

(Paper presented in two parts)

PART I

CONTINUOUS RECORDING OF ACTIVE SONAR DATA

by

A.D. Waite
Admiralty Research Laboratory,
Teddington, Middlesex, U.K.

An experimental active sonar was described followed by a description of the digital data recording method at present planned and concluded with a proposal to use a video tape recorder to replace the digital tape recorder.

The sonar will not be described in this unclassified abstract, it is sufficient to say that the signals leave the receiver signal processing in the format shown in Fig. 1.

This format is suitable for digital recording on 7 tracks at 556 rows per inch. The tape recorder speed is 36 inches per second giving a total record time of 13 minutes for a 2400 ft tape length. Three hundred and sixteen amplitude and phase samples are recorded every 16 milliseconds followed by a gap of 4 bytes (during which time no read clock pulses are generated). The read clock pulses are used to index phase and beam counters and these are reset by a gap detection circuit every 16 milliseconds.

The contents of the beam and phase counters, together with the amplitude samples are assembled into words as shown in Fig. 2 ready for input to the data processing computer. There are two sonar input channels (SIC 1 and SIC 2); SIC 1 accepts the basic resolution samples and SIC 2 post detection integrated samples.

The method of data recording chosen is just adequate for the present sonar, but a full system presenting the computer with four times the samples would require a bit density per second not sensibly achievable using currently available digital tape recording systems (it would be necessary to go to 1600 rows per inch and to run at 75 inches per second giving a total record time of only 6 minutes which would be unacceptable).

Alternative methods of recording are being investigated to overcome these drawbacks, in particular a proposal to use a video tape recording system. This proposal is described in detail in Ref. 1. Because of the advanced development of the sonar and computer it is not possible to change the agreed digital recording format which may not be optimal for a fully serial recording system and therefore the video recorder system is designed to accept the 7 bit (6 data+parity) bytes, converting to serial in an input shift register and converting to parallel form at playback as shown in Fig. 3.

A comparison of three recording methods, digital, video and instrumentation/digital (as the SACLANTCEN method) is shown in Fig. 4.

The video system affords an intermediate solution at around the 1 Megabit per second bit density region, and a very significant advantage in record time for a given length of tape. A record time of about 1 hour is very important for real time data recording of active sonar, both for satisfactory analysis by computer and for sonar operator training in operational situations.

The tape cost comparison was justifiably criticised at the conference.

A simple comparison of existing systems is shown and strictly, for true comparison, allowance should be made for the different bit densities of the system.

REFERENCES

1. "Technical Proposal for a Digital Recording System for A.U.W.E.", Document Ref. No. MCP 8027, Issue 2, EMI Electronics Ltd., Wells, Somerset, U.K.