

LOGGING AND PROCESSING OF SURVEY DATA ON BOARD THE "DENEb"

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FOREWORD

The Survey, Wreck-Search and Research Vessel DENEb will shortly be the latest addition to the fleet of the Federal Maritime and Hydrographic Agency (BSH). Currently under construction at the Peene Yard in Wolgast, the DENEb is due to be commissioned at the end of 1994. She will be sister ship to the existing Survey, Wreck-Search and Research Vessels ATAIR and WEGA and will replace both the Survey Vessel C.F. GAUSS and the Survey and Wreck-Search Vessel DENEb.

1. SURVEY EQUIPMENT

Generally, the DENEb is to be equipped to the same high standard as the WEGA. In surveying terms, this means that surveying is to be performed from two survey launches and the ship itself on which the following positioning systems will be installed: Syledis, differential GPS and Polartrak. Soundings will be taken using a hydrographic echo sounder by Fahrenholz and a HYDROSWEEP-MD system by Atlas will be available for multibeam surveys. A roll, pitch and heave sensor, a CTD probe, various logs and, of course, a gyro will ensure correction of the survey results.

Like the WEGA, the DENEb will be equipped with a side-scan sonar - system for wreck-search purposes and will in addition be fitted with an OSS11Z object search sonar by Atlas-Elektronik. Again for wreck-search work, a complete set of diving gear — plus a decompression chamber — will also be available on board.

A newly-designed data logging and processing system will be installed on the DENEb in place of the now outdated and unreliable technology used on the

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WEGA. The new system shall encompass the whole range of surveying activities on the ship and launches — including multibeam surveying — and will include a LAN connection to the navigation system.

2. UNIFORM PROCESSING OF MULTIBEAM AND SINGLE BEAM DATA

Various systems — commercial and ones partly developed in-house — were compared in order to select a new data logging and processing unit. The decisive factor in the design of the new system was the realisation that single beam surveys are special cases in multibeam surveying. It therefore seemed appropriate to develop a joint system based on the existing one for multibeam data processing and so basic components of the WEGA's HYDROMAP300 system were modified for use on board the DENEb.

At the very least, the user interfaces for single beam and multibeam data processing were to be as uniform as possible. The main difference in processing the various types of data is found at the preprocessing stage, especially when correcting data to take account of the ship's roll and pitch and sound velocity. The new system corrects four types of data: auxiliary data, positioning data as well as single beam and multibeam depths.

Because the user interfaces are now unified, multibeam and single beam survey data are processed in one complex system that has become so large it no longer fits in the launches which are smaller and have less electrical power than the parent ship. Nevertheless, the launches are equipped with only a few sensors and have no multibeam system with auxiliary sensors. As most survey work is performed on the launches, however, their user interfaces must be identical with that on the DENEb.

3. DEPTH DIGITISING AND EDITING

Sea floor types in the areas surveyed by the BSH vary greatly. Data from muddy areas or those with vegetation are especially difficult to evaluate. This is why it has not yet been possible to process depths being digitized by the echo sounder. Instead, morphologically important depths are manually selected on the echogram and are digitized. In this way the depth positions are approximately shown in the grid in which they will later appear on the fair sheet.

In contrast, however, the new system stores all measured depths. Individual depths are automatically selected, depending on the scale of the fair sheet and local morphology. Next, the echogram is used to verify these depths using an interactive graphic editor. Depths can be deleted, new ones added and the position and value of individual depths can be changed, as indeed can the associated auxilia-

ry data such as sound velocities, tide corrections, etc.. The effects of changes can be followed on the screen.

In difficult areas, echogram recordings can still be digitized manually and the resulting values fed into the system. Experience will show whether the one or the other technique should later be used.

4. DATA TIME TAGGING

A critical aspect influencing the accuracy of the surveying results is depth positioning. Depths and positions are provided by various sensors — the echo sounders and, primarily, the various positioning systems.

All the data generated by these systems must be processed by the data logging system. In important areas, such as the edges of channels, where exact positioning of depths is essential, depth and position measurements must be time-tagged. To prevent an increase of no more than ± 1 dm in the positioning error, even when the ship is travelling at speed, time-tagging must have an accuracy of ± 0.01 s.

All sensors are thus initially connected to a so-called interface processor which in its turn is fitted with a real-time operating system and time-tags all incoming survey data. The data are then transmitted via a local area network and are stored in a server.

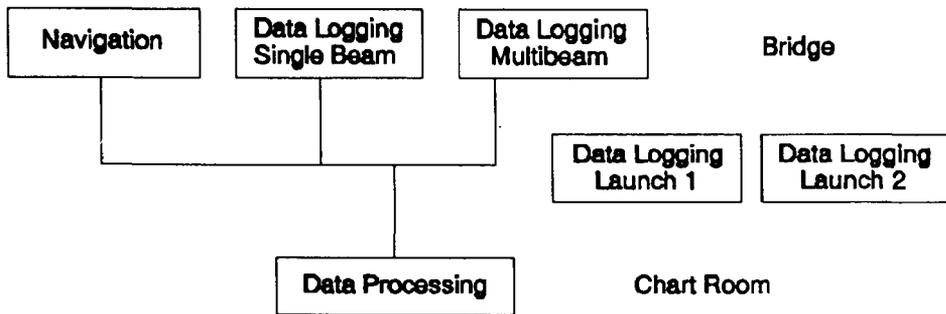


FIG. 1.- System configuration.

5. SYSTEM CONFIGURATION

The system is configured to correspond with the various functions as shown in Figure 1. Additionally available are a PC for CTD data capture as well as several PCs forming part of a data distribution system that displays the principal navigational and environmental data during research cruises and transfers them to data carriers. A screen is also available for the server in which all data are stored and which controls the local area network and the interface processor.

The DENEb system should thus meet all the survey requirements of the BSH. Through time, it is hoped to equip the other surveying vessels with the same uniform system. If and to what extent this aim is realised depends on how well the DENEb system functions.