Portable scientific echo sounder for lakes and rivers

General description
The portable EY60 is specifically suited for use in lakes and rivers. Coupled with the Sonar4 and Sonar5 post-processing software from the Lindem Data Acquisition, the EY60 provides biologists, scientists and technicians with the most easy-to-use and reliable biomass assessment and fish tracking tool today. The portable EY60 can be delivered in a rugged transport case. Transceiver (GPT), portable computer and GPS are already connected, and the only connections required are the power source (normally a car battery) and the transducer. Reflection of sidelobes from the surface and the bottom, is a common problem in shallow waters, especially during horizontal beaming. The new composite transducer series (70, 120, 200 and 400 kHz) is particularly beneficial in shallow water environments due to its low sidelobes.

Unique features
• Plug and play
• All in one case
• Built-in calibration
• Remote control
• Low noise
• High ping rate
• Raw data recording
• Application specific post-processing
• Save and load personal configuration

Operation
It is crucial that operation of the echo sounder is made so easy that mistakes in settings and data storage are made “impossible” during the tough conditions frequently experienced in the field. With raw data storage you only have to press one button, and then assure that all data are saved and can be retrieved. Calibration is done by a built-in program. A calibration file is recorded to allow retrieval of specific calibrations. The echo sounder can be remotely operated. Settings and data storage can be controlled using a datalink created by e.g. mobile phone or satellite.

This allows you to control and monitor any remote field from your office desk.

Ethernet connection
Using Ethernet connection, the noise transfer between the transceiver and the portable computer is avoided. Furthermore, Ethernet provides for optical cable connection between the transceiver and the computer. The transceiver can then be placed near the transducer, reducing the cable length and thus the noise. There is virtually no limit to the length of the optical cable to the computer, making this setup attractive for fixed location studies like fish monitoring in rivers.

Technical specification
Transducer .............................. 70, 120, 200, 400 kHz
Other technical specifications as for EK60, see the EK60 standard product brochure.
The new EY60 echogram window includes the following important features:

- **Echogram** - a high performance, multi-frequency, long range fish finder with a large dynamic range. Single fish detection at more than 500 m range. Unlimited numbers of user-defined layers with analysis of biomass and target strength.

- **Bottom locked expansion** - gives detailed information about single fish and fish schools close to the bottom.

- **Target strength distribution** - analysis of fish size distribution presented in a histogram.

- **Target position plot** - single fish position and fish tracking in beam cross section display.

- **Numerical display** - general information on frequency used, pulse duration and output power. Information about layer settings, threshold, integrator values, etc.

Post processing software comes in two modules:

- **Sonar4**
- **Sonar5-Pro**

Both modules are made by Lindem Data Acquisition. These are specifically designed to work with the portable EY60.

**Sonar 4 post-processing tool for lake tracking**

The Sonar4 is an up to date biomass assessment tool with echo integration and Target Strength (TS) detection with many advanced features for ease operation and professional use.

The Sonar4 pictures includes: Time, date, range, GPS position, transect on map, survey pictures....

**Functions:**

- Estimation of fish per unit volume and area
- Zooming and scaling
- Noise removal
- Track studying
- Adjustable vertical and horizontal echogram axis
- Multi-layers and segments
- Data export to spreadsheets

**Sonar5 post-processing tool set up for river tracking**

The Sonar5-Pro is an advanced version of Sonar4 with additional tools for tracking, track statistics, classification and data insight. It is designed for both horizontal and vertical use. It contains methods as automatic alpha-beta and cross filter tracking, 3D echogram and phase display, image analysis, oscilloscopes and methods for predicting optimal transducer placement in shallow water.

The Sonar5 picture includes: Time, data, range, GPS position, track classification and statistics, image analysis....

**Functions:**

- Noise reduction
- Image analysis
- Tracking
- Classification tools
- Exact track positioning
- Tools for transducer positioning
- Water current and bottom profile
- Track statistics
- TS to weight conversion
- Temporal data coverage estimation

**Scope view** - ping to ping echo signal. Useful presentation during calibration and detailed studies of fish echoes.
Fish stock assessment in lakes

Freshwater research vessel with transducer mount

Both vertical and horizontal beaming is required to detect all the fish

Daytime fish distribution (vertical beam)

Night time fish distribution (vertical beam)

Fish close to the surface detected by horizontal beaming at night

Monitoring of fish migration in rivers

Study site with fish guiding gill net

Housing for echo sounder

Transducer and mount used for fixed location fish studies, prior to deployment

Typical field setup for studies of fish migration in rivers
Bottom mounted transducer

Bottom mounted transducers are ideally suited for studies of the natural behaviour of undisturbed fish. Interesting information can be obtained on vertical distribution, swimming activity and even physiology (example below).

The echograms below show a time series showing echoes from patches of fish ascending towards the surface of a lake at dusk. The blue lines between the fish and the surface are echoes from gas bubbles released from the swimbladders.

Sonar5’s 3D echogram can be applied when studying echo phenomena. Here one of the above presented gas bubbles hitting the surface. 3D phase plots are also available.

Sonar5’s oscilloscope window can analyse the sea state, separate closely spaced fish or classify bottom sediments. Here two individual fish are found close to the surface.

The above fish c presented in Sonar5’s 3D echogram.

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