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INES MOVIES : A NEW ACOUSTIC DATA ACQUISITION AND PROCESSING SYSTEM

N. DINER, A. WEILL, J.Y. COAIL and J.M. COUDEVILLE*

IFREMER, Département DIT/TNP Centre de Brest, BP. 70, F-29263 Plouzane, France

*ORCA Instrumentation, 38 Rue Jim Sévellec, ZI du Vernis, F-29220 Brest, France

Résumé :

Un nouveau système de traitement des données sondeur, appelé INES-MOVIES a été mis au point à l'IFREMER - Centre de Brest. Utilisant comme terminal un micro-ordinateur, compatible PC, cet équipement permet notamment de numériser les données sondeur, de les stocker sur support informatique, de les visualiser en couleur, d'en faire l'écho-intégration. Très simple de mise en oeuvre, il est adaptable à tous les types de sondeur et permet de travailler en temps réel mais également en rejou.

Abstract :

INES-MOVIES, a new powerful acoustic data acquisition and processing system, has been developed at IFREMER - center of Brest. Using an IBM-PC compatible micro-computer as terminal, that system, among other tasks, digitizes the returned echoes, can store all the data on the computer hard disk, displays in color the echoes, makes echo-integration. INES-MOVIES is an operational system which can be used by non specialized people and be connected to any type of echo-sounder. It also gives an help for TVG control and acoustic sphere calibration. The language of the software menus can be set to French, English or Spanish.

Underwater Acoustics give powerful tools to the scientific community related to fisheries and to the fishermen themselves. The analysis of the response of the medium to acoustic pulses is the basis of all echo-sounders. The more sophisticated the processing of the echoes is, the more valuable the displayed informations are both for the scientists and for the operational people as the fishermen.

Besides the numerous works that are being conducted on the acoustic part of the echo-sounders, the acquisition, processing and display subsystems have a more and more important place because they make all the informations included in the echoes available to the final user. Thanks to low cost and powerful micro computers, the acquisition of the signals and the sophisticated processing algorithms can be rapidly performed and the results can be presented in real time on colour video displays. IBM PC compatible computers are now widely used and are commonly found aboard research vessels and fishing ships.

Within the framework of its fisheries Acoustic Research Program, IFREMER, the French Ocean Agency (Institut Français de Recherche pour l'Exploitation de la Mer) has developed a new powerful acoustic data acquisition and processing system.

INES-MOVIES

INES, an acronym standing for Interface de Numérisation des Echos de Sondeurs (Acoustic echoes digitization system), is a device which is connected to the echo-sounder and to a micro computer. It digitizes the returned echoes, preprocesses the numerical data and transfers them to the computer.

MOVIES, an acronym standing for Module pour la Visualisation, l'Intégration d'Echos et leur Stockage (Echo-integration, display and storage module) is the name of a powerful user-friendly software which enables the computer to process the raw data (echo-integration, detection, bottom detection, depth ...) in real time, to display the results on a color video screen and to store all the processed results which can then be analysed after the survey.

INES-MOVIES is an operational system which can be used aboard middle or little size vessels by non-electronic and non-software specialized people.

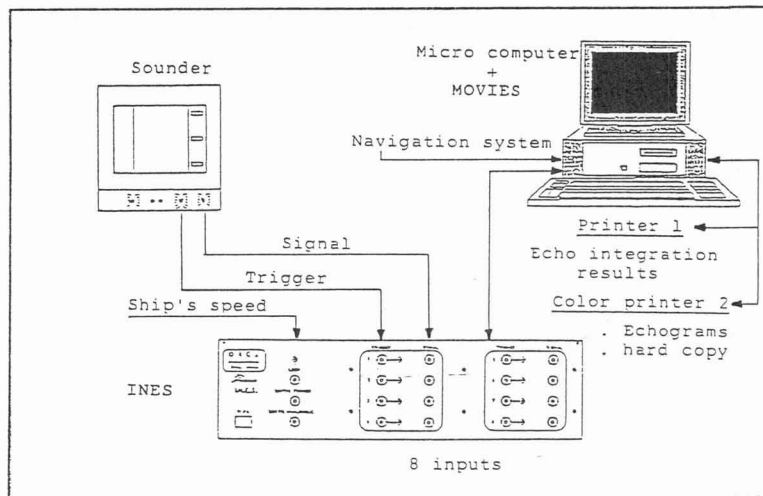
GENERAL DESCRIPTION

Fig 1 : INES-MOVIES block diagram

Figure 1 shows a block diagram of the system. INES can be connected to any type of echo sounder : analog signal and trigger outputs are the only two needed signals. The maximum usable frequency is 200 kHz.

The outputs of the ship's navigation receiver and log (loch) can also be connected ; the ship's position, speed and the sailed distance are automatically computed.

MOVIES software is stored on floppy disk and is compatible with all IBM-PC compatible computers. INES is connected to the computer through a bidirectional 16 bit parallel data link.

Two printers can simultaneously be connected : the first one, a standard printer, is used to log the echo-integrated data, the second one, a color graphic printer, prints the echograms.

WHAT IT DOES :

After connecting INES to the echo-sounder and to the computer, the user is able to get many valuable informations from the analog returned signal, in real time, just by using the MENU type software which is showed on the color screen.

Among the many capabilities of INES-MOVIES one can list :

- Digitization of the acoustic data including the bottom echo
- Water depth computation
- Storage of the all data on the computer hard disk or diskette : detection, echo-integration, depth, ship's speed and position, sailed distance, date ...
- Echo-integration on 10 surface and 4 bottom locked layers. The ship speed and the ping rate can be taken into account for this process.
- Real time color display at sea or play back of the echoes in the lab ; color copy of the data can be made on a color printer.
- Help to the user for TVG control and acoustic calibration : automatic computation of TVG errors at different depths, of the echo-sounder source level and voltage response (SL + VR) and echo-integration constant.

Besides these numerical processing, D/A circuits convert into an analog signal the processed data which can be recorded on a magnetic tape recorder but which can also be displayed on a standard paper chart recorder to take advantage of the process which optimizes the signal. A standard triggering signal is also available for recording.

INES : Mechanics and Electronic circuits

INES can be either mounted in a standard 19 rack or used as a table top equipment.
 INES is powered by a standard 220 VAC supply.
 The electronic printed circuit boards are compatible with the GESPAC - G 96 standard. Seven

"Simple EUROPE" cards are mounted in the rack. Three of them are standard cards, the four others have been specifically developed.

Eight echo-sounders inputs (8 analog signals and 8 triggering signals) can be connected.

INES performs the following functions :

- choice of one channel between the 8 inputs
- gain programming
- A/D conversion of the signal (12 bits - sampling frequency : 7.5 kHz)
- data thresholding and compression
- automatic bottom finding and following
- ping rate computation
- ship's speed determination
- analog output of the processed data with a standard trigger

Any type of echo-sounder can be connected to one of the 8 inputs. Each input has a divider which can be adjusted to fit the circuits specifications.

For triggering, positive or negative edges are accepted. To compute the ship's speed, only the pulsed signal is needed (10 to 800 pulses per nautical mile).

MOVIES SOFTWARE

Real time analysis can be performed by MOVIES when INES is connected to the computer and to an echo-sounder.

Play back analysis can also be made with MOVIES, in the lab ; in that case the data have to be stored on the hard disk or on diskettes.

MOVIES is a user friendly MENU driven software. The user can choose between different data processes the one he wants to be done. The language of the menus can be set to French, English or Spanish.

MOVIES can be divided into 4 parts :

- a/ Real time acoustic data processing
 3 main menus can be used : INES setting, Display and storage, Echo-integration.
- b/ Play-back (replay) : Choice of the file to be read and processed, Display, Echo-integration.
- c/ system configuration
 The user defines what he is using : type of printer, user outputs, vessel speed log, type of data storage device, language.
- d/ INES tests
 This menu is maintenance oriented : the user can reach the link between INES and the computer, the gain of each channel.

COLOR DISPLAY

The acoustic data are displayed on the computer screen with 8 different colors. Each color represents a certain level of the echo strength. The table "color versus echo strength" can be changed by software. A threshold, used also as an echo-integration threshold, can be displayed.

Vertical and horizontal (a line every 0.1 mile) scales are also displayed.

When the echo-integration menu has been chosen, all the different layers are appearing on the screen. It is possible to display 3 analogic deviations : all the detections (dark), detection of one surface layers (green), the ones of the one bottom locked layer (red).

Different display modes are selectable :

- a) normal :
 The whole video screen is used to display the echograms. In the lower part of the screen, the number and the gain of the chosen channel are displayed with the threshold, the vessel position and speed, the water depth, the date and hour and, upon request of the user, the name of the file which is currently stored or replayed.
- b) Scope
 In that mode, 1/4 of the screen is used for displaying the echoes which are color coded depending on the received level.
- c) bottom expansion
 Half of the screen shows an expanded bottom locked layer.

If the user wants to "freeze" a screen to analyse the displayed data, a pause can be made. In that case the coming new data are stored in a virtual screen and are not lost. This feature is also available when using a menu in real time. Color echograms can be printed on the color printer which can also be used, in replay mode, to get hard copy of the screen. MOVIES software have been run on different brand of PC compatible computers without any trouble.

INES-MOVIES tests

INES-MOVIES has been first tested in the lab with data stored on tape. After these tests, actual at-sea surveys have been made aboard several ships : THALASSA (66 m long), THALIA (20 m long), GWEN-DREZ (25 m long) with various echo-sounders :
- SIMRAD EK 400, SKIPPER 38 kHz, FURUNO FE 881, KODEN CVS 888, BIOSONICS.
It has also been connected to prototypes such as a multibeam echo-sounder (INES was connected to one beam) or a wide band echo-sounder. All the results were successful. Each time it was used, INES-MOVIES demonstrated its reliability, its ability to withstand at-sea conditions, and its easiness of use.

USES/CONCLUSION

INES-MOVIES is very well adapted to acoustic survey, fish stock assessment, at sea or on lakes, by acoustic methods, and all the programs which need echo sounders : bathymetry, planctonic detection, demersal and pelagic trawling, marine geology... Play-back capabilities enable the user to play-back the at-sea acquired data to analyse them in the laboratory.

Many scientists will certainly find a great interest in INES-MOVIES. It offers unequalled performances, can be connected to any sounder.

User friendly software can be used by non qualified people

This equipment is manufactured by ORCA instrumentation, a new company which has been created by people who worked for 15 years with IFREMER.

REFERENCES

PERSON (R.), MARCHAL (E.), TERRE (T.), BERTHE (J.), 1982. -Système d'écho-intégration numérique pour l'évaluation des stocks AGENOR. - Symposium sur les techniques acoustiques appliquées à la pêche, Bergen, Norvège, 21-24 juin 1982.