

**MINISTRY OF AGRICULTURE, FISHERIES AND FOOD  
FISHERIES LABORATORY, LOWESTOFT, SUFFOLK, ENGLAND**

**1983 RESEARCH VESSEL PROGRAMME**

**REPORT: RV CLIONE: CRUISE 7**

**(PROVISIONAL: Not to be quoted without prior reference to the author)**

**STAFF:**

**R B Mitson**

**L Cox**

**M Fulcher**

**M H Beach** 13-18 May

**B J Robinson** 13-23 May

**N D Pearson** " " "

**T J Storeton-West** 23-31 May

**E G Shreeve** " " "

**C R Hood** " " "

**C Cary-Smith** Loughborough University (18-23 May)

**DURATION:**

**Left Lowestoft 2300 h on 13 May**

**Arrived Lowestoft 1000 h on 31 May**

**LOCALITY:**

**Portland and SW Coast**

**AIMS:**

- 1. To test the 38 kHz acoustic survey system.**
- 2. Deploy and test the near-bed current velocity measuring system.**
- 3. Check and calibrate the new sector scanner transducer.**
- 4. Carry out trials of a pressure measuring tag.**
- 5. Test the new headline transducer winch.**

**NARRATIVE:**

CLIONE was able to sail on the evening tide after completion of the headline transducer winch installation. During 14 May towed body trials were carried out using the new crane for handling. Early on 15 May an anchor berth was taken in Portland Harbour and the acoustic calibration of survey equipment began. On 16 and 17 May a variety of measurements and calibrations were made some of which were made difficult by the frequent squalls. On 17 May after a short running period the sector scanner azimuth steering failed. Mr Beach was taken ashore to return to Lowestoft on 18 May then CLIONE went to sea for towing trials and measurement of roll and pitch of the towed body on loan from DAFS. Later in the day the anchor was dropped again in Portland Harbour and Mr Cary-Smith joined. Next day work on diagnosis and remedy of the sector scanner fault continued whilst tests of the EK400 echo-sounder and QD echo-integrator were carried out at sea.

The following two days saw the scanner repairs completed and investigation started of an anomaly in performance of one of the survey transducers. On 22 May CLIONE went to sea towing a survey transducer in the DAFS body and also carried out tests on the sector scanner which gave usable results. On the morning of 23 May Messrs Robinson, Pearson and Cary-Smith were put ashore in Weymouth Harbour and Messrs Storeton-West, Shreeve and Hood joined, after which CLIONE set off in a westerly direction carrying out various trials of equipment before docking in Falmouth to take on water at 0930 h on 24 May.

An anchorage was taken in Carrick Roads where the depth of water (30 m) was sufficient for a variety of acoustic measurements including the pressure measuring tag and the sector scanner transducer. Measurements continued until 27 May when CLIONE left the anchorage at 2300 h to steam out about 30 miles south of Lizard Point. Fishing started early next day mainly for the purpose of testing the headline transducer winch and continued for the whole day. At night an easterly course was followed and fishing started the following morning about 50 miles ESE off Start Point. A pressure tag was attached to the headline and its signal monitored by sector scanning sonar. Fishing finished in the early afternoon and preparations made for towing one of the 38 kHz survey transducers.

The 38 kHz survey system was then run for several hours and also during the following day whilst CLIONE was on the homeward journey. Lowestoft was reached at 1000 h on 31 May.

It should be noted that, thanks to a special effort by Mr Pearson and the manufacture of two adaptors by Mr Pitman the Chief Engineer, minimum delay to sector scanner operations occurred.

## RESULTS

Aim 1. To test the 38 kHz acoustic survey system.

- 1.1 Despite poor weather conditions Portland Harbour proved to be very satisfactory for calibration and trials purposes. Temporary rigs on both towed bodies showed that standard target measurements were possible, although for a high degree of accuracy calm conditions were necessary. Some very good results were obtained.
- 1.2 Many impedance measurements were needed to establish the cause of changes in transmitted power, hence Source Level (SL) + Receiving Sensitivity (SRT) relative to measurements made at Staines reservoir. The effect was found to be due to the bottom fairing of MAFF TM1 towed body, when the spare fairing was fitted the time to normalise was reduced.
- 1.3 Towing trials with the TM1 body showed that it moved in towards the ship's side and streamed well aft at 8 knots. Sensor measurements showed it slightly nose-down with a mean downward movement in pitch of  $3^\circ$ . A roll plane attitude of  $10^\circ \pm 4^\circ$  deviation to port was observed in a heavy swell. It appears that the towing arm cannot travel forward far enough, which may account for the present poor performance.
- 1.4 Similar trials to 1.3 above were carried out with the DAFS body which showed a mean pitch movement of  $\pm 3^\circ$  and a mean roll movement of  $\pm 1.5^\circ$  in similar conditions of sea state.
- 1.5 Backward radiation from the Simrad 38 kHz transducers is serious, approximately -17 dB relative to the main axis which causes a strong sea surface echo. This problem needs to be overcome for the system to be completely viable.

- 1.6. The EK400 echo-sounder was run extensively during the cruise and worked well apart from some minor interfacing problems. Having no control knobs it appears to be "user unfriendly" because some of the routines take a significant time to change and the keyboard must be used to set all operating parameters. On sharply changing bottom contours the bottom follower appeared to cope. No large concentrations of fish were encountered to check its efficiency on strong, short range signals.
- 1.7. During the latter part of the cruise the Simrad QD echo-integrator was brought into use. It seemed to work reasonably well but there were very few signals on which to operate.

Aim 2. Near-bed current velocity measuring system.

The near-bed instrument package was lowered from the ship's crane in order to test the pressure cases and to try the acoustic link. Current meters were not fitted during this exercise. For a period of 2 h the system was left in the water whilst all combinations of the acoustic control were tried. On recovery the recording tape was removed and run through a tape player. It sounded as if the right signals were present, from which it can be deduced that the system worked correctly. No sign of leakage or corrosion was evident from the pressure cases. Later analysis of the tape showed 100% success.

Aim 3. Check and calibrate the new sector scanner transducer.

This is a polycarbonate faced array with an acrylic lens fitted to the transmitter section. Observations on some wrecks gave a reasonable impression but on smaller targets deficiencies were apparent.

Signals from the pressure tags were seen out to maximum range of 400 m but fluctuated considerably across the scanning sector. Bright patches on the centre of the display evidently associated with sidelobes, were distracting.

The transmitting array was found to be 7 kHz off frequency and not matched to the transmitter; the source level was relatively low even when these matters were corrected. Fluctuations of  $\pm 2.5$  dB were evident on the  $30^\circ$  axis of the main lobe and the sidelobes were only 2 dB down relative to the maximum response. In the vertical plane the beam pattern is correct to specification.

Similar fluctuations were apparent in the receiving beam pattern. It is evident that the array does not meet specification and is unsuitable for MAFF applications.

Aim 4. Trials of a pressure measuring tag.

- 4.1 Three prototype pressure tags were individually attached to a temperature/depth probe and lowered from the ship's motor boat in 5 m steps to a maximum of 27 m. Conditions were rough, wave height about 0.5 m, thus causing a variation about the mean hydrostatic pressure telemetered to the ship which was received by the sector scanner and decoded into digits. Signals were also recorded on the Alden paper.
- 4.2 One of the tags was attached to the Guildline CTD probe and suspended from the hydrowire for lowering in 1 m increments. Small variations around these increments, due to the ship's movement, were recorded as variations in time between the transpond and telemetry pulses. Depth temperature, conductivity and salinity measurements were made simultaneously.
- 4.3 The above tests were made in Carrick Roads near Falmouth where the water temperature was between 10 and 12°C. Laboratory calibrations were at

12 to 12.5°C in a pressure test chamber with an equivalent accuracy of  $\pm 0.1$  m.

Provisional results suggest that a resolution of  $\pm 0.3$  m depth was possible for 4.1 above and the greatest deviation during 4.2 above was 0.59 ms corresponding to a depth change of less than 0.2 m.

4.4 Resolution is limited by the triggering point of the tag signal decoding equipment, the signal to noise ratio and shape of the pulse. An improved decoder is essential if pressure tags are to be used during fish tracking exercises.

#### 4.5 Micro-pinger (for tracking Nephrops).

Tests were made at up to 360 m range from the ship and despite a low source level of  $145 \pm 2$  dB/ $\mu$ Pa/1 m adequate signals were received to a range of 330 m.

#### 4.6 Pressure tag on a trawl.

One of the pressure tags was loosely attached to the meshes close to the trawl headline. With the sector scanner looking back at the trawl very good signals were seen and decoded, these agreed exactly with the upward firing headline transducer.

#### Aim 5. Testing the headline transducer winch.

The ex-CORELLA hydraulic winch has been fitted on top of the new boat-deck laboratory with its controls on the bridge conveniently sited where the fishing skipper can see both winch and cable. Four hauls using an 800 mesh Engel trawl were completed smoothly. The cable was anchored to the centre of the headline by a stainless steel grip and hammer-lock set through the headline rope. On each haul the cable ran freely between the trawl warps and was recovered without damage. A minor problem was the snatch block wheel chafing against the 'A' frame when the trawl was directly astern or beyond, and under these conditions the cable laid against, or turned slightly round the stern section of the ship. To overcome this a small modification will be made to the 'A' frame and a section of semi circular metal will be welded down the stern.

To complete the system the cable block will be modified to meter rate of travel and cable out.

R B Mitson

2 June 1983

SEEN IN DRAFT; J French - Master  
R C Newrick - Fishing Skipper

INITIALED: HWH

DISTRIBUTION:

Basic List +

R B Mitson	B J Robinson	C R Hood
L Cox	N D Pearson	C Cory-Smith
M Fulcher	T J Storeton-West	
M H Beach	E G Shreeve	