

## SIMRAD EK SYSTEMS

EK is our common name for all single beam echo sounders designed for research applications. The first EK sounder was introduced in the 1960's, and already back then the focus was to create a quantitative sounder that could measure biomass.

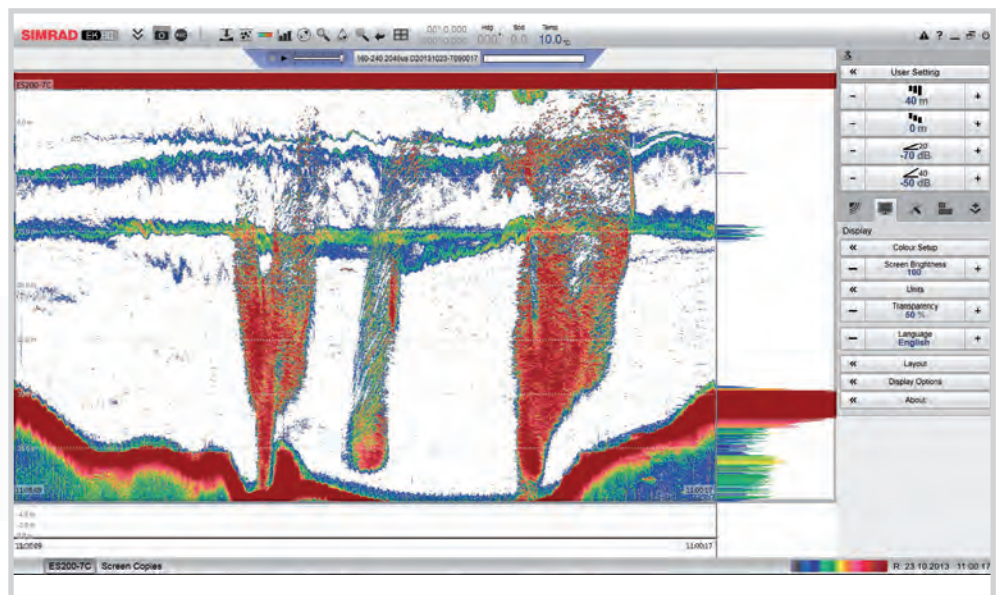
All EK systems share some common features such as built-in calibration and split beam capabilities with full beam compensation for accurate TS measurements. The focus when designing any EK system is that you should be in full control of all sounder parameters. That is why there are no automated settings in the acquisition SW. A skipper might want optimal settings displayed at all times

to get a good picture of the fish, but a sudden change in ping rate or duration will ruin a survey and the data are no longer comparable.

Another common feature is a standardized RAW data format, which means that you can compare data across platforms. In many cases you need to combine your vessel data with data collected from profiling platforms to get TS measurements or measurements from great depths, and those times it is good to know that the sounders use the same currency. Simrad RAW data is an open, well documented format, as can be expected from a scientific system.

**EK is a quality stamp for scientific echo sounders.**

In this EK80 screen capture you see hard bottom in deep red colour, herring schools releasing gas that slowly drifts towards the surface and a substantial layer of plankton and small jelly fishes.

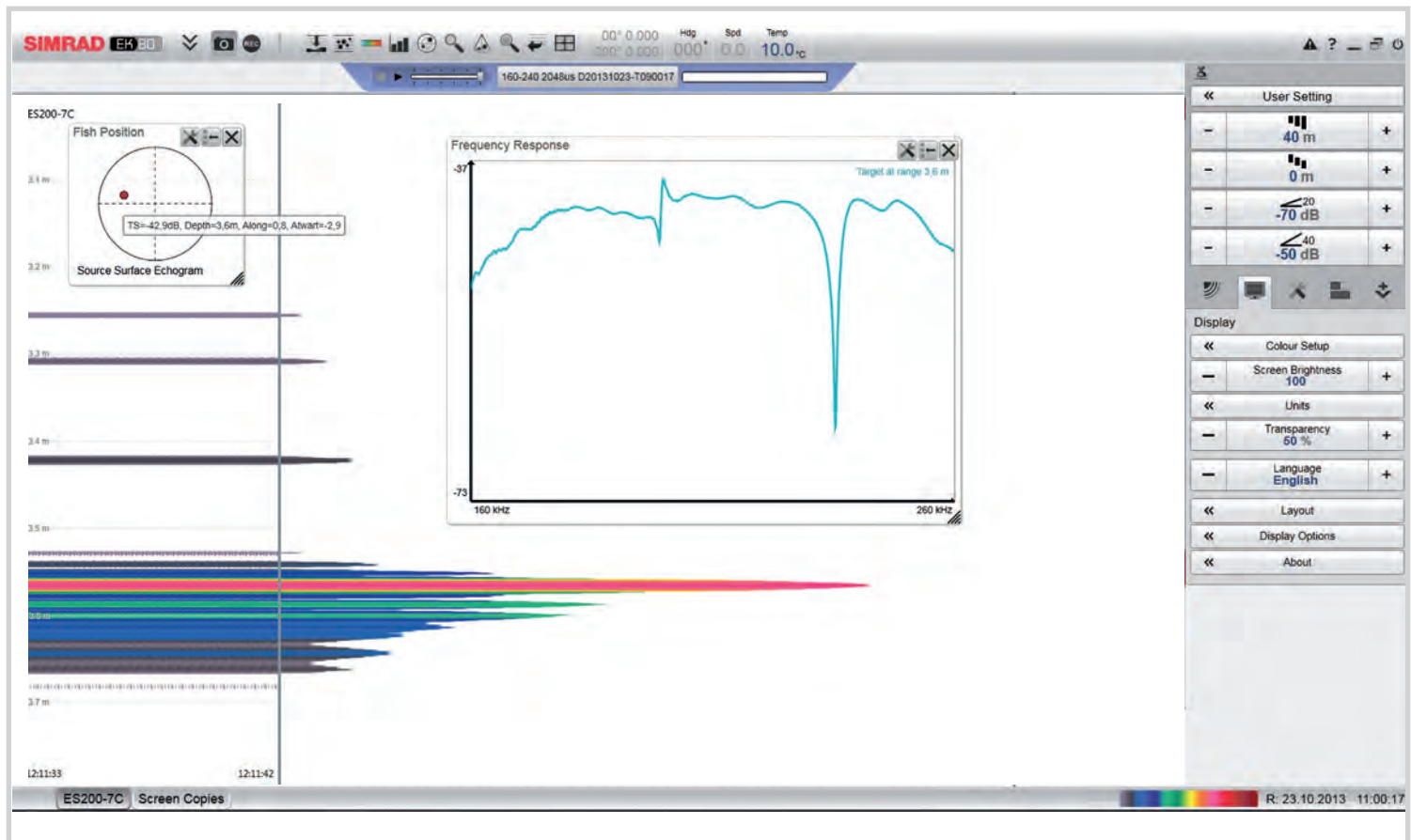
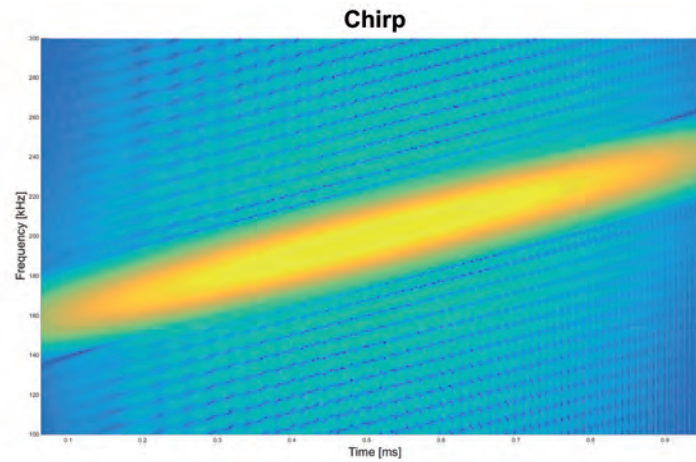


# WIDEBAND ECHO SOUNDERS

The new series of EKs has wideband capabilities. That means that you can transmit a signal that varies in frequency across the transmission. The most common way to operate the sounder is to use linear FM, or chirp. In an EK80 chirp transmission you utilize the effective frequency band of your transducer, starting low and continuing higher until you reach the frequency where the transducer efficiency drops off.

Due to advanced matched filtering techniques you can correlate the returned signal with what you sent out, and the result is improved range resolution of single targets. The improved range resolution is obtained when you have targets that are in comparable size. When you have very weak targets in the near vicinity of strong ones, such as small fish close to bottom, you might want to use a different pulse shape. A dolphin's click is shorter,

but still spans over a large bandwidth and might be better suited for such environments. The EK80 has this capability and, as the SW continues to be developed, new functions would be available.



Range resolution and target ID are improved. Echo from a 38,1 mm tungsten sphere is measured, and you can clearly see how the target strength changes with frequency. This frequency response is unique to this particular target, and

corresponds well with the theoretical curves. Resolution is excellent, and you can clearly see the knot on the fishing line where the suspended sphere is attached to the line, around 10 cm from the sphere itself.



## SIMRAD EK80

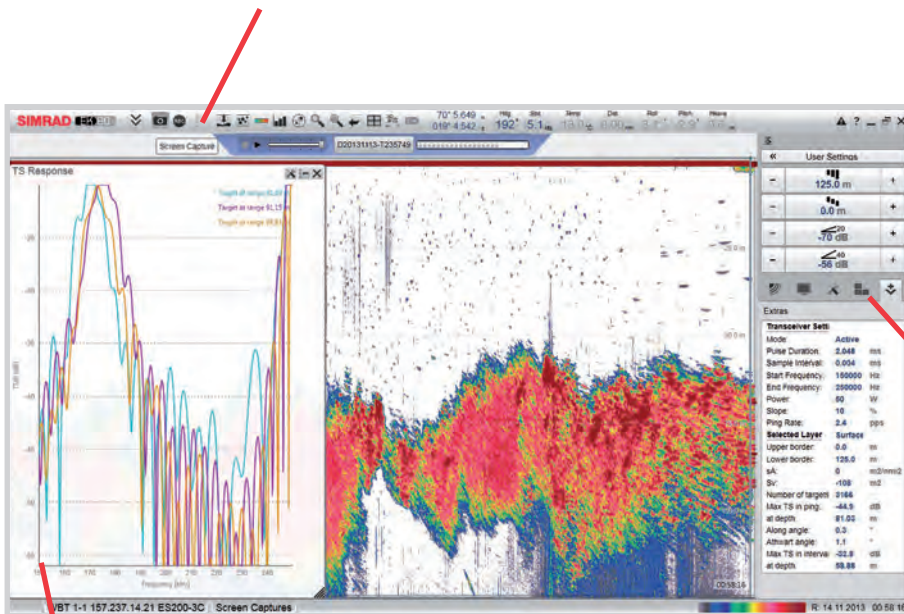


Frequently used buttons and numerical displays such as ship heading, roll, pitch and heave are always shown on top of the EK80 SW. The EK80 has new tools that can be used to inspect

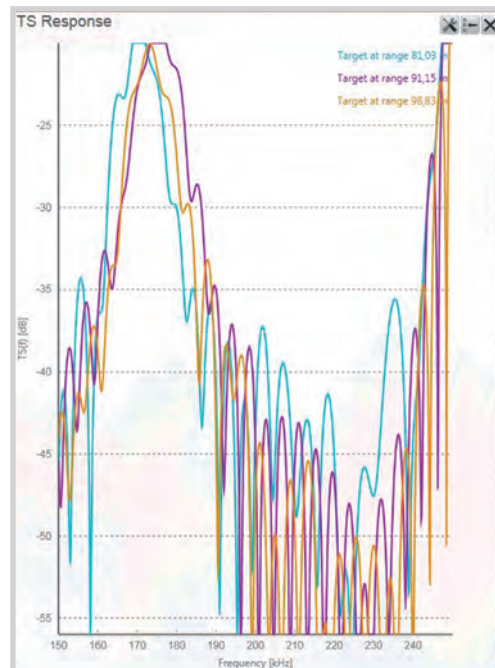
and display data, when clicking on the magnifying glass you would for instance get access to a zoom tool that can come in handy when creating screen shots to use as examples.

The Simrad EK80 system consists of an acquisition software, one or more wideband transceivers, and transducers. The system is operated by a Windows™ based processor that runs the EK80 acquisition SW. Also, the system normally requires input from auxiliary sensors such as GPS and motion sensor.

The EK80 SW is the command and storage centre of the system. This is where the user sets the parameters of the transmission and the data you want to record. The EK80 also has advanced tools for replaying and visualization of RAW data. Biomass in predefined layers is automatically calculated, and the SW has lots of new tools such as 3D visualization of single targets, frequency response across the frequency band and a neat little zoom tool that can be used to inspect details.



TS response resolved individual targets are calculated and displayed as a function of frequency in real time in the EK80 SW. In this capture you can see three objects passing the single target criteria, all being picked out of a dense mackerel school at 81, 91 and 98 meter range. In the tool menu you can also set the parameters of what is to be recognized as single targets.



All settings needed to operate the EK80 SW are distributed under five main tabs for easy operation:

- The **OPERATION** tab is the place where you have all settings that are directly influencing the RAW data you record, such as transmission settings and settings related to RAW data recording.
- The **DISPLAY** tab comprises settings that regulate how the SW appears on your computer right now.
- The **SETUP** tab includes installation and calibration settings
- The **ACTIVE** tab contains settings related to calculation done and displayed in the SW, such as creation of layers, biomass estimation and which TVG is displayed.
- The **EXTRAS** menu, which is displayed here, shows numerical details from the transmission, as well as the results from the active layer.

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## WIDEBAND TRANSCEIVER (WBT)

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The Wideband Transceiver (WBT) is designed for applications where performance is the top priority. The WBT has four 500 W channels that can either work independently with single beam transducers, or together with a split beam transducer. The WBT is optimized for applications where power consumption and size is not critical, typically on board a research vessel or a platform with power and communication available through high speed ethernet cable.

The WBT transceiver is capable of operating on entire band from 10 kHz to 500 kHz, only limited by the transducer's bandwidth. The WBT is operated by the EK80 SW, and depending on the settings it can be used either in narrowband or wideband mode. The WBT itself is capable of doing CW, chirp and also user defined signals.



SINGLE BEAM SYSTEMS

### ABOUT TRANSDUCERS

In general any Simrad transducer can be used with the EK80, as long as it operates within the 10-500 kHz band. However, the effective bandwidth will vary with transducers.

The Simrad composite transducers have more bandwidth than transducers based on the tonpiltz elements. Because of that, for frequencies of 50 kHz and higher we always recommend these with an EK80 system.

Typically the EK80 is used on a research vessel. On vessels where size and weight are not critical, 7° transducers are often used. When used as a portable system, or on smaller platforms such as the WBAT, size could be an issue and for these applications we have smaller transducers available.

