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A note on a new method of estimating "echo abundance".

by

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In echo surveying various methods have been used for obtaining numerical estimates of the amount or magnitude of echo signals received. Apart from that of the automatic fish counter developed by Mitson and Wood (1961), these methods all include more or less significant elements of personal judgement by the operators, and their reliability as presice quantitative methods is generally limited to very special conditions which are seldom fulfilled.

This, to my mind, has been one of the most serious drawbacks of all echo sounder work in the past, and quite probably acoustic intruments would have played a much greater role than they do today in abundance investigations of many fish stocks, if we ten years ago, say, had developed methods of measuring "echo abundance" with the same ease and accuracy as we are measuring the temperature of the sea or the length of the fish.

In the Barents Sea during late summer and fall the 0-group of many species of fish are pelagically distributed in the top layers of water, and from our experience it seems likely that their distribution and total abundance may be determined quite accurately by a combination of echo surveying and fishing experiments with pelagic trawl and purse seine.

For this purpose we have recently at our laboratory developed an echo integrator set-up to work in conjunction with the research sonar equipment on board the "G.O.Sars". This integrator is summing all signal voltages generated by the echo-sounder receiver within a set time interval (i.e. depth range). For each transmission any new signal voltages from the same depth range is added to the previous ones, and the result is displayed on a special paper recorder. We are presently using a duo-channel system, which allows integration over two different depth ranges at the same time, or over two different signal amplitude levels.

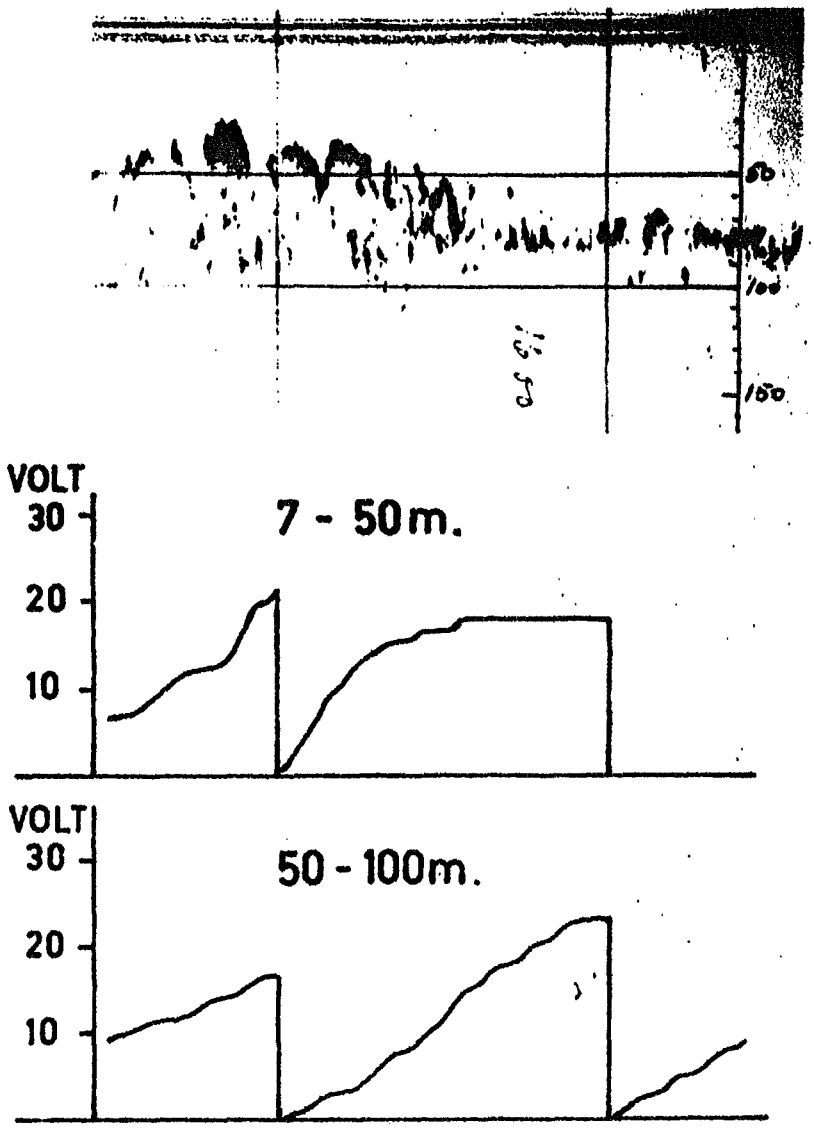


Fig. 1. Echo sounder recordings of a fish fry layer (top) and the corresponding signal voltages from 7 - 50 m (middle) and 50 - 100 m (bottom) depth.

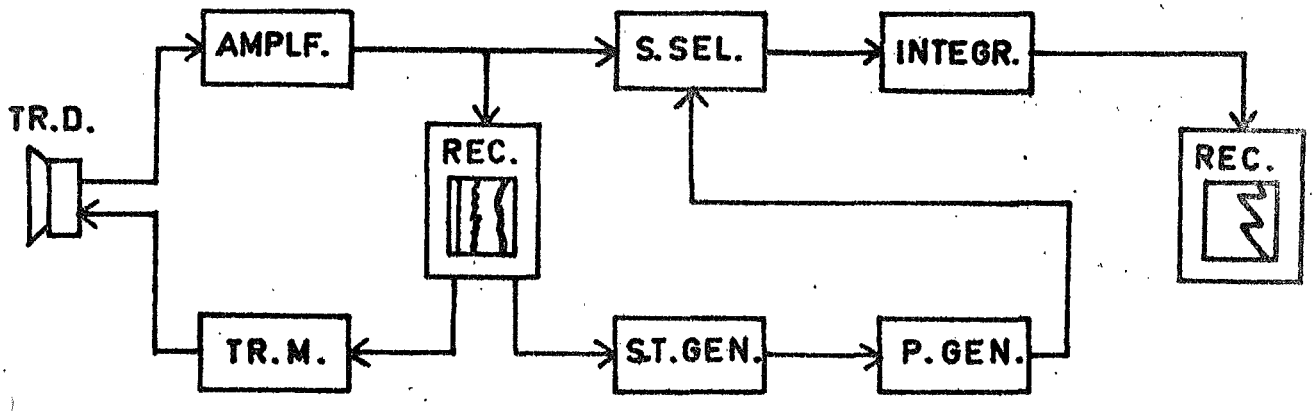
This instrumentation was first used during a cruise to the Barents Sea in August-September this year, and its technical performance proved to be excellent under all conditions.

Previously for the purpose of estimating the abundance of fish fry traces, we have been using a system of more or less arbitrary grading of the echo recordings from three different echo-sounders. For comparison this procedure was also carried out on the present cruise. At low density levels there appeared to be a fair agreement with the integrator readings, but in areas of greater abundance the lack of dynamics of the old system became overwhelmingly apparent.

Reference.

Mitson, R.B. and Wood, R.J. 1961 "An automatic method of counting fish echoes". J. Cons. Explor. Mer., 26, pp. 282-91.

A P P E N D I X



Block diagram of the echo integrator set-up.

TR.D. - transducer
AMPLF. - echo sounder receiver amplifier
TR.M. - echo sounder transmitter (pulse generator)
} SIMRAD type 580-10

REC. - recorders for echo sounder (SIMRAD type 580-10) and integrator (SANBORN model 322)

S.SEL. - signal selector

S.T.GEN. - saw-tooth generator (TEKTRONIX type 162)

. . GEN. - square pulse generator (TEKTRONIX type 161)

INTEGR. - integrator (TEKTRONIX type 0)