

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

1994 RESEARCH VESSEL PROGRAMME

REPORT: RV CORYSTES: CRUISE 2(a) - GEAR TRIALS

STAFF:

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- L Fernand - p/t

DURATION:

4 - 10 February 1994

LOCALITY:

Southern North Sea

AIMS:

1. Trials of a new PC-based display for the sector scanner to be undertaken in parallel with the existing LSI scan converter system. Also, the sector scanner will be checked (acoustic source level, beam pattern, *etc*) in readiness for the next tracking cruise (2b/94), and an assessment made of interference from the broadband ADCP.
2. Ship noise trials - measurements of underwater noise radiated from RV Corystes in 'loaded' and 'unloaded' mode over a 10Hz to 20kHz frequency range. A static sonar buoy will be used for these measurements with its wide-band hydrophone suspended at mid-water depth (overall depth > 20m). Acoustic spectra will modulate an RF carrier for transmission to Corystes for analysis and recording.
3. Check and calibrate 300kHz transponder and depth telemetry tags in readiness for the fish tracking part of the cruise (2b).
4. Trials on the latest versions of RoxAnn, Sextant, Sidescan (hardware, software, documentation, *etc*), and on satisfactory operation of the ADCP's remote keyboard.
5. GPS - Sercel differential-chain corrections trials, provision of positioning information for ADCP, and trials of the Ashtech GPS-based compass/pitch/roll system.
6. Trials of new Vodafone mobile and CDLC modem for transferring data files ship-to-shore.

7. Trials of a fluid-filled passive acoustic target as a possible marker for lobster pots using Lowrance LMS-300 192kHz echo sounder.

NARRATIVE:

CORYSTES sailed from Lowestoft at 1430h on Friday 4 January 1994 after a 24-hour delay due to gale-force winds. Dr Robinson (Systems Engineering) was on board for the first few days for acceptance trials of a new PC-based colour display for the sector scanning sonar system. CORYSTES headed north-east to test the display using as targets a number of charted wrecks, and the calibration of a 300kHz telemetry tag. During these trials the Sextant plotting display system proved to be a valuable aid. The opportunity was taken to check the status of a 'minipod' rig deployed on the previous cruise on the Race Bank, and subjected to the recent storm.

Dr Robinson was put ashore at Lowestoft on Sunday 6 February and CORYSTES then proceeded to deeper water due east from Lowestoft to complete the telemetry tag trials. The weather remained fair and we were able to use this area to undertake the remainder of the aims listed above.

With continuing fair weather, and with all aims completed, CORYSTES sailed into Lowestoft on the evening tide of 10 February 1994.

RESULTS:

1. The new, PC-based display for the sector scanner gave an impressive improvement over the existing monochrome (green) display. The large (21in) high-definition, colour monitor gave a dual display of full range, and a 'mouse selectable' expanded range of 70m. Clear range and bearing scales were provided with additional lower border displays of the range and bearing of the mouse pointer. A 'snapshot' record of a single frame was available using the Windows Clipboard facility, and a colour print obtained using an HP Deskjet 310 printer (see Figure 1 of a wreck off Lowestoft). Various colour palettes were tried and Dr Robinson (PR) demonstrated the ease with which changes to the palette could be implemented (a grey palette with red targets, *etc*), and set up a number of customised palettes for later use. PR provided clear written instructions for operation of the system, valuable comments on the status of the existing beamforming and transducer sections of the current system, and proposals for implementing a digital beamformer.

Beam plots of receiver sensitivity were conducted by injecting signals using a boom and hydrophone rig off the starboard quarter (30m from the transducer array) in about 40m water depth. The receiver was confirmed as acceptable for the subsequent tracking exercise (CORYSTES 2B) although various small irregularities were detected: these could not be tuned out since many of the adjustments are no longer possible and emphasise the need to replace the receiver.

The extent of the interference of the ADCP's new wideband transducer to the scanner was estimated: useable for tracking with the scanner transducer in a forward sector, but would need to be switched off for 'search' mode (the newly installed remote keyboard provides this facility at the scanner console).

2. Ship noise trials were to be conducted using a sonar buoy supplied by Sparton Electronics, Arlington, USA. In the event, and after vigorous negotiations over many weeks with DTI over the allocation of radio frequencies, the transfer of payment, and transport arrangements, the US State Department has yet to provide the necessary documentation to enable Sparton to release the assembled sonar buoys which are ready for shipment. However, in view of the good weather and the ability to work a small boat about 20 miles east of Lowestoft in 40m of water, we obtained valuable ship's noise spectra using a wide-band hydrophone suspended at mid-water and a small digital recorder. CORYSTES made four sets of runs by the hydrophone at a measured minimum range of 50m. The runs were performed with both engines running at 80 rpm, with the smoothing chokes in and out of circuit, and with the ship being loaded for half the time with an Engels 800 mid-water trawl. The recorded spectra will be analysed using a spectrum analyser, preliminary analysis indicates the expected low frequency tone at 307Hz. Data on the electrical status of each engine were provided by the Chief Engineer.

3. A number of transponding and pressure telemetry tags were calibrated in readiness for the tracking exercise. Ranges out to 410m were achieved using the usual rig and long line. Depths of 40m were achieved and the tags immersed for sufficient time to ensure temperature equilibrium. Problems were encountered with the pressure tags: although all had been calibrated in the laboratory failures (multiple firing) occurred at depths greater than 15m. Various modifications were attempted but only one satisfactory pressure tag was obtained. Tags were returned to the laboratory during a staff transfer for further investigation.

4. The RoxAnn calibration site off Great Yarmouth (now in close proximity to three oil platforms) was surveyed and a number of day grab samples taken. The sediment type was consistent and as expected (mainly sand and shingle). The RoxAnn software and Microplot operated correctly, and Sextant again proved invaluable by defining survey courses and grab sites for precise navigation. A recent new version (V5.21) of RoxAnn software proved faulty. No trials were performed with the sidescan sonar since the system was not available (required by CIROLANA). The ADCP remote keyboard in the Acoustics Laboratory operated satisfactorily and will enable it to be used when tracking with the scanner.

5. A demonstration GPS system to give data on ship's pitch, roll, heading and yaw (Ashtech 3DF) was loaned by Positioning Resources, Aberdeen for evaluation. It comprises four aeriels and a receiver. The receiver was calibrated with the ship in harbour using a suite of PC-based programs to provide the necessary geometric calculations on data derived from an hour of satellite position data (millimetric accuracy of the aerial baselines is obtained). Measurement accuracy is not affected by Selective Availability (intentional range accuracy degradation currently imposed by the American Department of Defence). The data was logged by PC at different rates and in various weather conditions. An example of data is given at Figure 2 where the dead-band of the auto pilot can be seen, and the list to starboard whilst CORYSTES was subjected to a fresh broadside wind. The necessary Sercel data transfer corrections were performed to provide navigational data to the ADCP.

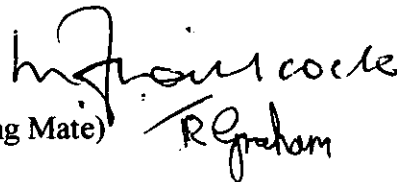
6. A Panasonic Vodafone mobile and CDLC modem were tested using a temporary aerial on the after deck. A number of data files were transferred from a PC at the Laboratory to CORYSTES when about 20 miles off Great Yarmouth. Sometimes several attempts at connection were made (about 1 minute) but 10 file transfers were achieved with no corruptions. The z-modem protocol was used and a baud rate of about 2000 achieved.

7 A recent question for Fisheries Division requested information on an inexpensive marker device that could be attached to a lobster pot to enable recovery (lobster pots trawled by beam trawlers and then discarded). A 15cm fluid-filled sphere was proposed. This was attached to a weighted inkwell lobster pot in 48m water depth, to another weight 100m away and to a surface bouy and recovery strop. The ship made several passes over the target using Sextant position information and detected strong echoes with the small Lowrance LMS-300 echo sounder with its 192kHz transducer down the instrument tube. The lobster pot was then recovered and two further passes made to confirm absence of the signal. Further trials will be undertaken to assess the contribution of the sphere to the echo return.



M H Beach
10 January 1994

SEEN IN DRAFT: M J WILLCOCK (Master)
R F GRAHAM (Senior Fishing Mate)



INITIALLED:



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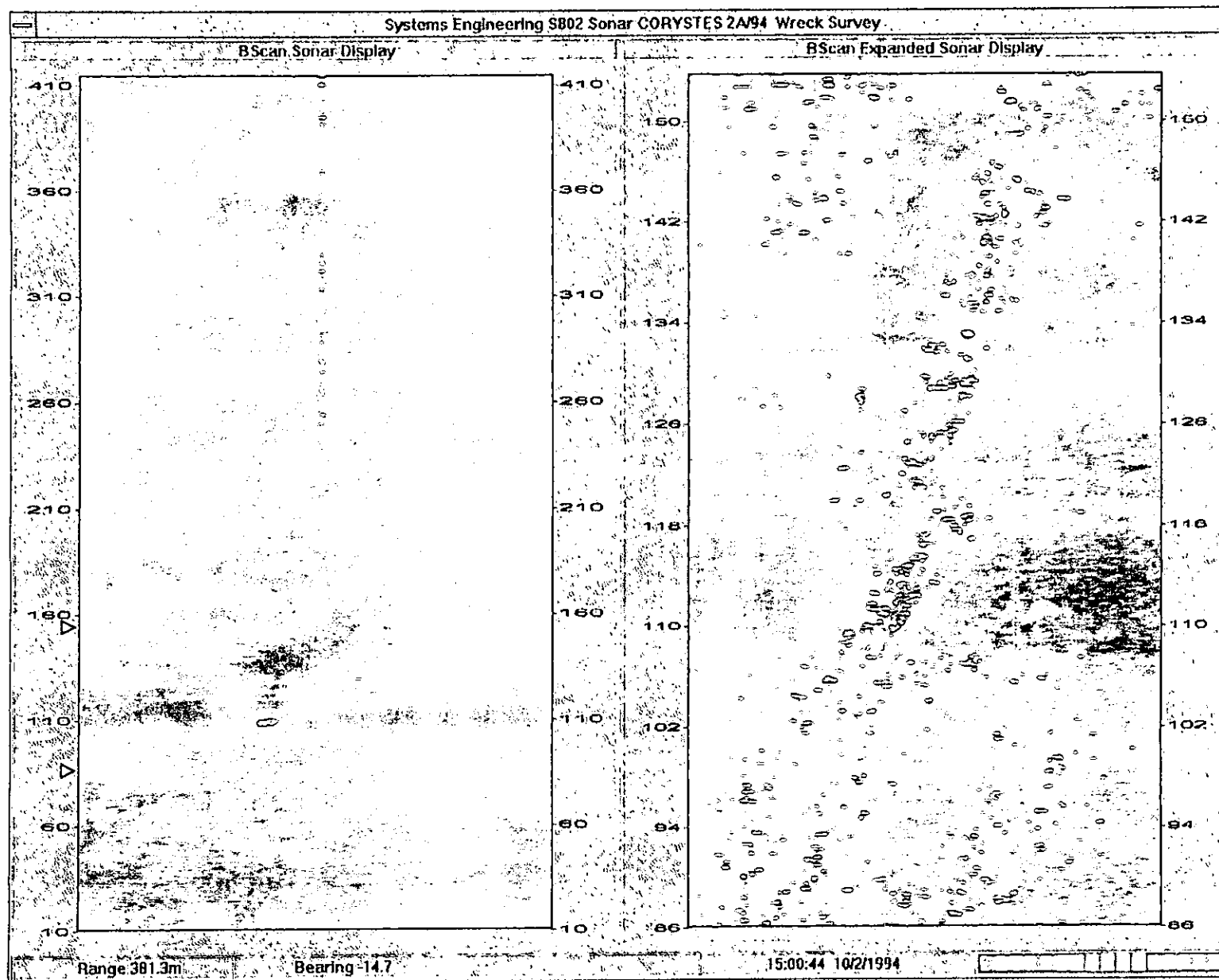


Figure 1 New PC-based colour display from sector scanner (target is wreck off Great Yarmouth).

● Gear Trials - CORYSTES 2a/94

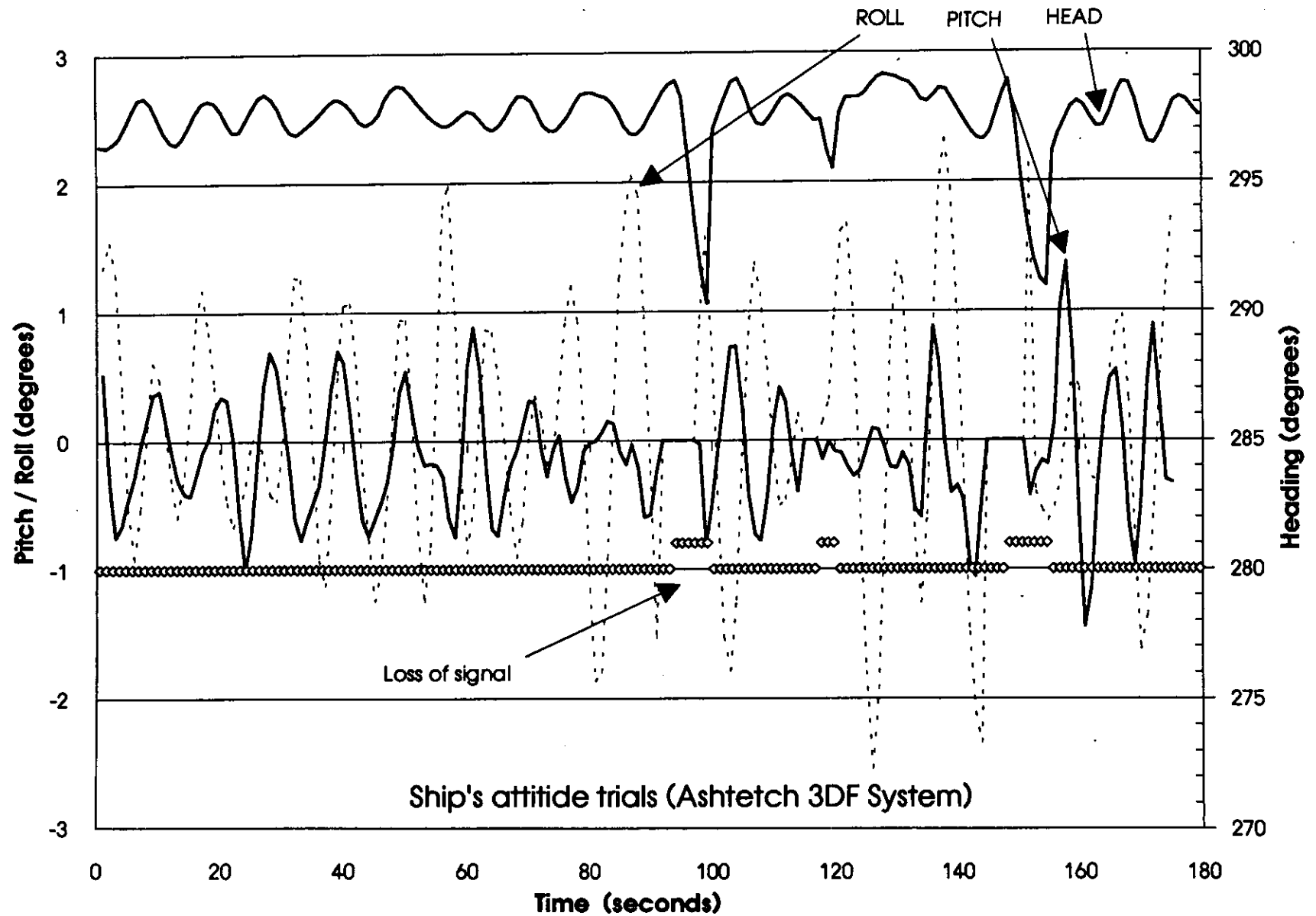


Figure 2 Results from trials of a GPS-based vessel attitude measuring system. (Ship's roll, pitch and heading are shown).