

NATIONAL INSTITUTE OF OCEANOGRAPHY
Wormley, Godalming, Surrey.

"Surveyor" Cruise August 1971
(5th August - 16th August)

N.I.O. CRUISE REPORT No. 42
(Issued August 1971)

Summary of Work Done:

(1) The main objective of the cruise was to recover and relay the two moorings left out at the end of the Surveyor Cruise in June 1971 (Nos 088 and 090). Of these 090 was located and recovered without any difficulty but 088 had apparently lost its buoyancy and was lying on the bottom some 2 miles to the north of its nominal laid position. Dragging for the mooring was unsuccessful but the major part of the mooring was recovered adrift on the passage back to Barry at the end of the cruise. Replacement moorings (Nos 091 and 092) were laid.

(2) A section of 8 water bottle stations was occupied on a line passing through the mooring positions and covering the continental slope between depths of 4000 and 400m.

(3) Attempts were made to interrogate the acoustic releases of moorings 075 and 084 both of which had been found to be operational at the end of the June "Surveyor" cruise. 075 was still working but no sign was found of 084 which may not have been turned off at the end of the June cruise.

(4) A test of a command pinger fitted with a new discriminator circuit was successfully carried out to a depth of 3000m.

Scientific Participants:

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Narrative of Cruise:

"Surveyor" locked out of Barry at 1515A 5th August and after streaming the E/S fish at 1715 set course for the mooring positions in the north of the Bay of Biscay (Near 47°N 08°W). The lab Decca receiver did not settle properly for some hours but eventually agreed with the bridge set to within 0.3 of a lane.

During the following day the Decca improved until the discrepancy between the two sets was often less than 0.1 lane. An E/S watch was started at 2115 6th and the 100fm line was crossed as 2215. By 0130 7th the nominal position of mooring 088 had been reached but nothing was heard of the command pinger and course was set for mooring 090. The approximate position of the mooring was reached by 0300 but by then the Decca conditions were poor and it was decided to go on down to deep water and start tests of the acoustic equipment rather than risk turning on the command pinger and not being able to hear it.

The tests started at 0600 and by 1000 we had two good releases and one command pinger. On returning to the position of mooring 090 the command pinger was turned on at 1135 and after a short break for lunch the release was fired at 1215. The buoy surfaced about $\frac{1}{2}$ mile to windward and the recovery proceeded. The subsurface sphere was grappled from the well deck and the mooring attached to the winch on the afterdeck and hauled in. The buoy was then removed and floated back to the well deck. The recovery was successfully completed by 1505 (2hr. 50 min. from the firing of the release). The wire and the instruments appeared to be in good condition. Much of the wire was only blackened on its surface and the terminations showed no signs of corrosion. All the current meter clocks were heard to be working. The deepest current meter on this mooring was that with the new 6000m pressure case. This showed slight corrosion where the anodising had been damaged - particularly round the edges of the rotor cage and at one place on the walls of the pressure case but none at any of the stainless steel/aluminium junctions. When opened the current meters showed that two had given full records but that the third had a fault on the clock cam which had stopped the recording after about three quarters of the full time.

Since the weather remained good (F2) and the wire was in good condition it was decided to relay the mooring immediately and this was done in a position less than $\frac{1}{2}$ nm east of the 090 position. The mooring design was exactly that of 090 except that the deep pressure case was not re-used but was replaced by an unmodified meter. During the laying the wire took considerable punishment as it left the storage drum owing to the large angles between the guiding sheave and the edges of the drum. All seizings were changed and a shackle with a worn pin was replaced. The mooring was released at 1938 (3 hr. 25 min. from start) and after the command pinger had been checked the ship returned to deep water for further acoustic tests. These were completed by 00007th and course was set for the position of 088 with the intention of arriving there when the Decca became reliable. At 0900 the command pinger was transmitted to but nothing was heard. However the acoustic release pinger was turned on readily but showed no indication of being above the bottom. The release was run through the firing position but nothing was seen to surface. It was assumed therefore that the mooring has lost its buoyancy and preparations were made to drag using the A.R. pinger as a beacon.

Dragging was done using 1000m of 8mm wire with Gifford grapnels, the Hook Fish and one small grapnel attached to the tail of the Hook fish. A weak link of 4mm wire was put in the drag line to ensure that the Hook fish and grapnels would not be lost. The procedure adopted was to position the ship upwind of the mooring and to drift down across it. The Decca track plotter helped with this technique but in general it was unsatisfactory. One run was done using this method with no success. The Hook fish electronics was then removed and a transponder put on

the wire 100m from the grapnels. Three more runs were made with this rig and on the second the transponder went very close to the AR pinger but again with no success.

During this attempt to drag for the mooring several faults with the winch became apparent. Considerable trouble was experienced with the chain drive to the storage winch. This often slipped and had stretched the chain. During the final recovery of the grapnels a more serious fault developed. With 350m still to be recovered the winch engine changed note, lost power and started to run with a very smokey exhaust. Eventually the engine stalled but was restarted and apparently ran normally from then on. It seemed advisable to investigate the cause of this malfunction and at first light on 9th the injectors were removed from the engine and inspected. Nothing was found to be at fault and they were replaced.

Dragging for 088 was started again at 0900 9th and continued until 2000 with no success. A tadpole hydrophone was rigged from the starboard boom to help in directing the ship towards the sound source but although the transponder had come to within 120 fm of the AR on one occasion only mud and stones were recovered. At 2030 9th dragging was temporarily abandoned and the ship moved to deep water to start a line of water bottle stations across the continental slope. The first station started at 0100 10th and was not completed until 0700. This was due to the tensioning mechanism on the storage drum drive seizing up and having to be dismantled and rebuilt. Towards the end of the station the wind had freshened to F5-6 from the S.W. and wire angles of up to 50° were common. The water bottle stations continued throughout the 10th with mooring 091 being interrogated at 1930. The stations were completed at 0700 11th and the ship lay to near the 088 position. During the morning the wires were wound onto a new drum for the replacement of 088 and from 1300 to 2300 dragging for 088 continued, again with no success. During the dragging the transponder flooded via a blanking plug in the end cap and the electronics was ruined. By 2300 the wind had freshened to F6-7 and manoeuvring was proving difficult so dragging was abandoned and the ship lay to overnight.

First light on the 12th showed no let up in the weather and so the ship went to deep water to test a command pinger with a new discriminator circuit. The tests started at 1230 and were completed by 1400. The pinger switched on using maximum power at shallow depths and minimum power at 3000m. The wind was still strong (F7-8) from the S-W and no dragging or buoy laying seemed possible so a tour was made of the moorings thought to have working pingers with the following results.

- 075 Still working. Switched on and off.
- 084 No sign. Seems it wasn't turned off in June.
- 091 C.P. on and off. Bottom echo same as on 10th.

The ship then lay to overnight near 088. At dawn the wind had eased (F3-4) but there was still quite a big

sea running.

The replacement mooring (092) was laid in about 1000m of water some way to the west of the 088 position. The wire had been wound on rather loosely from the wooden storage drums and these loose turns meant that the mooring had to be paid out slowly. All went well until the buoy had to be attached. By then the wind had increased again to F5-6 and the wire angle was 30°. The buoy was floated round from the well deck and with some difficulty was attached to the mooring. By then the wire angle was such that the stopping off strop could not be removed and this had to be cut. The buoy was then lowered into the water but had to be cut away rather than slipping the hook since by then the lines had become tangled. The mooring was released at 1220.

During the afternoon accurate fixes were made on the AR of 088 and on 092. These confirmed that 088 had moved up the slope into a depth of 796m (it was laid in 399m). Dragging for 088 was restarted at 1800 but was abandoned at 2300 due to worsening weather and trouble with the ships steering gear. The ship lay to overnight and steamed back to the 088 position early in the morning. Worsening weather meant that the dragging position was not reached until 0800 14th. The wind was still from the S-W (F6) and freshening. Dragging was abandoned at 1000 due to increasing wind and continuing trouble with the ships steering and with sea noise. The A-R was turned off and course was set for 092 to check that its C.P. and AR were both off. For some unknown reason Decca reception was very poor and it was 1145 before the position was reached and the mooring confirmed to be correct. Surveyor then set course for Barry.

At 1230 the lookout spotted an orange sphere on the surface at a range of about 1 mile. When the ship was manoeuvred alongside the buoy it was immediately recognised as mooring 088 by the name "Ruth" on the sphere. In spite of the wind which had now increased to F6 and 15-20 ft. waves the sphere was brought into the well deck and a polypropylene line attached between the winch and the mooring line. The buoy was removed by cutting away a shackle and the mooring line transferred aft. The mooring was recovered without undue difficulty until the wire was found to have been severed a few meters above the lowest current meter. The wire had most likely been broken by a trawl coming up against the lowest termination of the 640 length of wire. The upper current meter and command pinger were recovered, the former having given a full record which may well reveal the time at which the buoy went adrift. The loss of paint on the sphere and the growth on the recovery line seem to indicate that it may have been on the surface for two weeks.

The ship was underway again at 1400 and the E/S fish was recovered in the Bristol Channel at 1830 15th. Surveyor was alongside in Barry at 0100 16th.

Summary of mooring work.

088 Recovered adrift at posn. $47^{\circ} 43'.3N$ $08^{\circ} 02'.3W$.
1220A 14-8-71. Release and bottom current meter on
sea bed at $47^{\circ} 46'.0N$ $08^{\circ} 00'.6W$ (Decca 1B Red
F4.00 Green E47.00)

090 Recovered 1505A 7-8-71 at laid position ($47^{\circ} 32'.1N$
 $08^{\circ} 22'.6W$)

091 Laid 1933A 7-8-71 at $47^{\circ} 32'.1N$ $08^{\circ} 21'.8W$ in 2018m.

092 Laid 1220A 13-8-71 at $47^{\circ} 45'.3N$ $08^{\circ} 05'.5W$ in 979m.

Water bottle stations

A/1	0055/10 - 0625/10	443m	$47^{\circ} 19'.1N$	$08^{\circ} 33'.5W$
A/2	0015/10 - 1340/10	718m	$47^{\circ} 24'.9N$	$08^{\circ} 26'.0W$
A/3	1526/10 - 1340/10	979m	$47^{\circ} 32'.1N$	$08^{\circ} 21'.1W$
A/4	2026/10 - 2327/10	1539m	$47^{\circ} 35'.1N$	$08^{\circ} 17'.1W$
A/5	0034/11 - 0154/11	2050m	$47^{\circ} 40'.3N$	$08^{\circ} 10'.7W$
A/6	0300/11 - 0352/11	2120m	$47^{\circ} 45'.2N$	$08^{\circ} 04'.3W$
A/7	0420/11 - 0510/11	2660m	$47^{\circ} 50'.9N$	$07^{\circ} 58'.3W$
A/8	0625/11 - 0652/11	4106m	$47^{\circ} 57'.3N$	$07^{\circ} 51'.3W$

Acknowledgements

Once again the willing cooperation of the Captain and crew of "Surveyor" played a considerable part in the success of the cruise. The help of Mr C. Hinsworth of the RVB is also much appreciated.

W.J. Gould,
20th August, 1971.