

A DIRECT DIGITAL ACQUISITION SYSTEM

by

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The low dynamic, the flutter and skew of analogue tape recorders cause considerable distortion of the signals used in underwater acoustic experiments. Digital recorders do not suffer from these shortcomings but are lacking in capacity and endurance.

The SANDRA system described below (SANDRA = Système d'Acquisition Numérique Directe pour la Recherche Acoustique) is a combination of two methods using the principle of high density digital recording with analogue recorders. This equipment, which SACLANTCEN helped to specify, will cost \$ 200 000 (including all taxes and custom duties). It is now being completed and will be available in spring 1972.

The system consists of:

A shipboard assembly [Fig. 1] with the following functions:

- Multi-channel collection of analogue information,
- Multiplexing, analogue/digital conversion,
- Generation of synchronization and parity-check signals,
- Recording on magnetic tape,
- Recording check.

A laboratory assembly [Fig. 2] with the following functions:

- Reading of magnetic tape,
- Reshaping and resynchronization of digital signals,
- Localization of useful signals,
- Transfer to computer.

The principle features of this assembly are:

Maximum sampling frequency: 240 kHz,

Number of analogue channels: 1 to 60,
(from 1 channel sampled at 240 kHz to 60 channels sampled
at 4 kHz),

Input dynamic: 84 dB (14-bit + sign sampling)

Accuracy: better than 1% (floating point conversion:
exponent 3 bits, mantissa 8 bits),

Digital recording density: 12 000 bits per inch.

The useful signals are distributed over ten magnetic tracks after insertion of longitudinal parity words and synchronization words. The 11th track is solely for coded time signals; the 12th is for transverse parity words. The two outer tracks are not used for digital recording but for auxiliary signals such as voice.

Transfer to the computer is carried out in 12-bit words in parallel at a maximum rate of 12 000 words per second by reducing the reading speed accordingly. Only useful signals are transferred owing to the use of the localization device (time code reader) which permits delimitation of useful sequences up to 1 ms.

The expected error-rate is of the order of 10^{-7} but could be further improved to 10^{-8} through correction of some parity errors by an appropriate computer program.

SANDRA SHIPGOING ASSEMBLY

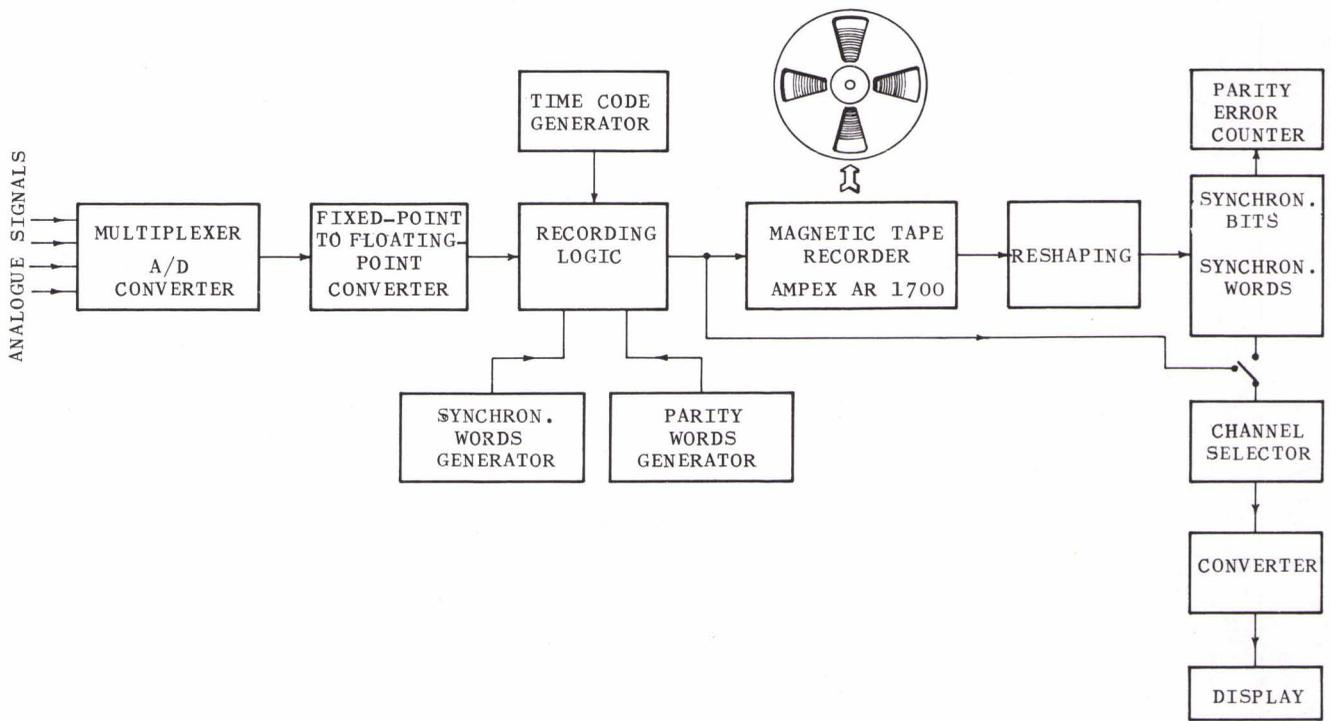


FIG. 1

SANDRA LABORATORY ASSEMBLY

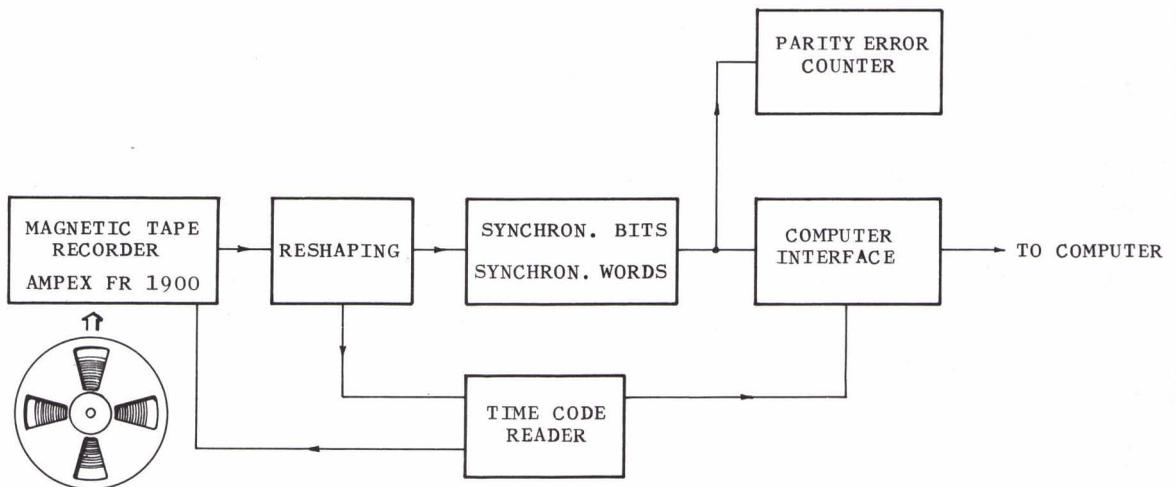


FIG. 2