MR STATE

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

1972 RESEARCH VESSEL PROGRAMME

REPORT: RV CIROLANA: CRUISE 4

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

STAFF

H W Hill (NIC)
P G W Jones
J W Ramster
A R Folkard
D J Ellett
J A Bedwell
J W Horwood
S R Jones
J W Read
H R Stewardson } Part-time
N D Pearson }
D I Gaunt (NIO)

DURATION

Left Grimsby 0922 h 6 April

Arrived Grimsby 1240 h 8 May

All times are Greenwich Mean Time

LOCALITY

North Sea and Newfoundland Grand Bank

AIMS

1. To test the acoustic release system

2. To service the JONSIS current meter stations

3. To launch two drifting buoys in the vicinity of 50°N, 22°W and 51°N, 23°W for subsequent tracking by EOLE satellite

4. To launch XBT probes at synoptic hours as part of the IGOSS XBT Pilot Project, and in the vicinity of the oceanic polar front and Western approaches for the Hydrographic Department, MOD (Navy)

5. To moor four current meter station across the Labrador Current between Flemish Cap and the Grand Bank

6. To complete a hydrographic study south-east of the Newfoundland Grand Bank as part of a joint WHOI/BIO/MAFF co-operative investigation of the Gulf Stream system in that area.

NARRATIVE

CIROLANA sailed from Grimsby at 0922 h 6 April and proceeded towards JONSIS Station A while preparing the current meter mooring in a 25 knot westerly wind. Station A was recovered by 1505 h and the rig relaid without the current meters to test the acoustic release system, but no communication was achieved between the ship and the buoy; nor was it possible to rotate the transducer head in the main laboratory well. JONSIS Station A was therefore relaid with Plessey meters, but minus the acoustic release system, at 2010 h and the ship steamed to JONSIS Station B which was changed by 0218 h 7 April. Salvage dredging was carried out at JONSIS Station C without sucess until 1320 h when further acoustic tests were made before redeploying Station C. On this occasion the command pinger was switched on and off at a range of $\frac{1}{4}$ mile, but could not be operated at greater ranges, although the pinger could be detected at $1\frac{3}{4}$ miles. The guillotine operated, but did not completely sever the mooring wire. After testing the TSD system and the Stewardson salinometer, CIROLANA steamed overnight to the Outer Silver Pit for deeper water, where further acoustic release tests were made. Next morning, two command pingers were operated successfully at up to $\frac{1}{5}$ mile range from the buoy, but the guillotines did not fire on either system. During further tests of the guillotine at 50 m depth on the hydrowire, the mooring wire was successfully chopped. At 1400 h the ship steamed for Dover which was reached at 0815 h 9 April.

After disembarking Messrs Stewardson and Pearson, and loading new mooring wires for the Grand Bank current meter stations, CIROLANA left Dover at 1010 h for Flemish Cap, XBT probes being fired en route at synoptic hours from 1200 h 10 April for IGOSS and MOD(Navy). A north-westerly wind, of increasing strength, steadily reduced the ship's speed to an average of 4 knots, although 3 engines were at full speed. Dodging began at 2118 h, 10 April, and continued until 2145 h 11 April. On 12 April a 1200 m TSD test lowering was made, but considerable difficulty was experienced with the automatic reeving-on gear during recovery, and on 15 April the NIO acoustic release equipment was tested successfully at 1700 m. Otherwise the ship continued steaming at full speed, varying from 5-14 knots, into a westerly wind of up to 30 knots, until a second period of dodging from 1100 h 16 April until 0750 h 17 April, when consistent wind speeds of 50-65 knots were recorded.

The first hydrographic station on Flemish Cap was reached at 1014 h 17 April (Station 38 of the attached track chart). After completing two hydrographic series stations and an echo sounding survey across the current meter line to establish suitable mooring positions, the first current meter rig was laid between 1100 h and 1133 h 18 April at Station D, opportunity being taken during the previous night, when only slow speed was possible because of icebergs and growlers in the areas to carry out further tests of the acoustic release equipment in deeper water. The command pinger of a shallow water (100 fm) release was successfully switched on and off at depths up to 100 m but failed at 140 m due to bursting of the pressure case cap. A command pinger in a deep water case was successfully tested to 330 m, but the guillotine did not fire. The pinger on Buoy D was tested successfully before leaving the position. Hydrographic stations were then worked across the current meter line until Station B was reached, but the launching of the NIO rig was delayed because of atmospheric interference with the navigational aids. Further series stations were made before a third period of dodging from 2245 h until 0800 h 19 April, when CIROLANA returned to Station B to lay the NIO rig. Unfortunately the pre-launch explosive bolt tests failed, due to a leak in the pressure case, and tests with the back-up pinger were not satisfactory. The launching of the station was therefore postponed, and the vessel steamed to current meter Station A which was laid by 2044 h in a heavy swell and seas, one of which snapped the lower hydro platform safety rail, during

the working of the associated series station. After completing a further series station while on the return steam to Station B, and a successful trial of the NIO back-up release, a further period of dodging was necessary until 2200 h 20 April, and Station B was eventually laid successfully by 1041 h 21 April.

Since the cruise programme was then 4½ days behind schedule, laying the fourth current meter station was abandoned, and the ship steamed to the southern of the two longer hydrographic sections, beginning at Station 56 at 1937 h. In considerably improved weather, alternate hydrographic series and XBT stations were completed along the southern section, selected data being exchanged daily with RV HUDSON, the Canadian research vessel participating in the investigation, some 150 miles further south. After consultation with HUDSON on 24 April it was agreed to shorten the length of the southern section and proceed to Ocean Weather Station DELTA (near to Station 80) to allow reasonable time to complete the more northerly section (Stations 80-98). The weather continued fair until the afternoon of 26 April, when visibility deteriorated to thick fog by 1900 h, but work on the northern section was completed by 0720 h 27 April, although the vessel was steaming at reduced speed. An attempt was then made to recover current meter Station D, but it could not be located during a box search in thick fog, either visually, or acoustically through the well transducers, or using a towed hydrophone, although the fault on the slewing motor on the MAFF transducer had been repaired. At 2000 h the search was postponed and CIROLANA steamed slowly towards St John's berthing at 2220 h 28 April.

Dr C R Mann of Bedford Institute of Oceanography boarded the ship on the afternoon of 29 April to discuss the data collected. A complete copy of the observed series data, together with copies of the corrected temperature, salinity, oxygen and silicate sections were handed to Dr Mann to facilitate the planning of Phase II of the survey by HUDSON and CHAIN, the Woods Hole research vessel.

CIROLANA sailed from St John's in good visibility at 0411 h 30 April with a moderate southerly breeze, and located the surface pellet above the sub-surface float at Station D at 2000 h, the toroid being adrift. After dragging for the ground wire the rig was recovered by 2227 h. The buoy tow was badly stranded in two places and had parted at the upper stranding. A TSD station was worked before proceeding to Station B which was recovered by 1214 h on 1 May, the explosive bolt acoustic release separating successfully although more than 1 hour elapsed in tracking the rig at the surface before the sub-surface float was sighted. Current meter station A was sighted at 1458 h and an attempt was made to switch on the command pinger to locate the rig acoustically, but this was not successful. The rig was recovered by 1720 h and CIROLANA set course for Bishop's Rock which was reached, after a fast passage with following winds and calm seas, at 1015 h 6 May, XBT being fired for IGOSS and MOD(Navy) en route.

CIROLANA berthed at Great Yarmouth at 1606 h 7 May and after unloading scientific equipment and disembarking the scientific staff sailed for Grimsby at 0413 h 8 May arriving at 1240 h.

RESULTS

1. The MAFF acoustic release system is unreliable and cannot, in its present state, be considered an operational system. The transducer head rotates satisfactorily $\pm$ 180°, but the maximum command pinger switch-on/off range was barely ½ mile, and the maximum detection range was only 1¾ miles. The deep pressure case was tested satisfactorily to 330 m but the shallower North Sea version imploded the top plate at 140 m depth when tested on the hydrowire. The guillotine never chopped the wire cleanly on a moored rig, the most

successful leaving 1½ strands of the mooring wire uncut. However, tests on the hydrowire produced a clean chop at a maximum depth of 50 m. The MAFF acoustic release system was therefore used only as a homing device, minus the guillotine, on the Newfoundland Grand Bank moorings A and D, but in neither case could the pinger be switched on before recover of the two stations. Several transmissions were usually necessary before the command pinger switched on or off. The acoustic release system on Station D was lost.

2. JONSIS Stations A and B were serviced without difficulty in a 20 knot wind from the foredeck. Dragging for the rig previously reported missing from JONSIS Station C proved fruitless but the Station was redeployed successfully.

3. Because contact could not be established between the drifting buoy aerials and the EOLE satellite during pre-cruise tests, nor before CIROLANA sailed from Dover, Aim 3 was postponed until a later cruise.

4. XBT probes were fired at synoptic hours for IGOSS and MOD(Navy) on both the outward and homeward runs and radioed in short-delay time to Bracknell. XBTs were also fired between each pair of hydrographic series stations on the Grand Bank survey.

5. Three current meter stations - two MAFF and one NIO (Station B) - were moored for periods of between 10 and 12 days across the Labrador current (see track chart), and recovered successfully, although the surface toroid from Station D is missing. Also three rigs were launched from the starboard quarter. Good records were apparently obtained on all 3 meters at Station D, and on the bottom and top meters at Station B, although there was a slight leak in the latter. The middle meter at Station B had leaked badly, and it seems likely that a very short record is the most that might have been obtained. At Station A, the top meter was recovered with a broken propeller and damaged fin, and the middle meter had shorted out at some stage in the record, causing a flat battery and giving a continuous record. However, both meters should provide some useful data, after recalibration. The bottom meter appeared to have a complete record.

The electro-magnetic log indicated a maximum surface velocity of the order of 1½ knots in the Labrador current, but generally the indicated velocity was of the order of ½ knot.

6. Three hydrographic sections were completed as shown on the track chart attached. Temperature, salinity, oxygen and silicate were sampled generally to the bottom, or to 4,500 m in the deeper water, but towards the eastern end of the two southerly sections, each alternate station was worked only to 2,300 m. Analyses were carried out on water samples and thermometer corrections completed between stations, so that corrected sections for the four parameters along each of the hydrographic sections could be exchanged with data lists in St John's.

7. The Stewardson salinometer was tested at a number of series stations over a range of salinities, and a calibration curve prepared. This prototype would seem to be the basis of a useful salinometer for shallow water, and particularly for estuarine work where great accuracy is not required.

8. The WANG worked well under all sea conditions, and provided a robust and reliable equipment for continuous hydrographic data analysis as far as the calculation of dynamic height anomalies. On one occasion during particularly heavy weather, one of the card readers was thrown from its housing on the bench to the plotting room floor. When replaced it did not function, but after

examination and repair of broken leads inside the reader, it worked perfectly for the remainder of the cruise.

9. Surface sea water samples were collected for Caesium analysis by Hamilton Dock, and further samples for hydrocarbon analysis by Marine Laboratory, DAFS.

10. The new PDR pinger was found to operate successfully, but further modification is required to the MUFAX.

11. Both DECCA and LORAN suffered from atmospheric interference preventing accurate navigational fixing for some period during each day CIROLANA was in the Grand Bank survey area. Astronomical fixes often could not be obtained because of cloud cover and poor visibility. Satellite navigation would be a considerable advantage in any future investigation requiring accurate fixes in this area.

12. Meteorological observations were made at synoptic hours and radioed to the Meteorological Office.

H W Hill
30 May 1972

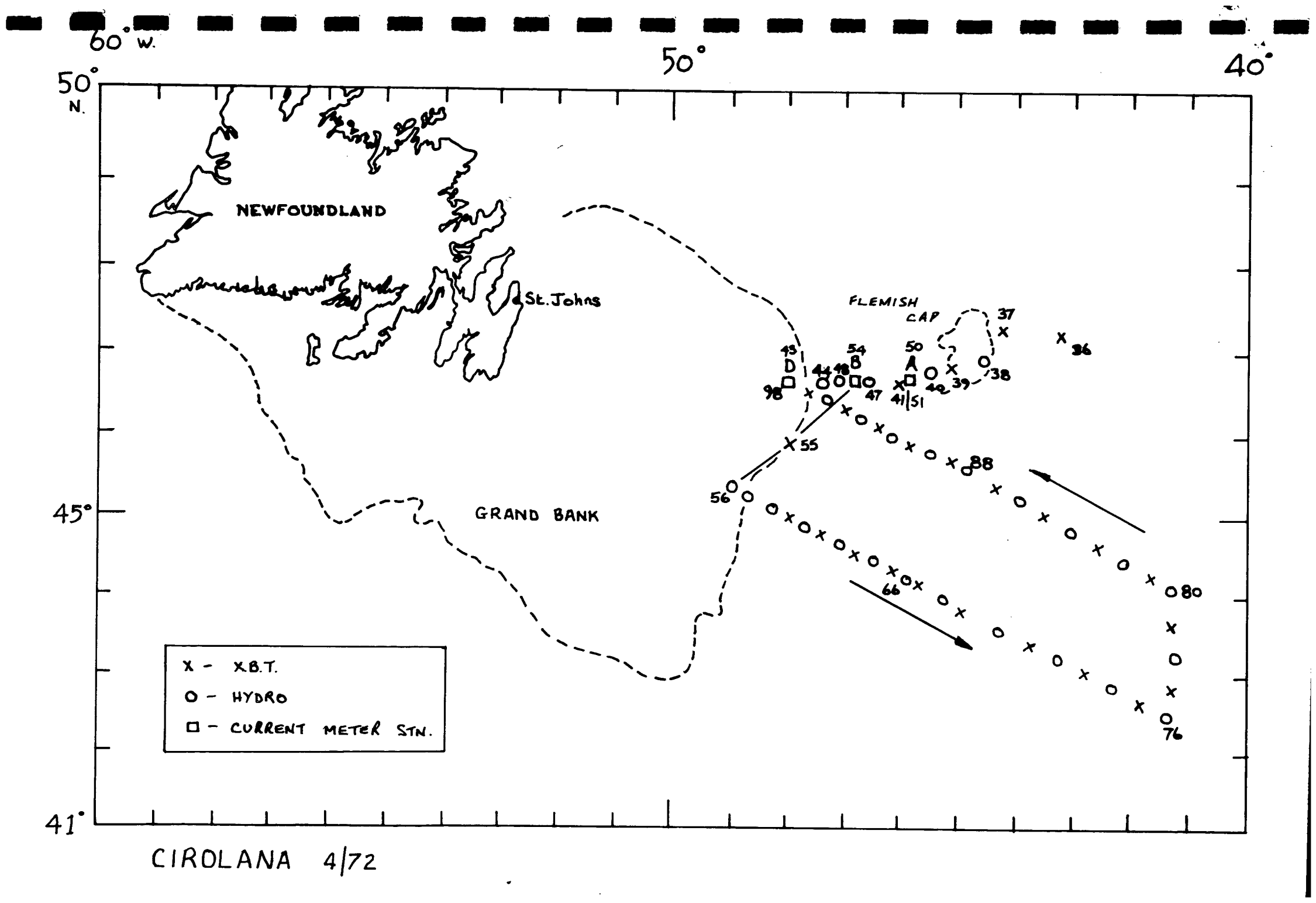
SEEN IN DRAFT MRS (Master)

GWA (Fishing Skipper)

INITIALLED AJL

DISTRIBUTION

Basic List
Scientific Staff aboard
Dr H Charnock (National Institute of Oceanography)
Mr Gaunt (National Institute of Oceanography)
Dr C R Mann (Bedford Institute of Oceanography)
Dr R F Reiniger (")
Dr J L Worthington (Woods Hole Oceanographic Institution)
Commander E A Delaney, US Coast Guard, International Ice Patrol


60° W.
50°
40°
50° N.
NEWFOUNDLAND
St. Johns
GRAND BANK
FLEMISH CAP
45°
41°
X - X.B.T.
O - HYDRO
□ - CURRENT METER STN.
CIROLANA 4/72