

# ECHO SOUNDING

## ECHO SOUNDING - XVI

Our series of articles descriptive of the most recent echo sounding appliances is continued by the following description of the Langevin-Florisson Ultra-sonic Echo Sounder fitted with the Langevin-Touly electrolytic recording system, Marti License :—

(Reference : Notice 135.2 issued by the Société de Condensation et d'Applications Mécaniques, 42, rue de Clichy, Paris, 9<sup>e</sup>).

The new echo sounder consists of a quartz projector and an emitter-receiver (spark emitter, combined with an amplifier-receiver).

These devices being well-known, it is unnecessary to describe them in this brief note, the primary purpose of which is to present the new control mechanism and the system of recording embodied in the *electrolytic recorder; Langevin-Touly type*.

### I. — PRINCIPLE OF THE RECORDER.

A moistened band of electrolytic paper moves slowly from the top towards the bottom. The reverse side of the paper rests on the metal surface which constitutes the negative pole of the recording circuit (the circuit leaving the amplifier of the sounding apparatus).

In front of the paper an oscillating arm, operated by a cam, carries a metallic stylus, the point of which rests on the paper. The apparatus is constructed in such a manner that with each revolution of the cam the stylus describes an arc of a circle from left to right across the band at a definitely known speed and then returns rapidly to its position of rest at the left.

The stylus forms the positive pole of the recording circuit. At the start of the movement of the stylus a second cam carried on the axis of the recording cam, causes the emission of the supersonic impulse by means of an interrupter. With this emission a corresponding current leaving the amplifier gives a brief current impulse which, passing from the stylus through the paper to the metallic plate, causes the salts in the paper to decompose and thus leave a brown trace on the paper. There is obtained therefore an automatic record on the band of paper of the emission of the supersonic sound wave. The echo returns from the bottom of the sea a short time after the emission of the signal (the time of the echo "t" being proportional to the depth "d",  $t = \frac{2d}{V}$ , where  $V$  is the velocity of sound propagation in sea water). This echo gives rise in the circuit leaving the amplifier to a second current pulsation. During its movement therefore the stylus leaves a second brown trace on the paper at a distance from the first proportional to the depth of water.

With each revolution of the recording cam these phenomena are repeated :— a trace of the emission followed by a trace of the echo.

Since the emission cam has a definite phase setting with regard to the recording cam and the roll of paper unwinds very slowly from top to bottom, the beginnings of the successive traces of emission form a parallel line along the left border of the paper. The successive echoes as recorded on the paper therefore yield a contour representing the profile of the ocean bottom on a longitudinal scale which is proportional to the speed of the vessel carrying the sounding apparatus. The scale of depths is determined by the rate of lateral translation of the stylus across the paper band, which is determined by the construction.

In order that the depths may be read off directly, a cylinder with equidistant graduated circles engraved upon it presses against the moist paper and marks electrolytically the equidistant spaces upon the band of paper. These intervals are known and represent to scale, for instance, either metres or fathoms, as the case may be.

To summarize : the electrolytic recorder of the Langevin-Touly type is the device in the sounding apparatus which causes the emission of sound impulses at equal intervals of time and records these together with their respective echoes, transversely on a band of paper which is graduated directly in depths. The successive records of the echoes on the band form a curve which represents the profile of the bottom of the ocean below the moving vessel.

## II. — PRACTICAL DETAILS OF THE RECORDER.

The devices in the recorder consist of : the meter, the governor, the reduction gear carrying the cam, the emission interrupter, the carrier for the oscillating arm as well as the box for the paper carrying the cylinder for unwinding the band. These are secured in the wall bracket of light alloy whose dimensions are :

Width : 454 mm. overall = (17.5 inches)  
 Height : 796 mm. = (31.2 inches)

A stamped-metal cover protects the whole. The depth of the cover is about 323 mm. (12.75 inches). A large window covered with glass allows the operation of the apparatus to be viewed while the devices remain completely protected. An electric lamp in the interior illuminates the band. A door fitted in the cover permits access to the interior where are located the devices for starting and stopping the sounding apparatus as well as the different very simple timing devices of the recorder (starting switch for the motor fed from the 110 volt mains on board, regulator for the intensity of the record etc.)

SCAM has succeeded after long and tedious research in perfecting a special chemical preparation for the paper which is moistened in advance and ready for use. The rolls are packed and stored in boxes having a moisture proof cover. (They can be stored in these for over six months).

The paper, consisting of a band of 185 mm. (7 1/4 inches) total width — the recording portion is 150 mm. (5.9 inches) — unwinds slowly in such a way that the successive soundings, spaced at intervals of three seconds, are recorded on parallel arcs of circles spaced at intervals of 0.75 mm. (0.02 in.) from each other.

The recorder is fitted with a sealed box for the paper in which the roll of paper may be preserved moist and ready for use for a period of several weeks. To load the box it is only necessary to insert the roll of paper which has been taken from the sealed package in which it is provided and place same in the box. Each roll of paper provides for an operation of about 40 hours. The band unrolls at a rate of about 90 cm. (36 inches) per hour.

The cam which carries the arm for the stylus may easily be shifted in phase with regard to the emission so that successive positions of the setting permit the recording of depths between the minimum limit of the order of 3 to 5 metres up to 300 metres; 300 to 600 metres etc. up to the maximum range of the echo of the sounding apparatus.

The starting and stopping of the recorder are instantaneous.

The emitter-receiver and the electrolytic circuits of the recorder are supplied by a storage battery of eight volts and by a dry battery or accumulator of eighty volts.

The Langevin-Touly recorder offers besides the well-known advantages in the employment of supersonic waves (very short emission, directed beam, silent operation, soundings in very shallow depths etc.), an automatic record which is accurate and precise, of the line of soundings on the band of paper. The recorder is compact, very robust and well protected. Its maintenance and operation are very simple.

The use of the electrolytic paper which is very sensitive and well preserved, requires no preparation on board and yields very clear clean-cut records on the paper. This gives the Langevin-Touly recorder a great advantage over competing recorders.

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### OUTBOARD OSCILLATORS IN STREAMLINED CASE FOR BRITISH ADMIRALTY ECHO SOUNDING APPARATUS.

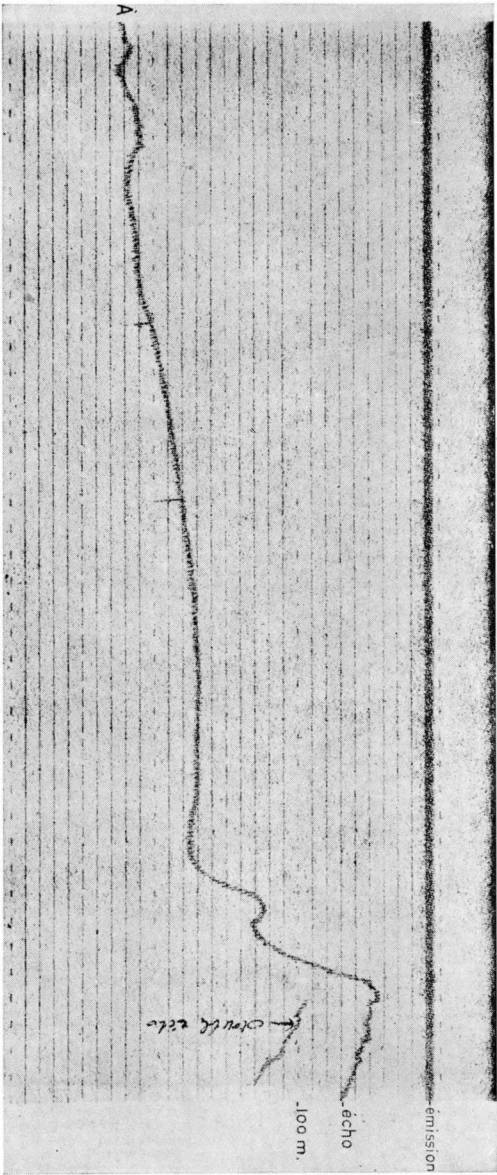
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In connection with the survey Echo Sounding Recorders, both type M.S. X and type M.S. XIII of the British Admiralty (\*) it sometimes occurs that the conditions of working are not wholly suitable for oscillators mounted in the bottom of the survey vessel. This may be either due to the question of speed, or again, to the question of draught, or to the necessity of portability, and the ability to change over the entire installation to another boat on occasion.

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(\*) See Hydrographic Review, Vol. XIII, N° 2, November 1936, page page 88.

BAND RECORD S.C.A.M. — BANDE D'ENREGISTREMENT S.C.A.M.

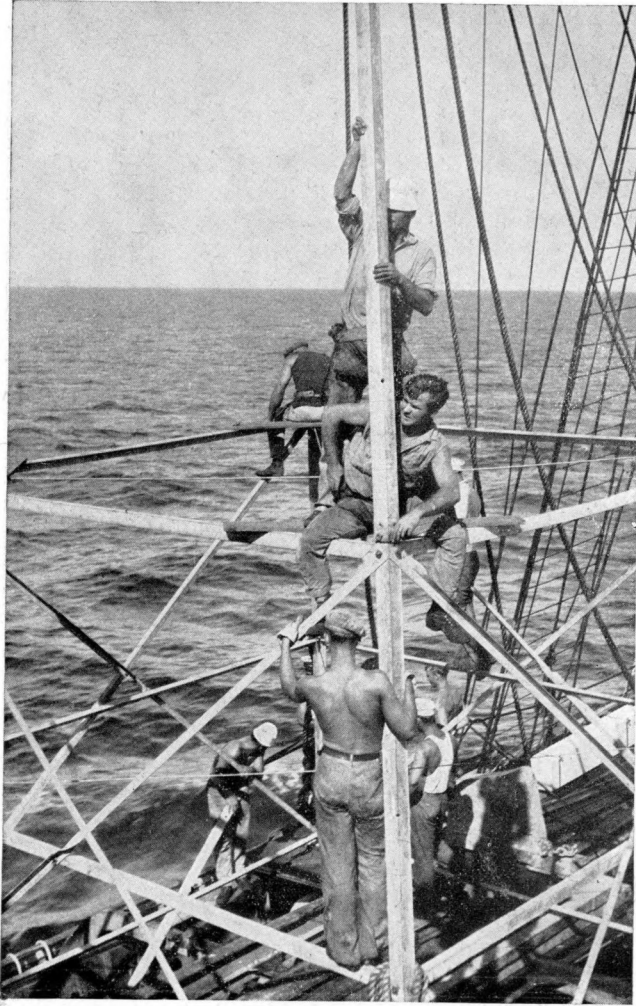




Completing Tower Suspended from Boat Boom.

*Terminaison de la Tour suspendue au mât de charge  
d'embarcation.*

Clichés dus à l'obligeance du MILITARY ENGINEER.  
Clichés kindly loaned by the MILITARY ENGINEER.



Constructing Marine Tower Aboard Ship.

*Construction des Tours en Mer à bord.*

Clichés dus à l'obligeance du MILITARY ENGINEER.  
Clichés kindly loaned by the MILITARY ENGINEER.

All these reasons have led to the development of the Outboard Oscillator and it has been found beneficial to enclose these oscillators in a streamlined case.

The Outboard Oscillator in streamline form, therefore, consists of the two Oscillators, Transmitter and Receiver, both housed in a fish-shaped case and designed to be carried on outriggers over the side or in front of the boat.

It has been proved that this arrangement is particularly effective in anything but rough sea. For river and harbour work it is singularly applicable and has the additional advantage that the oscillator can be put into positions and soundings obtained where it would not be possible to manœuvre the whole boat.

Oscillators arranged in this manner have been successfully run at speeds up to 18 knots giving perfect recordings the whole time, an immense advantage in surveying fast running rivers.

Outrigger arrangements can be supplied but depend upon the type of boat in which the oscillators are intended to be used. The usual practice is to supply the Outboard Oscillators in a streamlined case with lengths of specially strong steel tubing for attachment to whatever outrigger arrangement may be desired by the local engineers.

Outboard Oscillators in a streamlined case can be supplied in two sizes, one for shallow water, and one for ordinary navigational depths.

(The above information was communicated to I.H.B. by the firm Henry HUGHES & SON Ltd., 59, Fenchurch Street, London, E.C. 3).

