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EXPOSURE. A NEWSLETTER FOR OCEAN TECHNOLOGISTS. VOLUME 8. NUMBE--ETC
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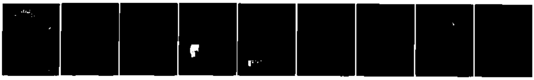

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EXPOSURE

vol. 8 no. 4

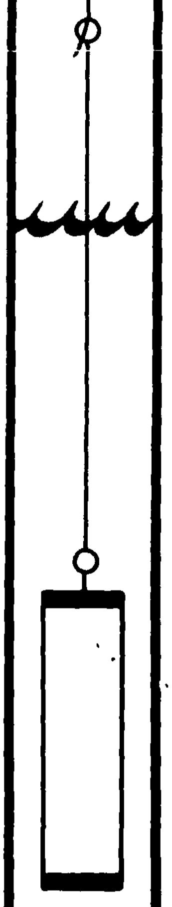
a newsletter for ocean technologists

# LSI Interface For Seadata Reader

A Seadata Model 12A cassette reader has been interfaced to an LSI 11/2 microcomputer in order to allow a quick-turnaround look at data. Many instruments in the Pacific Marine Environmental Laboratory use Seadata cassette recorders for data storage. Before deployment, the instruments must be tested and the data recorded on their test tapes must be inspected to insure the proper operation of the instrument. This phase of the pre-deployment test procedure has been sped up dramatically by using the LSI 11/2 to read, format, and print the test data. It should be emphasized that this system is intended primarily for use with test tapes where the total volume of data is less than 0.5 megabits.

## Hardware Interface

The hardware interface between the LSI-11 and the 12A consists of a custom-built latch board, which resides inside the 12A reader, and a DRV11 parallel interface board, which plugs into the LSI-11 backplane.



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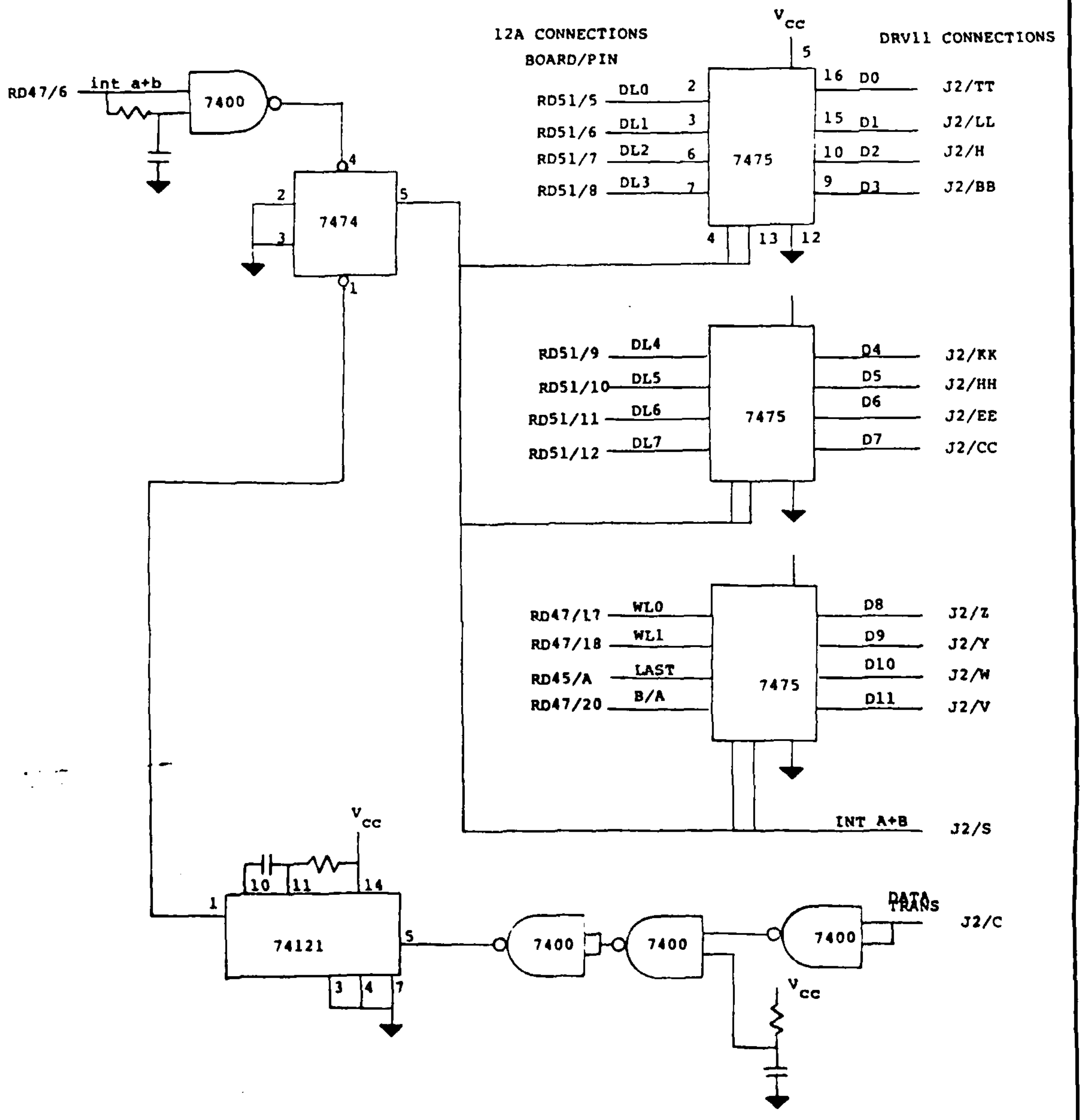

FIGURE 1. Latch board diagram showing connections to the 12A reader, and the DRV11 interface board.

The latch board latches the current data and the interrupt signal from the reader. This data is then held until the LSI-11 returns a "data accepted" handshake signal. A diagram of this latch board is shown in Figure 1. The board was mounted inside the reader, and a separate backpanel connector was installed for the latched outputs. In this way, none of the existing features of the reader were interfered with.

## Software

The software interface for this system consists of a main program written in FORTRAN, and some FORTRAN-callable subroutines written in MACRO, the LSI-11 machine language. The MACRO subroutines are responsible for handling the Seadata interrupts, and some data manipulation tasks.

From a users standpoint, the program asks for the number of data words in a frame and the number of bits in each word. Once this information is supplied, the user is instructed to start the reader. A typical data format entry is shown in Figure 2. While the reader is running, the LSI-11 is buffering the data into memory. After all the data has been read, the operator types an "E" signifying the end of data. The LSI then types the data on the printer according to the format received from the user. The data shown in Figure 3 is formatted as shown in Figure 2.

```
PLEASE ENTER THE NUMBER OF DATA WORDS PER FRAME:7

IS 7 THE CORRECT NO. OF WORDS PER FRAME?
Y

ENTER THE NUMBER OF BITS PER DATA WORD
(IN ORDER)  FOR A DATA FRAME.
24
24
24
8
8
16
24

IS THE FOLLOWING THE CORRECT DATA FORMAT:
  24
  24
  24
   8
   8
  16
  24
Y

START THE READER NOW.
```

FIGURE 2. Typical data format entry.

In addition, the software generates a frame count (the first column in Figure 3), and displays the Seadata error word which is generated by the 12A reader (the last column in Figure 3). The data can be formatted to have any integral number of Seadata characters per word. Figure 4 shows the same data as shown in Figure 3, configured as eight words with 20, 4 12, 12, 32, 8, 20, 20 bits per word. Currently, the data is printed in HEX; however, options are planned to allow octal or decimal printouts also.

```
42   01017D   0101FF   010101   3F   7F   0101   010101   0F
43   01017D   0101FF   010101   3F   7F   0101   010101   0F
44   01017D   0101FF   010101   3F   7F   0101   010101   0F
45   01017D   0101FF   010101   3F   7F   0101   010101   0F
46   01017D   0101FF   010101   3F   7F   0101   010101   0F
47   01017D   0101FF   010101   3F   7F   0101   010101   0F
48   01017D   0101FF   010101   3F   7F   0101   010101   0F
49   010101   010101   010101   07   01   010B   657B01   0F
50   010101   010101   010101   65   7B   0101   010101   0F
51   010101   010101   010101   65   7B   0101   010101   0F
52   010107   010105   010107   65   7B   0101   010101   0F
53   010105   010105   010105   65   7B   0101   010101   0F
```

FIGURE 3. Print-out of data as formatted in figure 2.

```
43   01017   D   010   1FF   0101013F   7F   01010   10101   0F
44   01017   D   010   1FF   0101013F   7F   01010   10101   0F
45   01017   D   010   1FF   0101013F   7F   01010   10101   0F
46   01017   D   010   1FF   0101013F   7F   01010   10101   0F
47   01017   D   010   1FF   0101013F   7F   01010   10101   0F
48   01010   1   010   101   01010107   01   010B6   57B01   0F
49   01010   1   010   101   01010165   7B   01010   10101   0F
50   01010   1   010   101   01010165   7B   01010   10101   0F
51   01010   7   010   105   01010765   7B   01010   10101   0F
52   01010   5   010   105   01010565   7B   01010   10101   0F
53   01010   3   010   103   01010365   7B   01010   10101   0F
54   01010   1   010   101   01010165   7B   01010   10101   0F
```

FIGURE 4. Same data as in figure 3, but with different data format.

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# A Means Of Obtaining Offshore Beach Profiles By Helicopter

Offshore beach profiles in open ocean environments are notoriously difficult to obtain. Changes in the offshore beach contour frequently occur after extreme storm conditions, and in the aftermath of these conditions it may not be possible to operate the shallow-drafted small craft[1,2] needed to obtain offshore beach data. Most open ocean beaches have a permanent swell present and hand lining or using an acho sounder in these conditions is hazardous and likely to produce inaccurate results. A helicopter was available during a recent exercise to monitor sand movement over an offshore pipeline, and it was decided to use it in conjunction with lowered instrumentation to obtain offshore beach profiles.

For initial uncorrected field measurements, the instrumentation package consists of a lowered absolute pressure transducer with a voltage regulator, and conducting cable to a display unit in the helicopter (Figure 1). Compensation of the pressure transducer for barometric

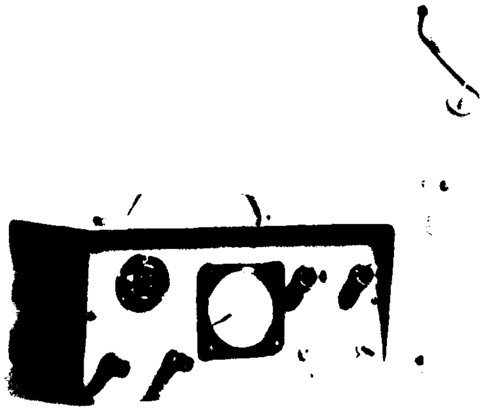

Figure 1. Electroplumb Instrumentation. (Subsequently holes were drilled in the sensor casing to assist free flooding.)

pressure and wave-induced pressure variations has been incorporated into the unit with manual zeroing and electronic filter circuits. The depth in meters is displayed on the front panel with an analog meter. Output terminals, also on the front panel, provide the option of using a 3 1/2-digit digital meter for increased depth measurement resolution. Copies of the instrumentation specifications and schematics can be obtained from the author.

Another pressure-related variable in beach profile measurements is due to the tide level. Tide information is commonly available from separate tide recording systems and it may also be obtained by interpolation from tide tables. Appropriate time related tide heights for the area being profiled are necessary for subsequent data reduction to compute beach profiles relative to coastal datum.

The transducer is connected to the display unit with a 50-m length of 4-conductor p.v.c. cable. This cable is strong enough for deploying the weight of the ballasted transducer package. On the cable is a buoy (of the type used in Aanderaa current meter installations) which is free to move up and down the cable. The door of the helicopter is removed to allow the cable to be deployed and recovered.

The helicopter crew consists of a pilot, surveyor, and winchman. Installed on the helicopter is the master unit of a Decca Trisponder system which functions with two slave stations on accurately surveyed onshore sites. The master Decca Trisponder unit has two digital displays which indicate the distance to the nearest meter and to the left and right slave stations.

Prior to the exercise the surveyor prepares a list of stations to monitor which coordinates the helicopter positions relative to the surveyed slave stations. Each member of the crew is connected to a portable intercom system featuring noise-cancelling boom microphones and a separate control box giving individual control of levels, push-to-talk switches, etc. This unit was designed and built by the department expressly for this exercise.

After take-off, the surveyor, noting the Decca Trisponder readout, talks the pilot onto the station position. Then, when on site, the winchman is given instructions to lower the transducers and, as the transducer is lowered to the bottom, the buoy floats up the cable and remains on the surface with the weighted transducer securely on the bottom. The pilot, having received word that the transducer is on the bottom, lays back the helicopter. Then the winchman pays out the cable as necessary until the pilot is able to sight the buoy through the lower front window of the helicopter. He positions the helicopter into the wind for minimum disturbance and, using the buoy as a position reference, maintains the helicopter on station. Meanwhile the winchman notes the display reading and the transducer is then recovered as the buoy slides down the cable until it meets the transducer's bridle mount. The operation is then repeated at the next station.

The crew engaged in this exercise has carried out many surveys and has perfected the technique to the extent that 40 stations have been monitored in a 3-hour flying exercise. Figure 2 illustrates some typical offshore profiles using the helicopter and "Electroplumb" instrumentation.

It is apparent that the system can be extended to replace standard lead lines on survey craft since a catenary in the cable does not affect the

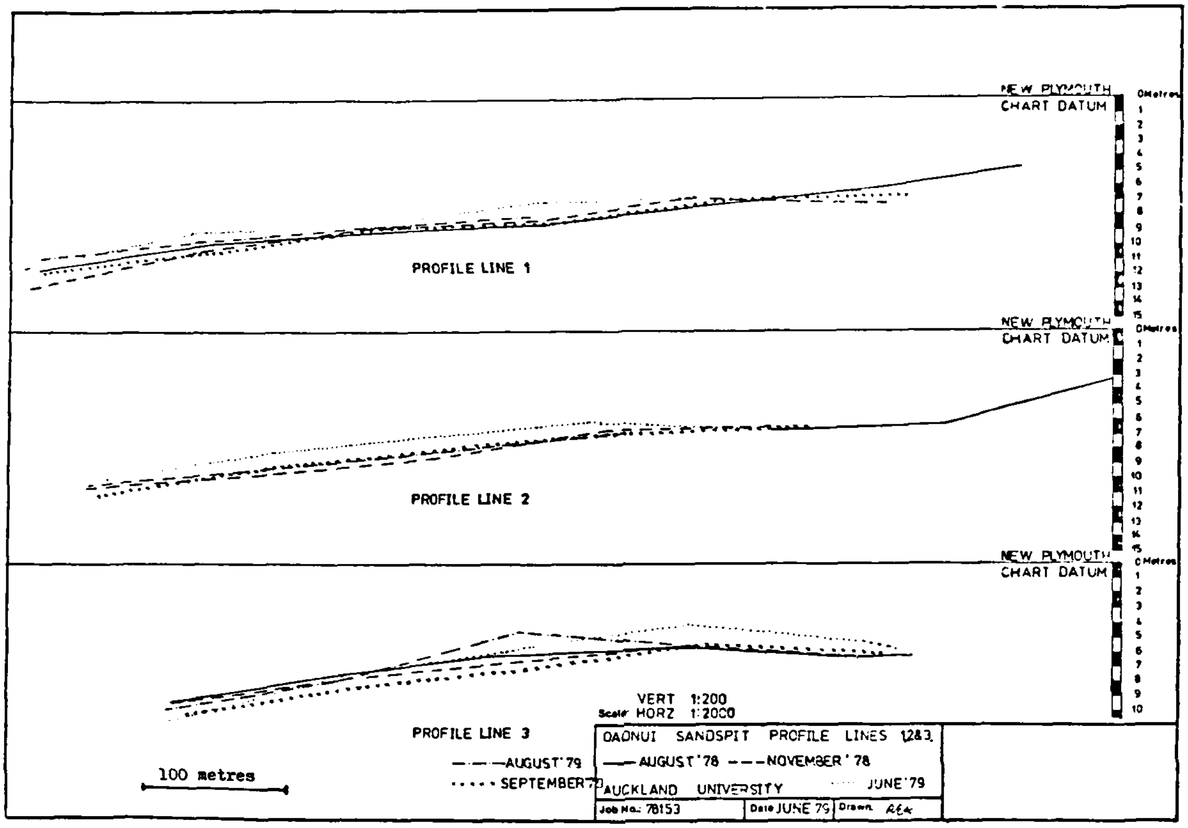

Figure 2. Some Examples of Offshore Profiles Obtained with Helicopter Sounding by Electroplumb.

transducer measurement. Calibration is done in still water from the dock side prior to each exercise. The success of the system has prompted consideration for the use of a Paros Scientific pressure transducer and the use of digital integration to obtain even better accuracy. The present system gives field resolution in the order of a few centimeters and one would expect the Paros Scientific sensor to better this by an order of magnitude.

## References

[1] Zwaborn, J. A., Russell, K. S. and Nicholson, J. 1972. Coastal Engineering Measurements. *Proceeding Coastal Engineering.* Vol. 1.

[2] Bascom, Willard. 1964. *Waves and Beaches.* pp 172-183. Anchor Books, Doubleday & Co. Inc.

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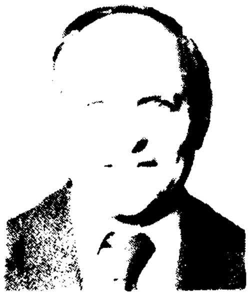

*D. A. Jones received his education at Birmingham College of Technology in the U. K. He was first employed in the Home Office Communications Directorate before being seconded to East Africa to take an appointment as Signals Officer, Tanganyika Police. Following the Independence of Tanganyika, he transferred to the Diplomatic Wireless Service of the Foreign Office, holding positions in Somalia and the Middle East before taking up his present appointment as Senior Technical Officer. His major interests are in teaching and research projects associated with Geophysics.*

## TABLE OF CONTENTS

*EXPOSURE*
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| 4. TITLE *(and Subtitle)*<br>⑥ EXPOSURE.<br>A newsletter for ocean technologists. Volume 8, Number 4. | | 5. ~~TYPE OF REPORT~~ & PERIOD COVERED<br>⑨ technical rep[redacted]t. |
| | | 6. PERFORMING ORG. REPORT NUMBER |
| 7. ~~AUTHOR(s)~~<br>⑩ Dr. Roderick Mesecar (Ed.) | | 8. CONTRACT OR GRANT NUMBER(s)<br>⑮ N00014-79-C-0004 ✓ |
| 9. PERFORMING ORGANIZATION NAME AND ADDRESS<br>School of Oceanography ✓<br>Oregon State University, Corvallis, OR 97331 | | 10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS<br>NR 083 103 |
| 11. CONTROLLING OFFICE NAME AND ADDRESS<br>NORDA, NSTL<br>Bay St. Louis, MS 39520 Attn: Code 410 | | 12. REPORT DATE<br>⑪ Sep[redacted]980 |
| | | 13. NUMBER OF PAGES<br>8 |
| 14. MONITORING AGENCY NAME & ADDRESS *(if different from Controlling Office)*<br>⑫ 9 | | 15. SECURITY CLASS. *(of this report)*<br>(U) |
| | | 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE |
| 16. DISTRIBUTION STATEMENT *(of this Report)*<br>Approved for public release; distribution unlimited | | |
| 17. DISTRIBUTION STATEMENT *(of the abstract entered in Block 20, if different from Report)* | | |
| 18. SUPPLEMENTARY NOTES<br>Published every two months by the School of Oceanography<br>Oregon State University, Corvallis, Oregon 97331 | | |
| 19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*<br>Ocean technology; instrumentation | | |
| 20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*<br>LSI Interface for Seadata Reader<br>A Means of Obtaining Offshore Beach Profiles by Helicopter | | |

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