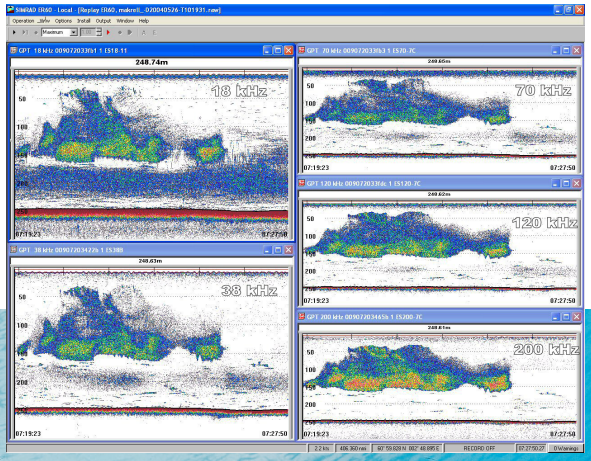
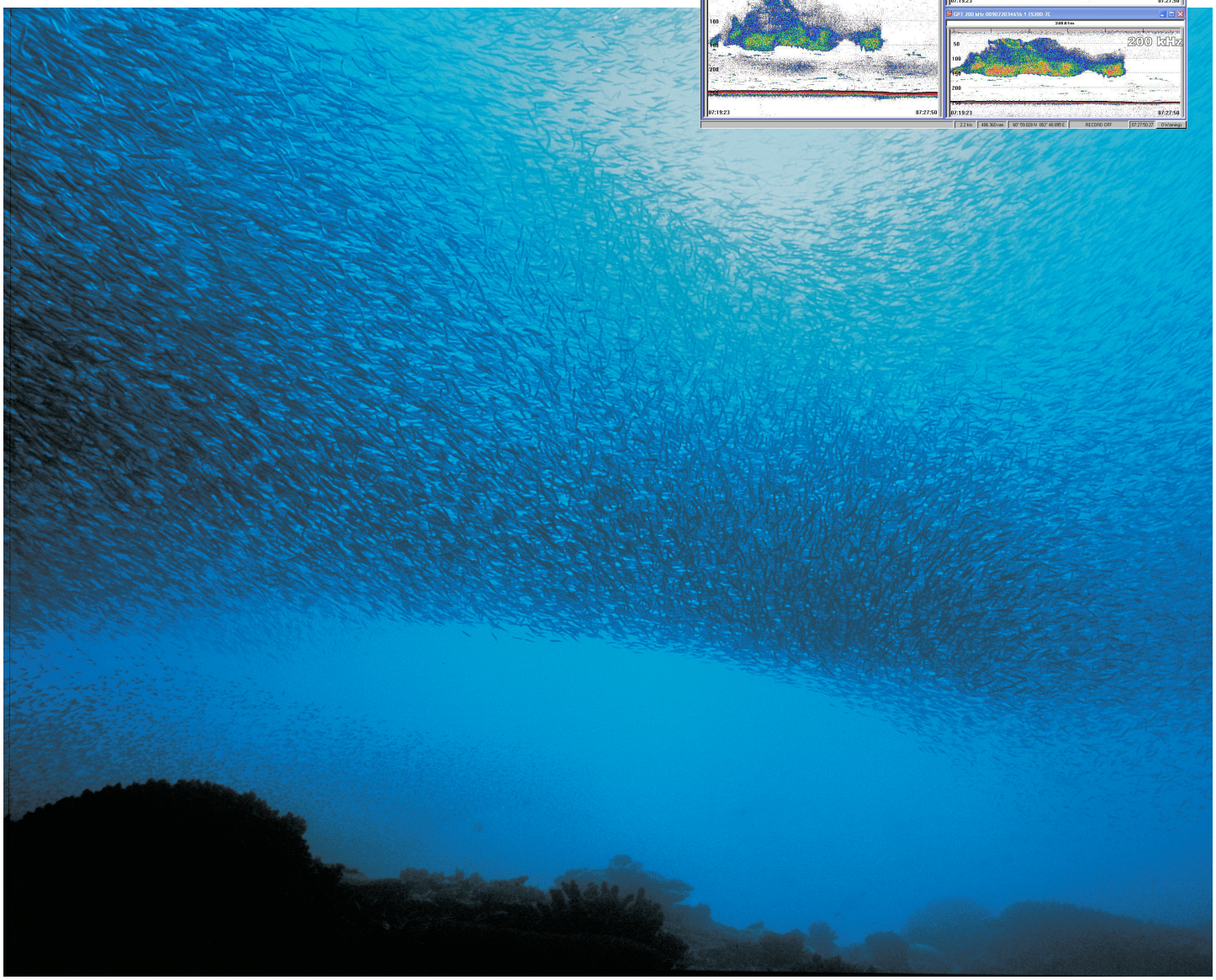
Simrad EK60

Scientific sounder with multiple frequency operation

In cooperation with the Institute of Marine Research in Norway, Simrad has developed an echo sounder system capable of discriminating between different fish species.





Recent research has shown that simultaneous use of several discrete echo sounder frequencies (multifrequency) not only improves fish stock estimates, but can also be used to identify species.

This is because each specie has a unique acoustic frequency response. This new and growing understanding greatly improves the value of hydroacoustics to obtain information about marine resources.

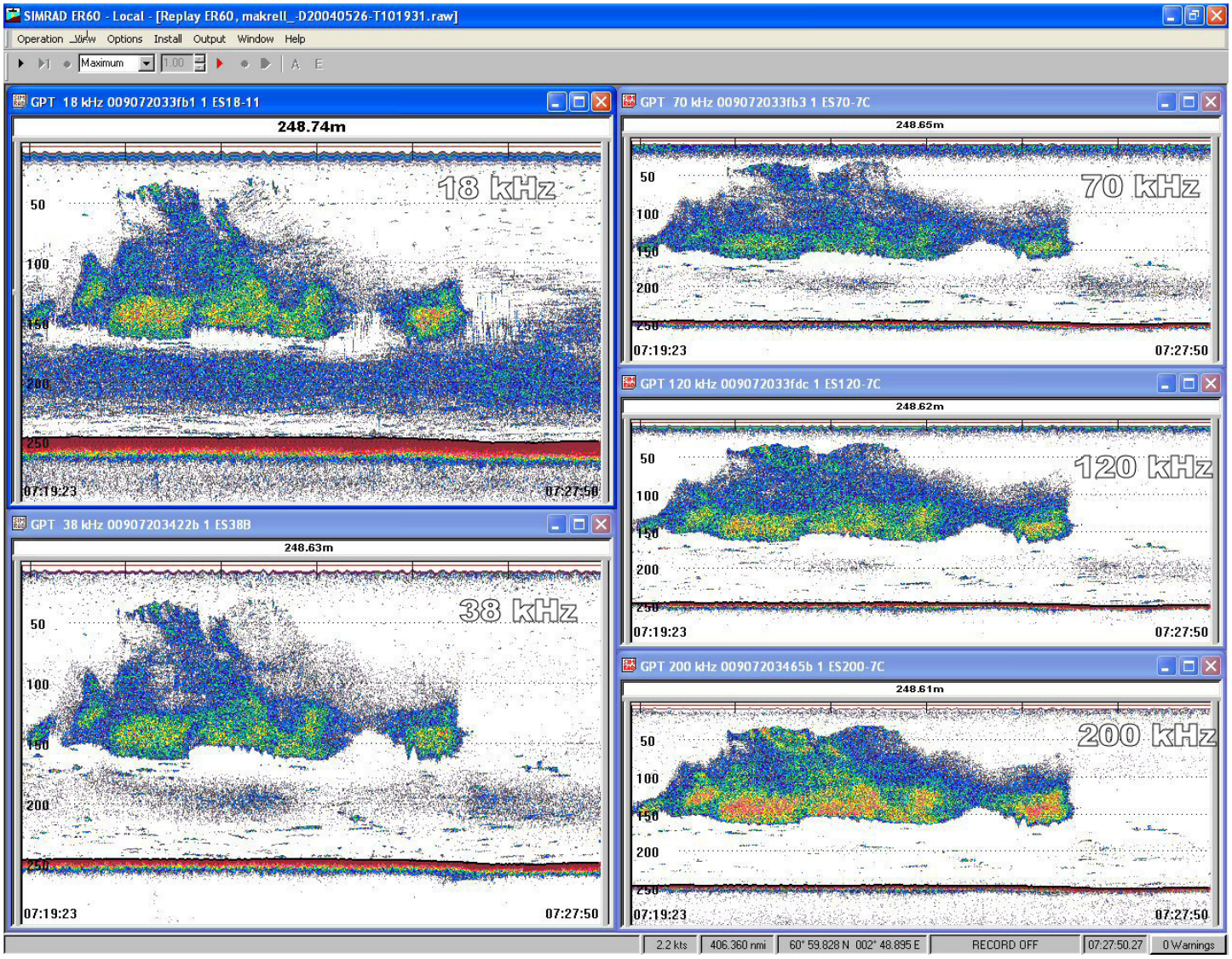
Scientists at the Institute of Marine Research, Norway, have shown that different species of zooplankton and fish can be identified based on multifrequency acoustics.

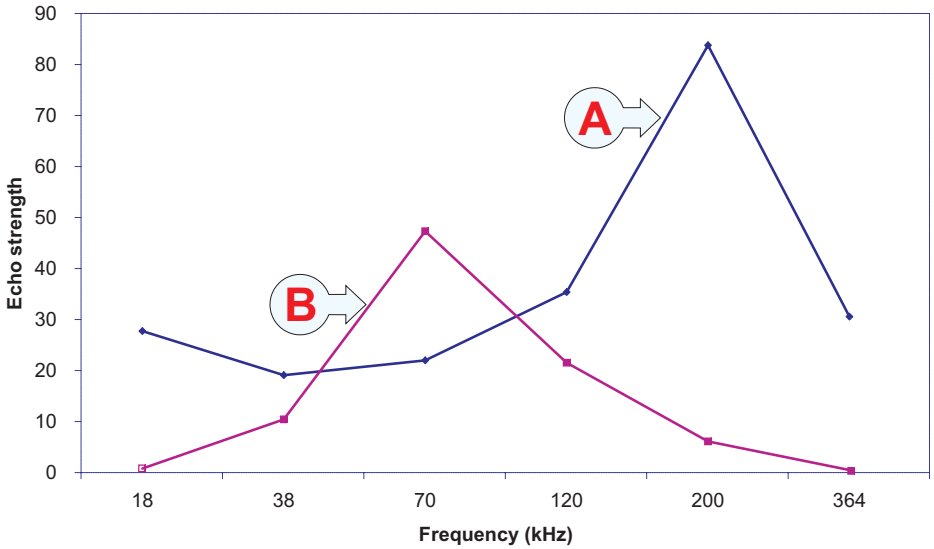
In the future, databases of 'acoustic signatures' for the different commercially interesting fish species will be established and Simrad is already developing echo sounders that can take this information into practical use.

Single frequency echo sounders have traditionally been used to locate fish resources and to determine their size, both at population and individual level. With the high exploitation rate on limited fish resources seen internationally, selective fishing has become a major topic in fisheries management. Our goal is to provide echo sounders for the international fishing fleet being capable of both species identification and accurate size estimation. Sustainable exploitation of our fisheries resources is dependent on this information and any instrument being capable of providing such information will be a success. Our development for fishery research systems can help the industry as a whole.

Example: Mackerel

One example is given in the echograms below where schools of mackerel are observed simultaneously at the frequencies 18, 38, 70, 120, 200 kHz using the Simrad EK60 scientific echo sounder. The schools of mackerel can be seen in the left part of the echogram. It is clear that the echo from the schools becomes stronger with increase in frequency. This response is unique to mackerel and can be used to discriminate mackerel from other fish species.





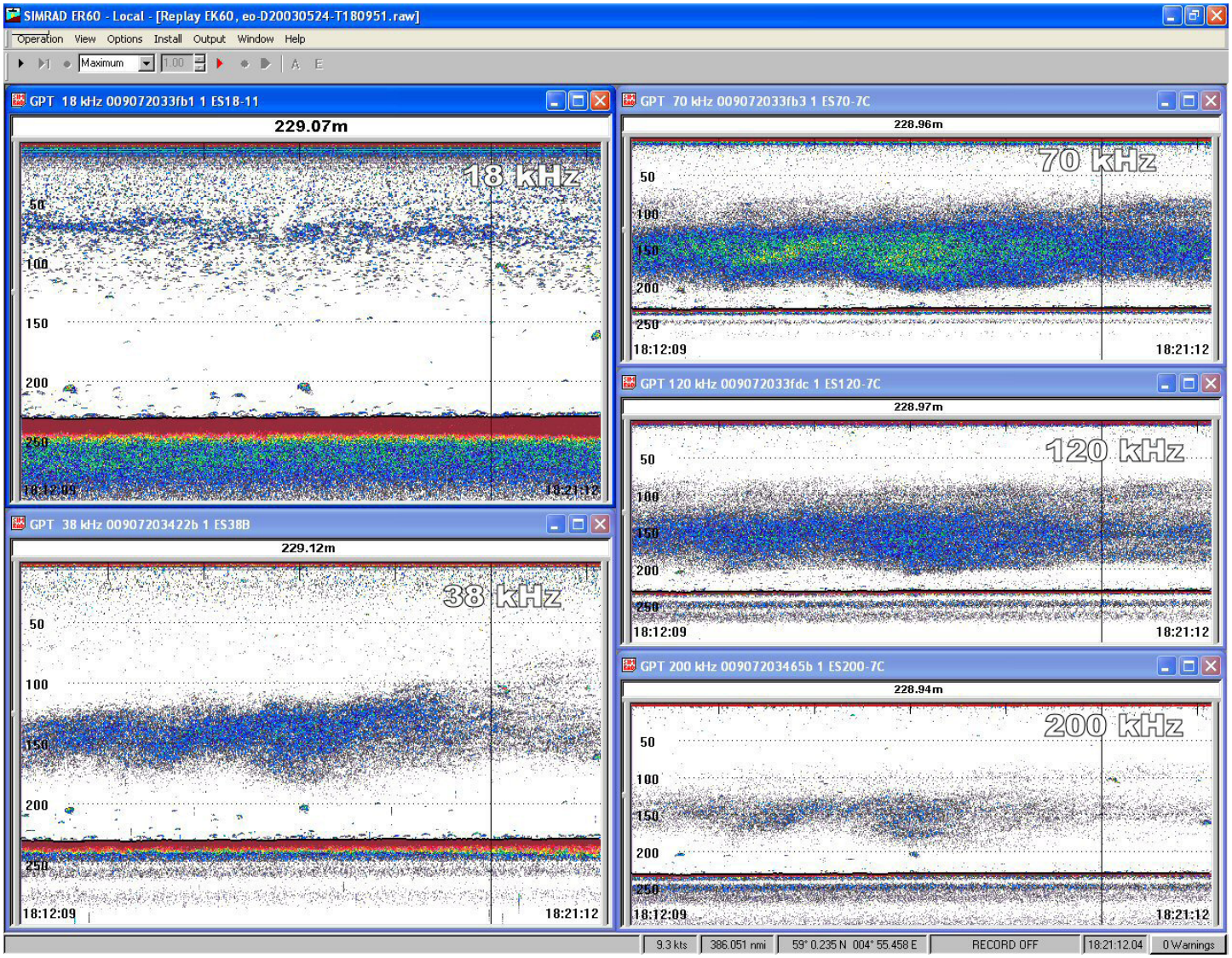
Acoustic signatures

The acoustic signatures of mackerel (A) and krill (B) can be used to separate and identify the species.

Example: Krill

The echograms below are a recording of a layer of krill at the same frequencies as above. As opposed to the mackerel, the strongest echo from krill is obtained at 70 kHz.

The frequency responses of mackerel and krill are clearly different and can be used to identify and discriminate these species.

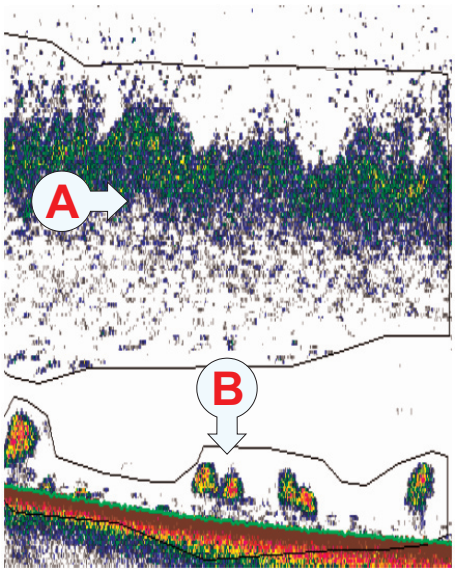


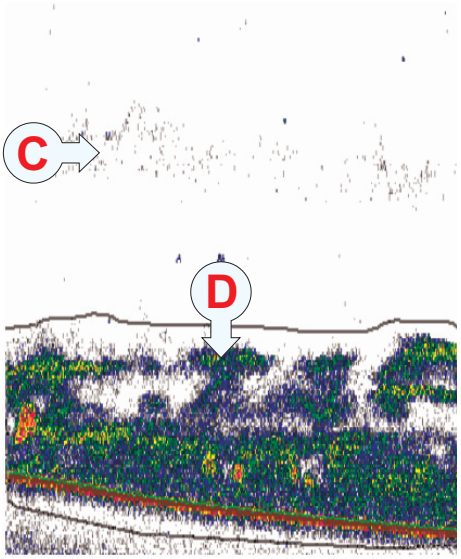
Multi-frequency echo sounder samples

Small organisms like many plankton species will normally have the strongest sound reflection in the higher end of this frequency range. The echograms below are kindly provided by NOAA. Using 18 and 200 kHz, they clearly demonstrate that the reflective properties of aquatic animals can be strongly frequency dependent.

These dual frequency echo sounder samples shows simultanous recordings of the same water column using two different frequencies. The echograms illustrate the detection of age-0 walleye pollock and capelin (A) and adult pollock (B) at a relatively low frequency (18 kHz), and the detection of age-0 pollock and capelin (C) and euphausiids and adult walleye pollock (D) at a higher frequency (200 kHz). These species-specific frequency-dependent differences in the acoustic data are useful in identifying the organisms which are responsible for the backscatter. Researchers are currently refining methods to discriminate species of interest based on their multi-frequency signatures.

The data is provided from a NOAA Alaska Fisheries Science Center survey conducted off Kodiak. The bottom depth is about 140 meters.

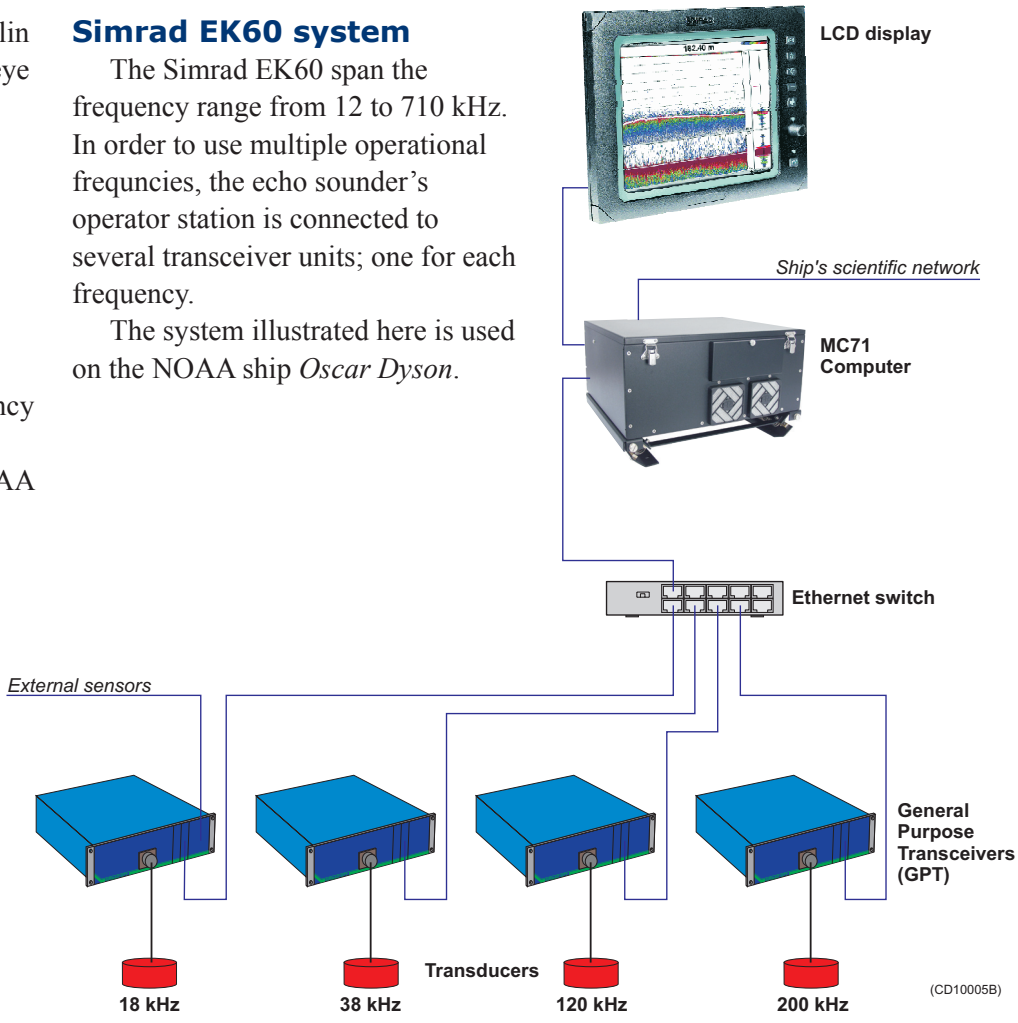




Simrad EK60 system

The Simrad EK60 span the frequency range from 12 to 710 kHz. In order to use multiple operational frequncies, 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*.



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