-mechanical principles. The underwater unit used here

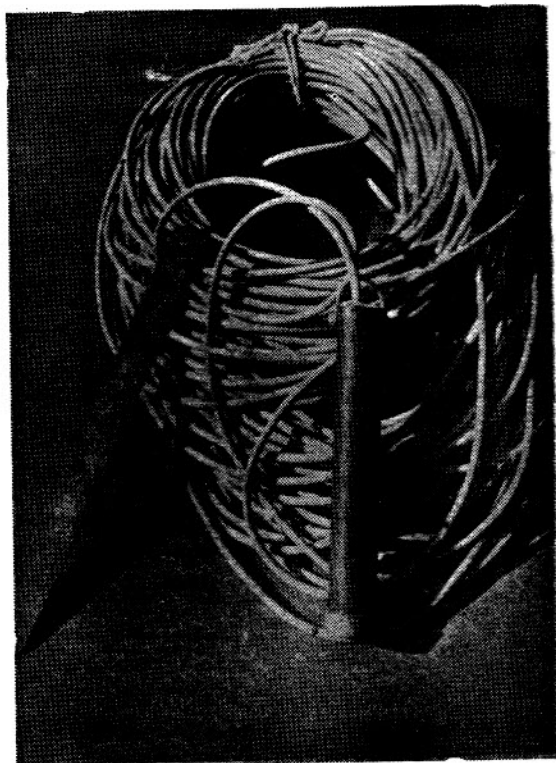


FIG. II

The photograph shows the water-depth transducer of the electromechanical net-depth meter developed by the author.

is an electro-mechanical device which converts the hydrostatic pressure into mechanical variations. The mechanical variations are converted into changes of electrical resistance in the unit. These variations in the form of electrical resistance from the transducer is connected to and measured in a ohm-meter which is kept on board the vessel. The weight of the underwater unit is 450 gms. and the accuracy of the instrument is ± 1 metre.

The utility of the instrument

The instrument is useful in commercial fishing as well as in fishing research and oceanography involving both experimental and exploratory fishing.

Mid-water trawling

In mid-water trawling, the fish shoals are detected accurately by the help of

fish finders. Now, the success of the fishing depends upon the proper controlling of the net and bringing it to the particular depth where the shoals have been located. But the exact position of the net under operation is quite often in doubt. The operator gets an approximate position of the net by computations based on the speed of the net, and length of the warp released. The accuracy of this information is insufficient to meet the requirements of bringing the net to the particular depth for catching the fishes. Under these circumstances, the operator has to leave the net to its course within the limits of the approximate calculations. But if the depth of operation is known exactly, the net can be brought to the desired depth. The schematic diagram (Fig. 3) describes the function of the net.

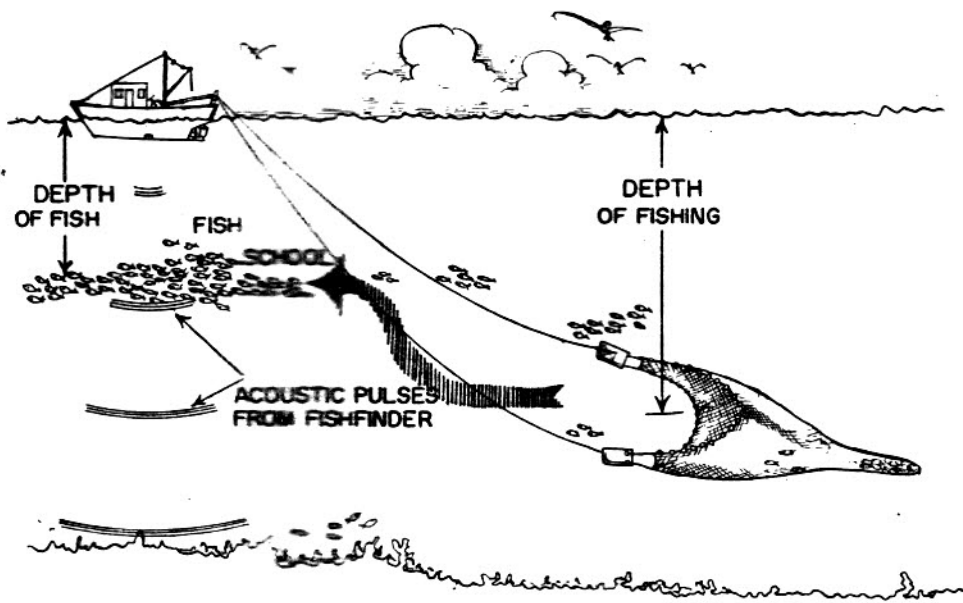


FIG. III

The schematic diagram shows the random positions of the fishes and the net and the arrow mark shows the correct depth to which the net is to be brought.

Bottom trawling

In bottom trawling, the net is expected to slide over the bottom always. There is an optimum condition for the trawl net with its ground rope and bottom edges of the otterboards touching the bottom. This optimum condition for a given net depends upon the length of warp released and the speed of boat if the water current is constant and favourable. Since the condition varies depending on the geometry, weight, buoyancy, the hydrodynamic forces acting on the different parts of the net etc., it is practically difficult to form a universal relation between these factors applicable to all nets under diverse conditions with the required accuracy.

If more warp is paid out (Fig. 4 B) the net will slide more flat on the sea bed and the otterboards will plough into the Ground causing high resistance and unsteady performance of its various parts. If the warp length released is insufficient (Fig. 4 A) the net may not touch the ground properly. Fig. 4 C shows the appropriate condition with the required length of warp released.

The proper length of the warp required for a given trawl net can be found out by noting the depth of operation of the net in the instrument as the warp length is varied for a particular speed of the boat. As the warp length is reduced the depth indicated is maintained the same upto a limit and thereafter it begins to show a decrease in depth. This length of warp corresponding to the sharp decrease in the depth of operation, indicates the correct length of the warp. In this condition the net just touches the bottom. Once the correct lengths are found out for different

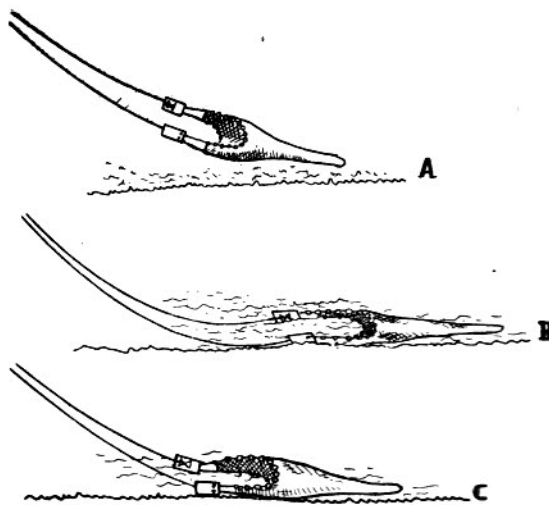


FIG. IV

- A. The insufficient length of the warp released does not permit the net to touch the bottom.*
- B. Too much length of the warp causes the net to lie flat on the ground and the otterboards to plough into the mud.*
- C. The correct length of the warp helps the net just to slide over the bottom.*

depths for a particular ottertrawl, other conditions being the same, the instrument is no more required to be operated along with the net.

With these technological developments, it is felt that trawl fishing will not be a mere 'groping in the dark' but a reliable business.

Commercial trawl fishing has hitherto been a 'hit or miss' affair. For a maximum yield of fish catch, it is imperative that the fishing gear has to be operated at that depth of water where the fish concentrate in greater abundance. Commercial trawl fishing can develop to a more efficient gear in the presence of instruments for the measurement of this important parameter. ● ●