

## Real time Aanderaa current meter data collection system

K Ashok Kumar & S G Diwan

Ocean Engineering Division, National Institute of Oceanography, Dona Paula, Goa 403 004, India

Received 4 March 1992; revised 23 March 1993

Aanderaa current meters are widely used for recording the current speed and such other 4 parameters by deploying them over extended period of time. Normally data are recorded on magnetic tape and after recovery of current meters, data are read in laboratory. In this paper a method is described to read the real time current meter data and display/print/store on cartridge. For this, binary coded electrical signal available at the top end plate of the current meter is connected by underwater cable running from the Aanderaa current meter deployed near the offshore platform to microprocessor board EC-85 interfaced to HP-85B personal computer housed in the platform cabin.

Aanderaa current meters RCM-4/5 are used for measurement of parameters like seawater temperature, conductivity, pressure, current direction and current speed. For this they are deployed in the sea for desired period of time. After recovery of the current meters the data recorded on magnetic spool is analysed using Aanderaa tape reader 2650, interfaced to a personal computer in the laboratory. Some of the end users of the data were interested in getting the real time current meter data on the offshore drilling rig/platform. Hence a need arose to convert self recording Aanderaa current meter into a real time data recording system.

The objective of the present work is to show the feasibility of converting Aanderaa self recording current meter into real time measurement of current and such other parameters on offshore platform. The hydrophone link with acoustic transmission from Aanderaa current meter can be used for real time data collection system. However data obtained by this method is not reliable in shallow water due to multiple reflections from the sea bottom. Hence, a new technique by connecting the underwater electrical cable between current meter end terminal and personal computer onboard the offshore rig/platform is used to obtain real time data.

The output pulses at the electrical terminal of the Aanderaa current meter are generated by the rotary encoder during the measuring process and consist of 10 short or long binary pulses, called a word for each channel (Fig. 1). As set of 6 words coming in sequence as reference number, temperature, conductivity, pressure, current direction and current speed makes one record covering about 26 sec period, it is possible to tap each word, compute N value and hold it till the next word arrives. This electrical signal available at

the current meter top end plate has a 5 V negative binary logic and to make it compatible to SID (serial input data) line of microprocessor board EC-85, an operational amplifier based inverter is used<sup>1</sup>. The reason to use commercially available microprocessor board EC-85 is that it is versatile, powerful and easily configured, thereby speeding up development time and producing reliable hardware. The microprocessor software is developed in assembly language so as to monitor the output, track the binary ZEROS and ONES flowing in, to calculate 10 bit binary word. The software developed for computer system is shown in the flowchart (Fig. 2). It identifies N value in decimal number and by inserting it in the following equation computes different sensor parameters. The various sensor constants are calibrated and provided by the manufacturers. The equation is as given below:

$$S = (A + a) + (B + b) + \times N + C \times N \times N + D \times N \times N \times N$$

where S is sensor parameter in appropriate unit and A, a, B, b, C, D are individual sensor constants.

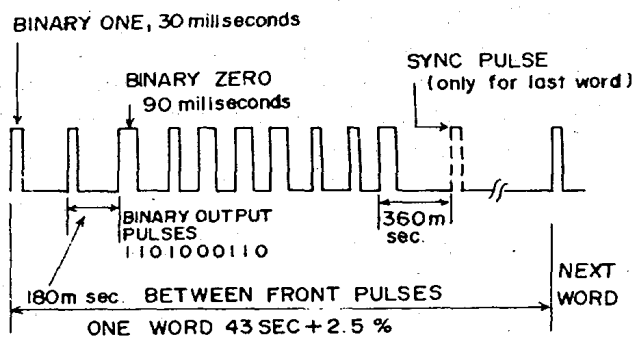


Fig. 1—Output pulses of the current meter

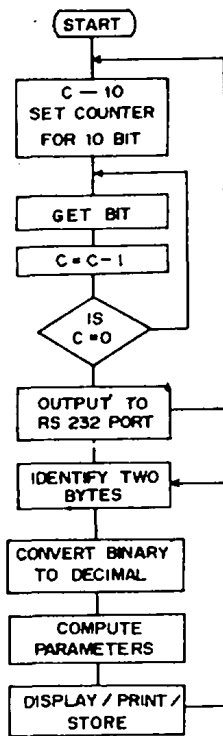


Fig. 2—Flow chart for computation of Aanderaa current meter parameter

The serial interface 82939A board is plugged into one of the ports of HP-85B and its mating connector is connected to RS 232C port of microprocessor board. The 10 bit word is converted into two bytes of eight bits each in the microprocessor board. The first byte is a least significant byte and it is transmitted to personal computer. The second byte is most significant byte. In this byte only lower order two bits are significant and other bits are zeros. The HP-85B PC port will wait till two bytes of information is received from microprocessor board. After identifying these two bytes and computing the 10 bit data word the program calculates the actual parameter value using the above equation and corresponding sensor constants. Flow chart (Fig. 2) explains the logic used for computation of sensor parameters. Depending upon necessity these values can be printed or stored on magnetic cartridge. After computing one parameter val-

ue, the PC will start searching for the incoming information from the microprocessor board. The gap between successive words sent by current meter is 4 sec. When next 2 bytes arrive the HP-85B system will compute the corresponding sensor parameter as described above. The computer serial port always waits for the information from the microprocessor board.

The Aanderaa current meter mooring consists of vinyl float set followed by current meter and mooring rope connected to sinker sitting at the bottom. The electrical signal available at the top end plate is taken through a water proof electrical mating plug connected to underwater electrical cable. This cable is tied in few loops along the rope coming from vinyl float to rig in order to avoid stress, entanglement or cuts in the cable. The interconnection of the cable was covered by water proof rubber sealant. The other end of the cable was connected to EC-85 board interfaced to HP-85B installed on the rig in a cabin where AC mains power supply is available. The current meter was deployed from ONGC rig off Ravva at 10 m water depth and continuous data was collected for two days.

The printout parameters on HP-85B were compared with the parameters obtained by reading the recorded magnetic spool on Aanderaa Tape Reader 2650 interfaced to IBM compatible PC. The results were matching fairly well.

It can be concluded that the instantaneous data obtained by real time measurement is of immediate use for controlling offshore activities. The data loss is minimised in case of malfunctioning of the current meter. Compared to hydrophone receiver the data obtained by this method is more reliable. This system eliminates the use of Aanderaa Tape Reader 2650 as data is stored on HP-85B cartridge. Instead of HP-85B PC an IBM compatible personal computer can be used with slight modification in the software.

Authors are grateful to Dr B.N. Desai, Director, Dr B.U. Nayak, Deputy Director and Dr N.M. Anand for their keen interest and encouragement.

#### References

- 1 Diwan S G, Ashok Kumar K & Prabhu Desai R G, *Indian J Mar Sci*, 18 (1989) 43.