

SIMRAD

EK60

SCIENTIFIC ECHO SOUNDER

MENU

↑

-

+

↓

HIGH DYNAMIC RANGE

RAW DATA RECORDING

LOW SELF NOISE

HIGH PING RATE

MULTI FREQUENCY APPLICATION FOR SPECIES ID

SEVERAL FREQUENCIES COVERING SAME SAMPLE VOLUME

REMOTE CONTROL

STORE AND RELOAD OF PERSONAL SETTINGS

DATA SERVER INTERFACE

PWR

SIMRAD

EK

SCIENTIFIC SOUNDER

www.simrad.com

SIMRAD

TECHNOLOGY FOR SUSTAINABLE FISHERIES

BASED ON MORE THAN 40 YEARS EXPERIENCE



Unique features

- High dynamic range
- Easy to use calibration program
- Personal user configuration
- Multi frequency echograms
- Comparable sample volumes
- Remote control
- Data server interface
- On-line/off-line processing
- Low noise
- High ping rate
- Raw data recording

The Simrad EK60 Scientific Sounder system is a new generation fishery research tool, based on experience from the EK500. The new electronic hardware is combined with up to date PC processing and Windows operation. The EK60 provides facilities for accurate echo sounding, data storage, data analysis and reporting results. The system communication is through Ethernet, which gives flexibility in the location of the EK60 system units and allows easy access to data from other instruments or stations on a vessel network. A post processing software, BI60, is also included in the EK60 system.

The Scientific Sounder

The well known receiver concept from EK500 is also used in the EK60, giving an instantaneous dynamic range of more than 150dB. Combined with a very low self noise and unlimited range compensation (TVG), this ensures correct measurements of all targets, from plankton to a dense school of fish. The sounder can operate seven frequencies simultaneously for comparisons of fish reflectivity in the frequency range 18 to 333 kHz. Also unique for the EK60 is its ability to observe the horizontal position of individual fish within the sound beam, enabling the scientist observes fish behaviour. Various types of processed data and sample data can be stored on the hard disk of the control processor.

Target Strength analyzer

Full freedom in investigating Target Strength is possible both on-line and off-line. The split beam principle is used to find the position of individual targets in the transducer beam, compensate for the beam pattern and calculate corrected Target Strength values. It is important that transducers used in the system are of high quality and are consistent.

Echo Integrator

The unique receiver concept combined with floating point arithmetic provides an echo integrator with virtually unlimited dynamic range. Saturation with resulting under estimation never happens in the EK60. Integration of echo levels are performed in surface or bottom locked layers, with individual parameter settings for each layer.

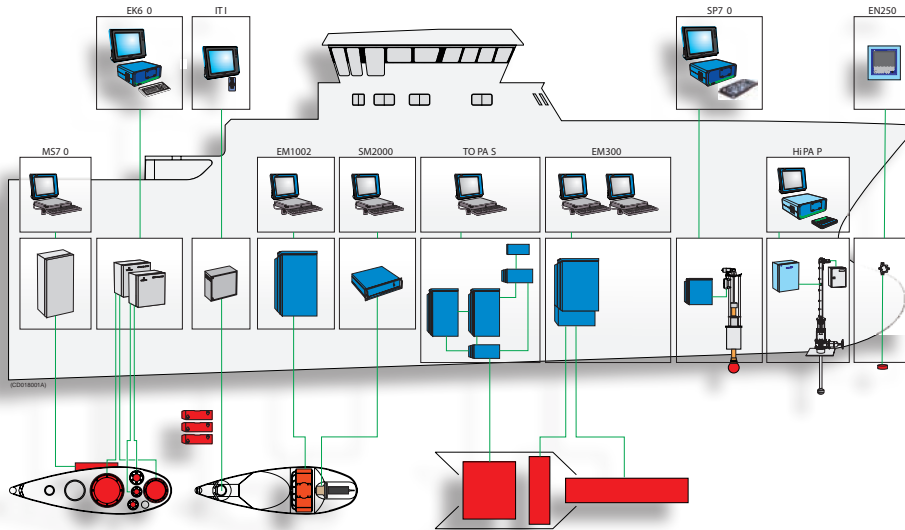
Post-processing

The high quality data produced by the Simrad EK60 scientific echo sounder provides an excellent basis for further analysis for applications such as biomass assessment and fish behaviour studies. The data formats are public and documented ensuring that Simrad EK60 is a truly open solution, allowing third party or own software to be developed for post-processing

GO SARS



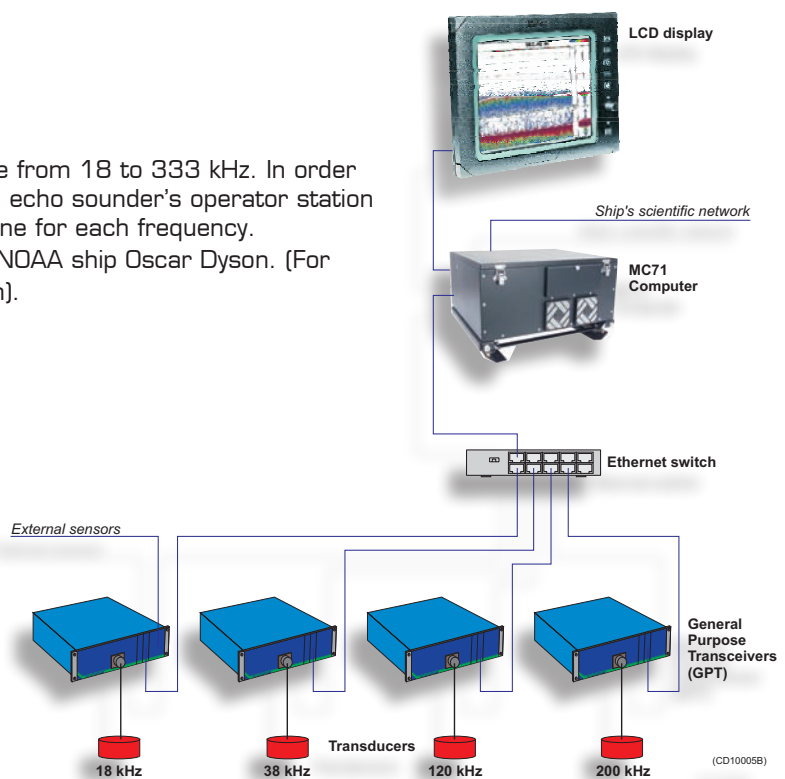
The Norwegian research vessel "G.O. Sars" is equipped with two independent drop keels: one with the standard split-beam transducers and the new scientific multibeam sonar (MS70), the other with multibeam systems for hydrographic use. The drop keel reduces interference from air bubbles, increasing the performance and accuracy of the survey. The split-beam multifrequency echosounders enable accurate measurement and improved potential for fish and plankton discrimination and identification. The SP70 sonar is used for long range detection and localization of fish schools and the ITI wireless trawl sensor for accurate monitoring of the trawl geometry and position. (For more details, ask for a specific GO SARS brochure).



OSCAR DYSON

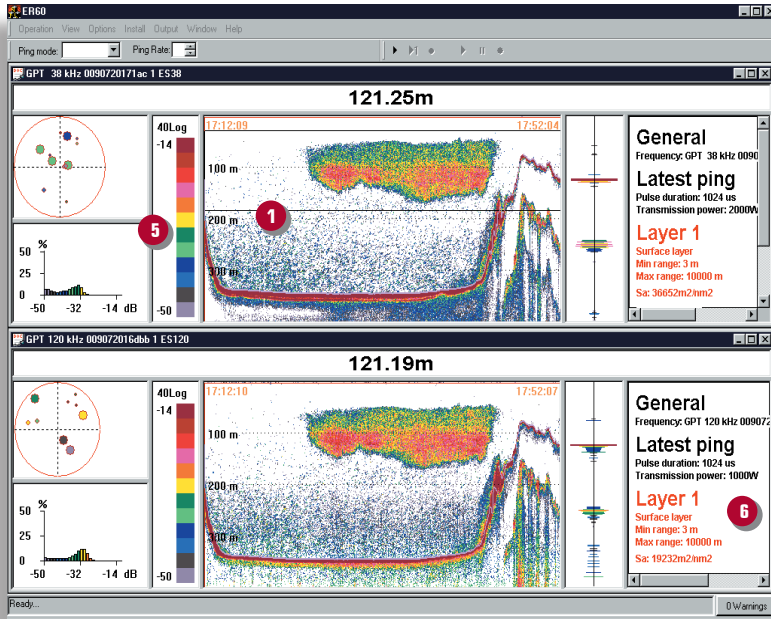
Simrad EK60 system

The Simrad EK60 span the frequency range from 18 to 333 kHz. In order to use multiple operational frequencies, the echo sounder's operator station is connected to several transceiver units; one for each frequency. The system illustrated here is used on the NOAA ship Oscar Dyson. (For more details, ask for a specific Oscar Dyson).

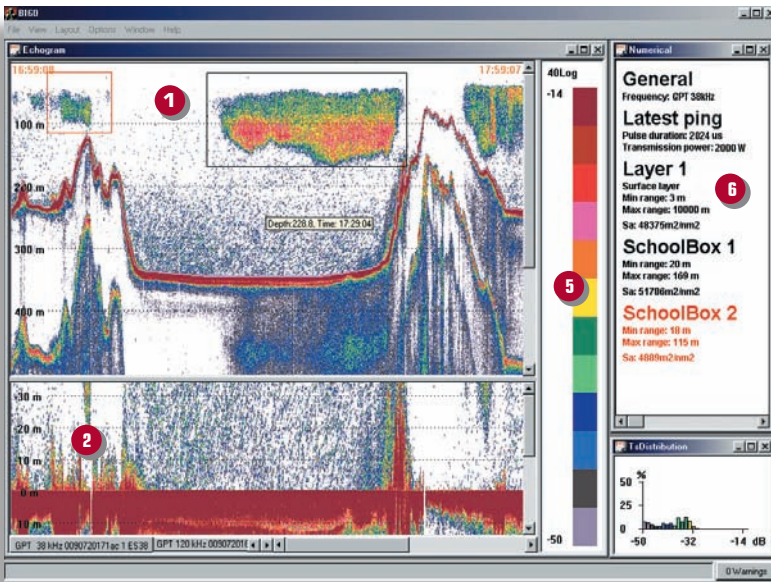


(CD10005B)

REAL TIME EVALUATION, POST PROCESSING AND DATA STORAGE...



ER60 layout example



BI60 layout example

ER60 operating software

ER60 is the real time operating software for the EK60. It displays the echogram, target position in the acoustic beam and target strength distribution. An unlimited number of layers can be set for independent echointegration and analysis of target strength distribution. A numerical display shows all settings including calibration parameters and s_A for the individual layer. The raw data storage is independent of the visual displays and changing display setting does not affect the stored data. Calibration is part of the ER60 software.

BI60 Post Processing Software

The sample data can be further processed using the internal BI60 program. The BI60 is intended for typical survey applications like assigning biomass to fish species, comparing results from different frequencies, storing results and printing survey reports. Investigations can be performed in virtually unlimited number of layers and regions.

Common features for ER60 (echo sounder part) and BI60 (Post processing)

1. Echogram

A high performance, multi frequency deep water fish finder with a large dynamic range. Single fish detection below 1000 meters.

2. Bottom Expansion

Bottom locked scale expansion. Gives more detailed information of fish close to the bottom.

3. Target strenght distribution

A fish size analyzer, depicting fish TS by echo color, and TS distribution on a histogram.

4. Target position

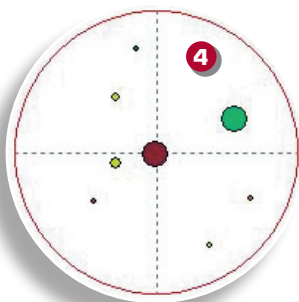
The target position presentation is a single fish position tracking display and indicates where the fish is in the echosounder beam.

5. Color Scale 12 or 64 colors, selectable

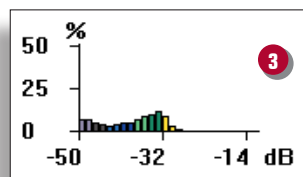
Acoustic values are mapped to colors. Free setting of upper and lower limits.

6. Numerical Display

General information on frequency used, pulse duration and output power. Information about layer settings, thresholds, integrator values, etc.



The target position presentation shows single fish location in true colors.



Target strength distribution indicates the size of the fish in the analysis.

HIGHLY SENSITIVE, HIGH QUALITY TRANSDUCERS...

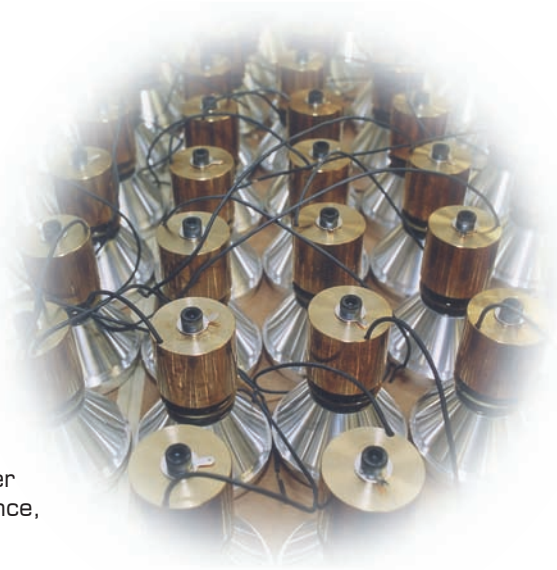
In addition to the well known 18 and 38 kHz transducers, a range of new transducers with frequencies 70, 120, 200 and 333 kHz, using the latest composite ceramics technology, have been designed for fishery research.

The new composite transducer design has a much wider bandwidth and lower sidelobes than the old traditional transducer design.

Smaller size and weight also enable easier installation and portable use.

Except 18 kHz, all other split beam transducers have 7 degrees beam angle.

Mounted close together, enables the scientists to explore overlapping sample volume for the different frequencies.



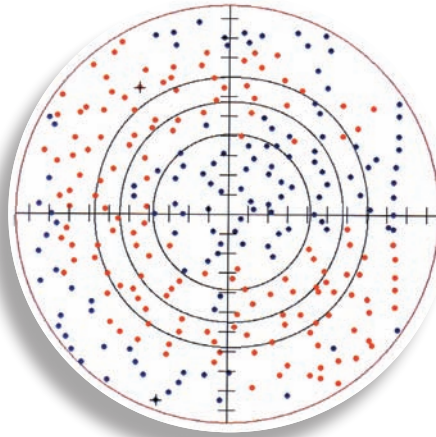
The development of advanced transducer technology demands considerable patience, accuracy and many hours of testing.

Pressure resistant transducers

To be able to study the biology of the deep ocean organisms, the sensor must be brought down to the target. Several pressure resistant transducers, depth rated to 1500 m, are available for deep sea research.

Calibration capabilities

The EK60 has built in calibration software, which updates the system with accurate gain settings and beam pattern calculations. Calibration is performed by the end user in their own environment. This unique feature offers valid check of the equipment prior to surveys.



Outstanding detection capabilities

With the low self-noise, efficient transducer and signal processing, the EK60 has astonishing detection capabilities. Echoes from single fish can be observed at depths down to 1000 meters (TS -30 dB, 38 kHz operating frequency, 10 dB signal-to-noise ratio). Bottom echoes may be detected down to 9000 m depths with 18 kHz operating frequency.

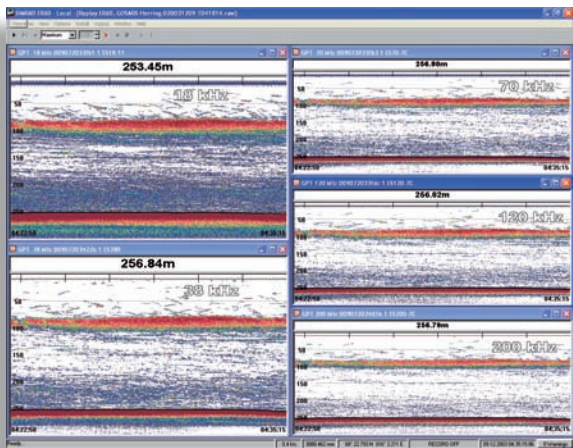


SIMRAD EK60 SCIENTIFIC SOUNDER SYSTEM - "ALL IN ONE SYSTEM"

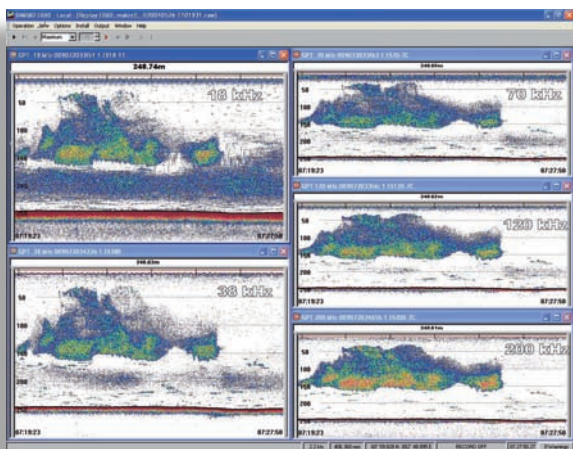
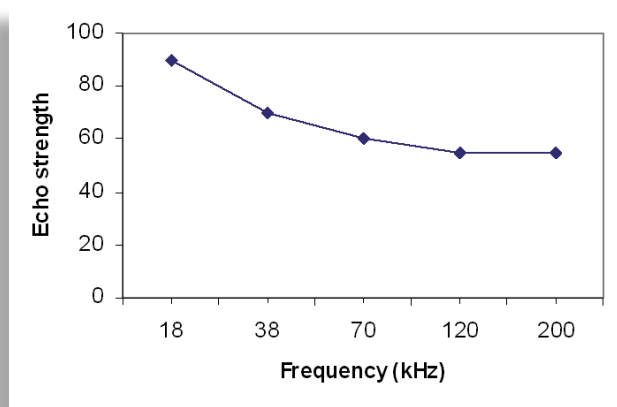
Multi frequency acoustics

Ecosystem monitoring is becoming increasingly important and new directives require status reports of all components of the food web. The echosounder has traditionally been used to locate fish resources and to measure stock abundance and size distribution. Recent research has shown that simultaneous use of several discrete echosounder frequencies not only improves fish stock assessment, it can also be used to separate species and identify them. This is because each species has a unique acoustic frequency response.

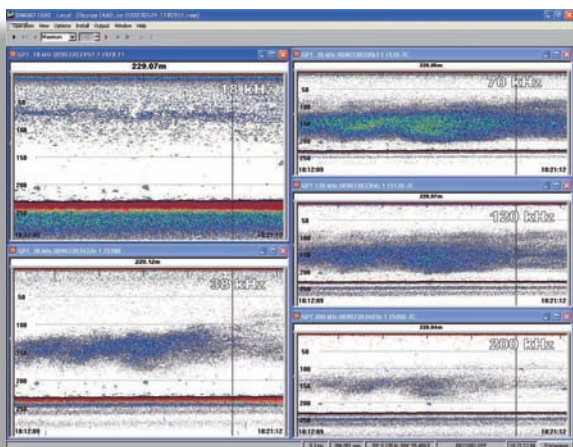
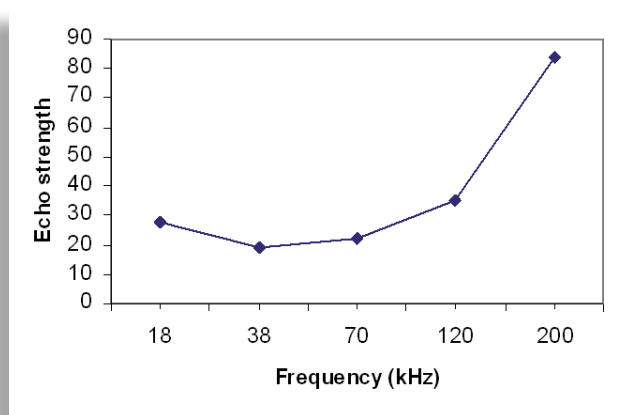
In the echograms, schools of herring, mackerel and a layer of krill is observed by simultaneous transmission at the frequencies 18, 38, 70, 120 and 200 kHz using the EK60 scientific echosounder. The frequency response of these three species are clearly different documenting the potential of multifrequency acoustics in species classification.



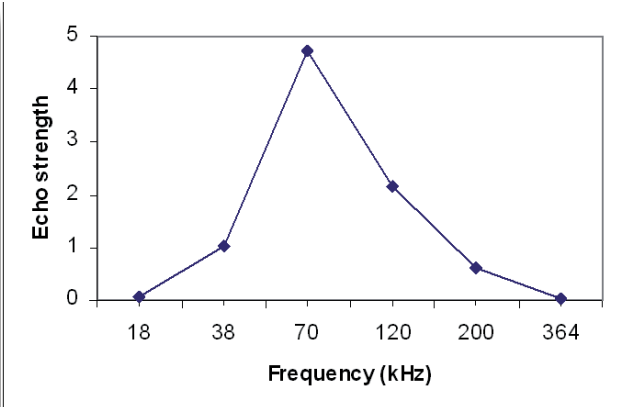
Herring



Mackerel



Krill



EY60 PORTABLE ECHO SOUNDER

The portable EY60 is specifically suited for use in shallow waters, lakes and rivers. The EY60 is the most modern, accurate and easy-to-use fish abundance measurement and fish tracking tool today. It is the same instrument as the EK60, but with a configuration suited for outdoor portable use. The EY60 can be delivered in a rugged transport case with robust splash proof laptop with sun-screen and USB-GPS.

Unique features

- Plug and play
- All in one case
- Built-in calibration
- Multiplexing
- Wireless operation
- Raw data storage



Multiplexing

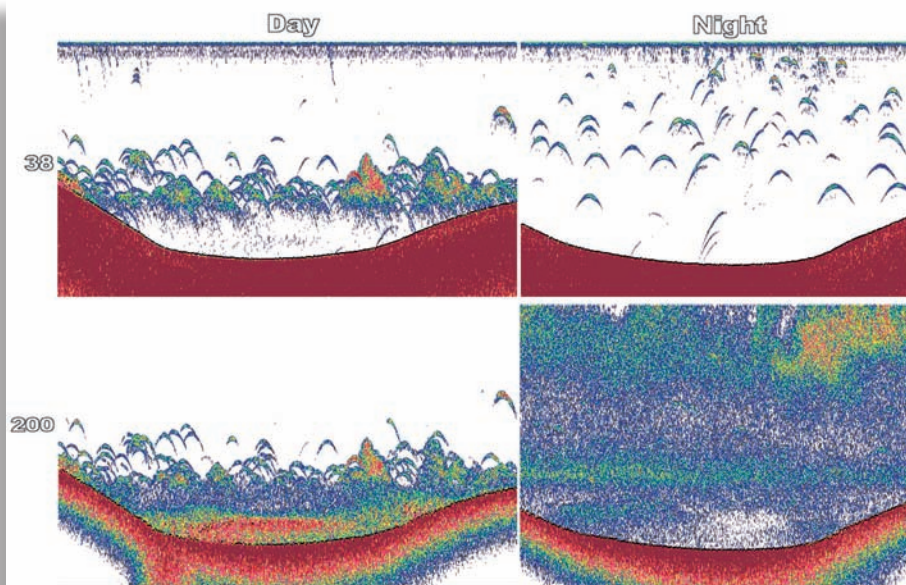
With the new multiplexer two transducers of the same frequency can be connected to the same transceiver. A typical application is mobile surveys in lakes where one transducer is pointing vertically and the other horizontally. With this setup the whole water column is covered simultaneously.

Wireless control and data transfer

Many scientists, both in freshwater and marine environments have chosen a wireless solution for data transfer and echosounder control (For more details, ask for a specific Wireless brochure)

EY60 single beam echosounder

A low price two frequency EY60 is available for biomass assessment (s_A), studies of behaviour and fish and zooplankton detection and separation. A combination of 38 and 200 kHz has proven effective for separation of fish and zooplankton.



Echograms are showing recordings from a mobile lake survey using a combi 38-200 kHz single beam transducer. Daytime recordings show fish patches in mid-water at 38 kHz, but no targets are detected near bottom. At 200 kHz a scattering layer, corresponding to zooplankton, is seen near bottom. At night single fish tracks are seen distributed in the whole water column at 38 kHz. At 200 kHz, all fish echoes are masked by zooplankton that have emerged from their daytime near bottom refuge.

SPECIFICATIONS

EK60 Scientific Sounder system Transceiver (GPT)

Frequency: 18, 38, 70, 120, 200 and 333 kHz
Operation mode: Active, Passive, Test
Transmission power: Adjustable in steps
Max power: See table below
Pulse duration: See table below
Ping rate: Adjustable
Max ping rate: 20 ping/sec
Data collection range: 0 – 15000 m
Receiver instantaneous dynamic range: 150 dB
Receiver filtering: Matched digital filters
Receiver noise figure: 4 dB
Split beam: Complex digital demodulation
Synchronization: Internal and external
Operating temperature: 0 – 55 °C
Power system:
 - DC voltage: 10.5 – 14 V / AC voltage: 110 -230 V

ER60 On-line Echosounder program

Windows operation: Easy-to-use standard Windows operation
Transceiver (GPT) control:
 - 7 Transceivers controlled simultaneously
 - Operation, Transmit power, Pulse duration, Ping rate, Data collection range
Calibration: Easy-to-use built in calibration program
Sensor input: GPS, Log-counter, Heave, Roll, Pitch, CTD, Trawl, Purse seine, and other
Manual input: CTD data, Speed, Annotation
Views: Configurable Echogram, Target position, TS distribution, Color scale, Numerical, Bottom depth

Echogram view:

- Volume backscattering echogram (20Log)
- Target strength echogram (40Log)
- Single target echogram (Only detected single targets)
- Virtually unlimited number of simultaneously echogram views with individual settings

Vertical range: Adjustable 5 – 15000 m

Horizontal Timespan: Ping-, Time-, or Distance-based

Layer: Virtually unlimited number of configurable layers for e.g. on-line integration

Calculation interval:

Ping-, Time-, or Distance-based

Single target detection settings:

Adjustable

Bottom detection settings:

Adjustable
Access control: User access control to prevent unwanted operation

Personal user configuration:

Save and load personal user settings

Remote control:

Ethernet datagrams for remote control

Data server: Ethernet datagram based system for remote subscription of data

Raw data storage: Storage of sample data

Processed output: Output of a number of processed data to serial line or Ethernet

Replay: Replay of previously recorded raw data files

BI60 Off-line post processing program (Raw data operation)

Windows operation: Easy-to-use standard Windows operation

View: Echogram, TS distribution, Interpretation, Numerical, Frequency response

Echogram view:

- Volume backscattering echogram (20Log)
- Target strength echogram (40Log)
- Single target echogram (Only detected single targets)

TS distribution view: Histogram of TS for detected single targets in selected region

Interpretation view: Assigning biomass to species

Numerical view: Configurable view for display of numerical values

Personal user configuration:

Save and load personal user settings

Data navigation: Navigation through data using vertical and horizontal scroll bars

Vertical range: Adjustable 5 – 15000 m

Horizontal Timespan: Ping-, Time-, or Distance-based

Zooming: Zooming in and out on data

Layers and regions: Drawing of virtually unlimited number of layers and regions

Data output: Output of raw or processed data from user defined regions to file

Database: Processed data organized in data

base for data query and report generation

Report generation: Generation of standard reports

Other post processing:

Echoview (www.echoview.com)

LSSS (www.marec.no)

Sonar5 (www.fys.uio.no/~hbalk/),

Available frequencies and pulse duration:			Nom. pulse duration (µs)	64	128	256	512	1024	2048	4096	8192
			Sample interval (µs)	16	32	64	128	256	512	1024	2048
			Sample interval (cm)	1.2	2.4	4.8	9.6	19.2	38.4	76.8	153.6
Nom. frequency	Frequency	Max power									
(kHz)	(kHz)	(kW)									
18	18.018	2					X	X	X	X	X
38	38.095	2				X	X	X	X	X	
70	70.175	1			X	X	X	X	X		
120	120.210	1		X	X	X	X	X			
200	200.000	1		X	X	X	X	X			
333	333.333	1		X	X	X	X	X			

Note: Specifications are subject to change without notice.

Kongsberg Maritime AS
 Simrad
 PO Box 111, N-3191 Horten, Norway
 Tel. +47 33 03 40 00 - Fax +47 33 04 29 87
 E-mail: contact@simrad.com

