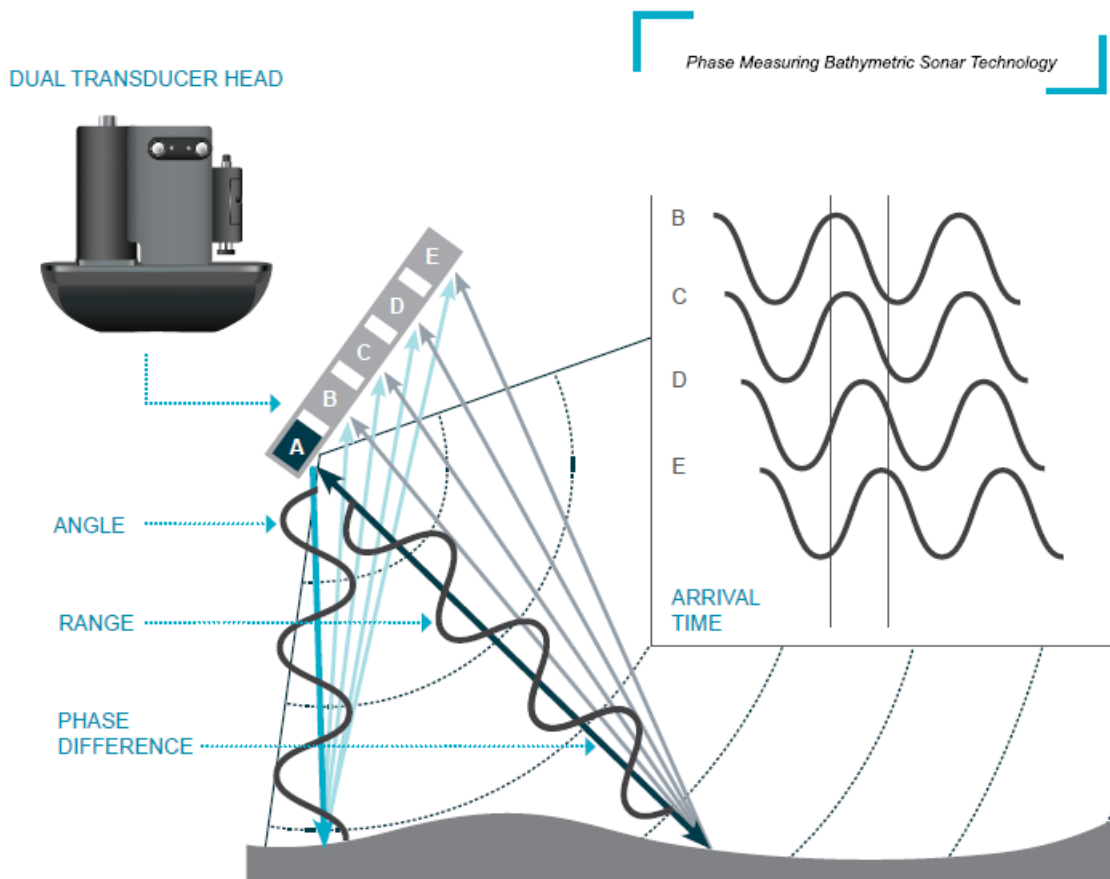


GEOSWATH PLUS COMPACT, FROM 2014 TO 2016.

DESCRIPTION:

An interferometric sonar can be considered a multi-stave side scan, collecting a wide swath of bathymetry up to 12 times depth and sonar amplitude data, with the angle of arrival of the seabed returns determined by phase comparison between the receive staves.

The Interferometric Sonar Geoswath Plus, is a very useful tool for shallow waters where the Special Order is required.



IHM owns three Geoswath Plus Compact (one 250 KHz and two 500 KHz).

Both models has two transducers located in a single-head system encapsulated into a single moulded part.

Each transducer array has five ceramic staves, one to transmit and four to receive.

Its dual transducers has a field of view of over 240 ° (Vertical) and two way beam of 0.5° (Horizontal) with an **effective** horizontal range for bathymetry up to 8 times depth (to accomplish IHO specifications in Special Order) in very shallow waters.

Both sonars, 250 and 500 kHz are deployed over-the-side pool mounted, on vessels of opportunity (small boats, RIBs, open vessels).

GEOSWATH PLUS COMPACT SET-UP

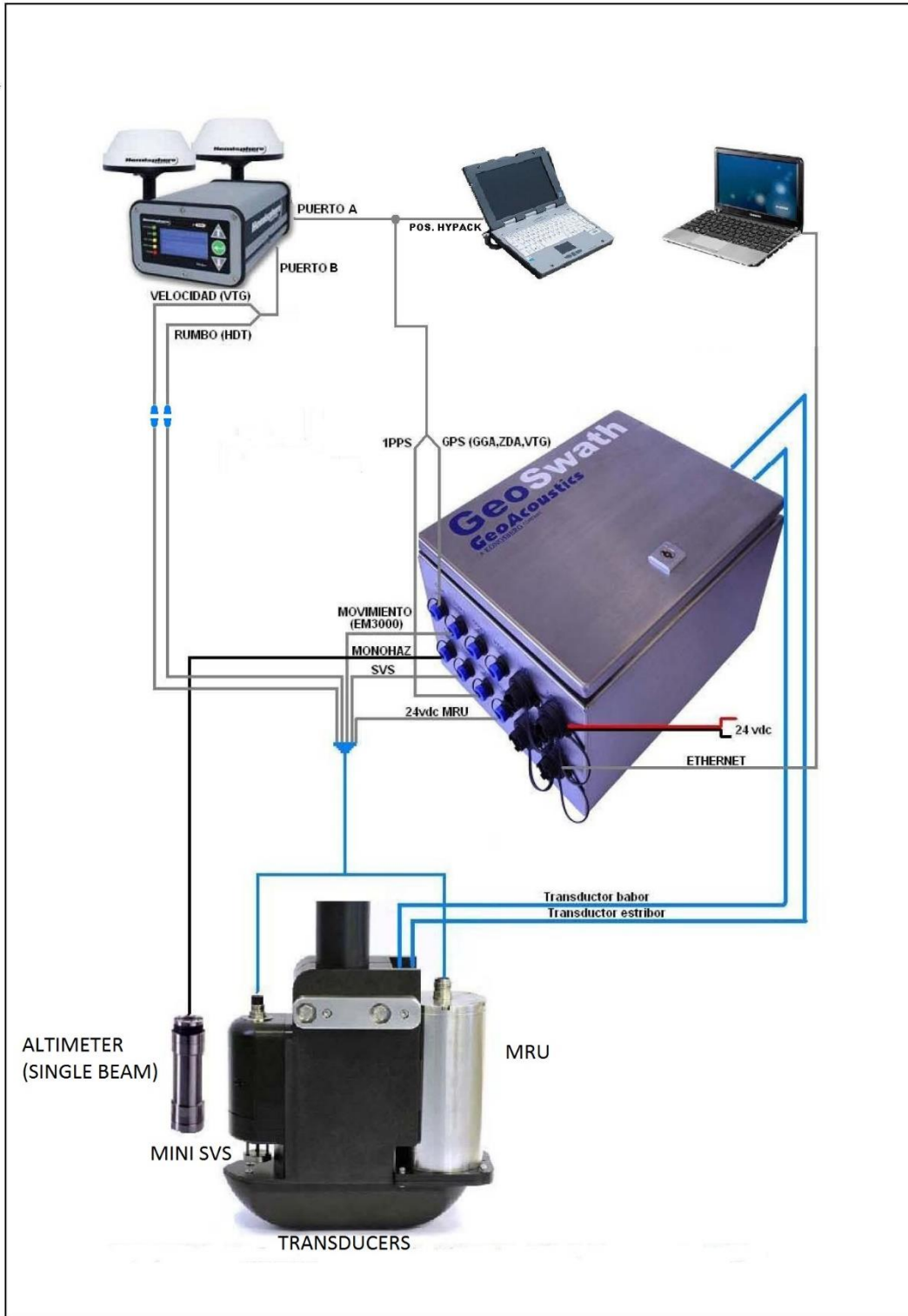
The typical set-up for over-the-side installation for small boat operations comprises the wet-end transducer t-plate, which holds the sonar head consisting of two transducers moulded into a single element for easy calibration.

In addition it holds a sound velocity sensor (MiniSVS), and altimeter (single beam echosounder) and a motion reference unit (MRU). The sonar head is deployed on an over-the-side pole together with the GPS and heading sensor.

This way the sonar system is separated from the vessel, which facilitates the calibration and makes the system truly portable.

The compact splash proof deck unit houses the sonar electronics together with an integrated PC. It runs of 24 V power supply. The system uses *GS4* software under Windows for data acquisition, system calibration, post-processing and data presentation. The software is operated from a laptop computer.

The vessel's position and heading sensors are obtained from a GPS receiver, and also linked to the deck unit.



GENERAL CONFIGURATION USED BY IHM

ADVANTAGES AND SHORTCOMINGS:

The main advantages of this equipment are the high performance in very shallow water in comparison to a multibeam (for example below 10 meters depth “8x GS vs 4x Multibeam”), and the geo-referenced Side Scan Sonar for a reliable bottom classification and object detection.

The shortcomings are listed below:

This system does not provide high data coverage within the nadir, so it is necessary to conduct a high overlap (no less than 100 %, 110 % recommended) between lines to meet the IHO specifications for “Special Order” for feature detection.

Furthermore, because of the high density of data collected during the acquisition (not only the thousands of seabed returns per ping, but also all the background noise), the interferometric systems required applying sophisticated filters during acquisition or during a pre-processing stage, in addition to be supported during the post processing stage (CARIS processing) by a reliable error model, such as The Combined Uncertainty Bathymetric Estimator (CUBE).

Because of this, data processing time and efforts are greater than the time spent processing regular multibeam data.

DIFFERENCE IN THE PROCESS WORKFLOW BEFORE AND AFTER GS4

With the previous software GS+:

The process work-flow was really slow. It was necessary to pre-process data applying filters to the raw data with the GS+ software, removing the background noise of acoustic and electronic origin, water column returns and surface backscatter. In addition, if the processing filters were not applied correctly, it was necessary to process the line again.

In addition, all the filtered points were discarded and could not be recovered in later stages. For example when it was processed in CARIS HIPS.

With the new GS4

GS4 replaced the GS+ software in 2015. This new software is a completely re-worked version of the GS+ software, providing higher performance and a contemporary graphical interface.

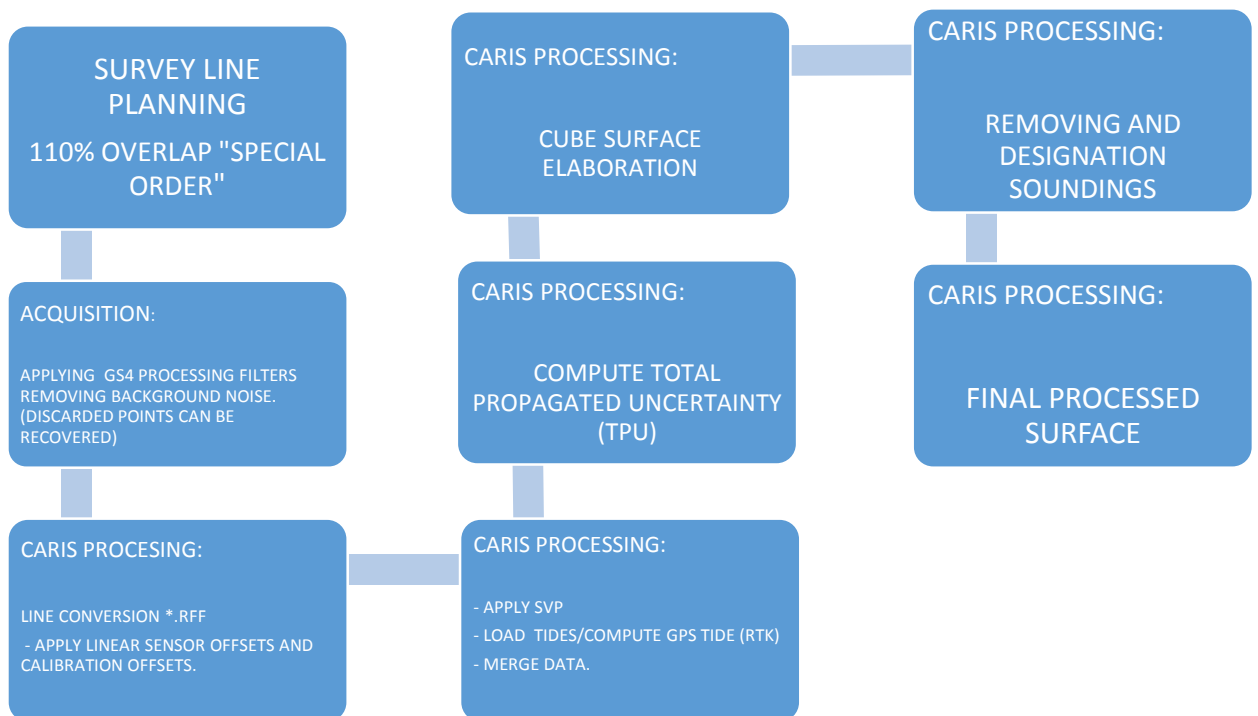
Furthermore, later versions of CARIS 9.022 allows to recover the discarded points filtered with all processing filters used in GS4 during the acquisition stage.

Because of that, it is possible to apply the processing filters during the acquisition survey and the raw data can be treated directly in CARIS HIPS without having to run the Processing Module in GS4.

In consequence, the combination of GS4 and CARIS 9.022 later versions, means a tremendous step forward, because the processing time seems to have been reduced considerably.

IHM has worked for the first time with this software version during last summer surveys conducted in the North of Spain getting very good results. However, we are still working to improve the process of acquisition and processing.

CURRENT GEOSWATH STAGES WORKFLOW (USING GS4 AND CARIS 9.022 OR LATER VERSIONS):



SURVEYED AREAS IN THE ATLANTIC WITH GEOSWATH PLUS COMPACT FROM 2014-2016:

See the slides in the presentation.