THE ACTIVITIES OF THE ROYAL NAVAL ANTARCTIC SURVEY PARTY, 1965–66

By P. J. E. CHESHIRE*

THE Royal Naval Antarctic Survey Party consists of a hydrographic surveying officer and two surveying recorders provided by the Hydrographer of the Navy, and about six ratings lent by H.M.S. *Protector*. As required, three engineers from the Decca Navigator Company are hired by the Hydrographer to operate Hi-Fix equipment. The party is provided with a 29-ft. (8·85 m.) surveying motor boat, *Nimrod* (Fig. 1), and it is fully equipped with surveying instruments, stores and provisions for conducting boat surveys from shore camps.

Two ships are from time to time available to assist the hydrographic work. Of these, R.R.S. *John Biscoe*, operated by the British Antarctic Survey, provides by far the greater contribution, mainly in the sounding role, and in 1964 she was fitted with Decca Hi-Fix equipment for fixing offshore sounding. H.M.S. *Protector* is generally only available for short periods, but her helicopters are invaluable for progressing triangulation by lifting observing and marking parties on to high and otherwise inaccessible triangulation stations.

In the 1965–66 summer season three main surveying tasks were undertaken: the survey of the western approaches to Coronation Island in the South Orkney Islands, the Cape Kater reconnaissance and, farther south, the survey of the area between the Dion Islands and Neny Island in Marguerite Bay. The first of these was progressed with only moderate success, the second was completed and the third, the main task of the season, was brought to an unexpectedly successful conclusion, largely because of abnormally good weather. Several minor tasks were also completed, including a large-scale survey of Neny Bay.

SURVEY IN THE SOUTH ORKNEY ISLANDS

The survey party took passage south in H.M.S. *Protector* and arrived in the South Orkney Islands on 1 December 1965 to undertake the survey of the western approaches to those islands. H.M.S. *Protector* was to stay in support for 8 days, during which time it was hoped to extend the triangulation round the western end of Coronation Island before R.R.S. *John Biscoe* arrived 10 days later. In the event, in the whole 8 days, only 15 hr. flying was allowed by the weather and all that was achieved with the helicopters' support was a reconnaissance, which will enable next year's work to progress more smoothly, and the landing of some of the stores for the Hi-Fix camps.

The second setback which greatly restricted the work output on this survey was the bending of *Nimrod*'s shaft in the early days. It was discovered too late that the spare carried was the wrong size. A new shaft was made in H.M.S. *Protector*'s workshops, together with three more spares, but they were not available until the end of this survey.

H.M.S. *Protector* left the area on 7 December, leaving the survey party under canvas on Signy Island. Moorings were laid for *Nimrod* in Factory Cove off the British Antarctic Survey station, and the next 3 days were spent in choosing and fixing the sites for the Hi-Fix slave stations (Fig. 2) and dumping stores.

On 10 December, R.R.S. *John Biscoe* arrived at Signy Island and after 3 days' cargo work became available for surveying on 13 December. 3 days later ship-sounding on Hi-Fix commenced, working towards the south-west from the west coast of Signy Island and the mouth of Norway Bight. Hi-Fix worked moderately well but trouble was experienced with lane-slipping, probably caused by reflections off numerous tall icebergs of which there were over a hundred in the area. Visibility was often poor in snow or fog and sometimes long delays were caused by the inability to see the marks for a visual fix with which to "lock on" again.

The weather was remarkable for its sudden changes and vivid contrasts. Days of dense fog and sunshine, mirror calm and gale, passing showers and driving blizzard followed each other in haphazard cycle. The ice, too, was utterly unpredictable. For a week the south coast of

* Lieutenant, Royal Navy; Officer-in-Charge, R.N. Antarctic Survey Party.

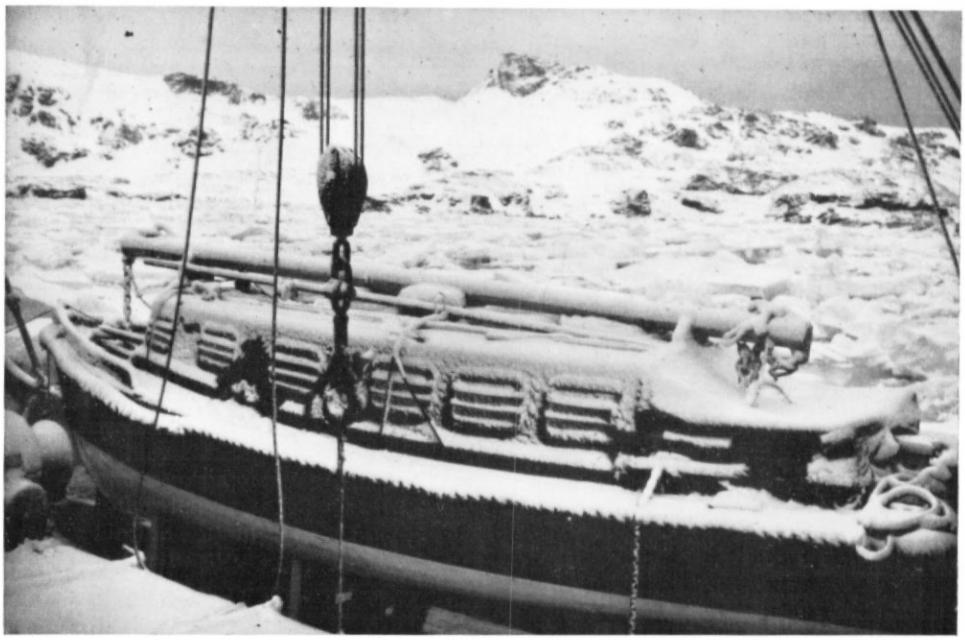

Fig. 1. The surveying motor boat *Nimrod* on board R.R.S. *John Biscoe* after a fall of snow.

Fig. 2. A Hi-Fix slave-station camp on Signy Island, South Orkney Islands.

Coronation Island was inaccessible behind a strip of pack ice, then one night it all vanished against the wind. On Christmas morning there was no pack to be seen and that same evening the ship was in eight-tenths heavy pack which extended as far as the eye could see; it stayed for 3 days and then completely disappeared in a few hours.

R.R.S. *John Biscoe* was available for surveying for 22 days, and in that period 750 miles (1,207 km.) of sounding covering 230 sq. miles (595 km.^{2}) were completed. Only 25 miles (40 km.) of boat sounding were completed. The continuation of the area to the west contains a far greater proportion of ship work to boat work, so it is hoped that the boat will be able to catch up next year.

On 4 January, H.M.S. *Protector* arrived off Signy Island and embarked the survey party for the Cape Kater reconnaissance and *Nimrod* for repairs. She also assisted by lifting one Hi-Fix slave camp by helicopter. That evening she set course for the South Shetland Islands.

Cape Kater Reconnaissance

There is a gap in the triangulation of the Graham Land west coast between Cobalescou Island and the triangulation schemes at the northern end of Trinity Peninsula. Good air-photography coverage exists, but the mapping cannot be completed until the triangulation has been extended to give ground control to the photography. The first stage in achieving this is to extend the triangulation as far as Cape Ducorps, and this year's task was a reconnaissance to see how this could best be done.

In contrast with the start of the South Orkney Islands survey, the Cape Kater reconnaissance was blessed with a run of perfect weather. It was a job tailor-made for helicopters (Fig. 3); landings were made on 15 different islands extending over more than 100 miles (161 km.) of coastline and many of the sites were difficult of access by boat and climbing.

All the stations for a braced tellurometer traverse between Cobalescou Island and the Tupinier Islands were chosen and, with the exception of two snow stations, permanently marked with brass markers set in cement and fully described. The lines of sight were proved and the most unlikely tellurometer line was also proved by landing a pair of Hydrodist instruments and achieving a strong signal and a clear "circle".

Fig. 3. A helicopter from H.M.S. *Protector* arriving to pick up a surveyor during the Cape Kater reconnaissance.

The enthusiastic support of the ship's helicopter flight and the skill of the pilots in landing on the irregular summits of steep islands, sometimes with only one wheel touching, made this reconnaissance possible and plucked success out of a period of unexpected good weather.

Scale Check and Magnetic Observations

The Cape Kater reconnaissance was completed on 13 January 1966. On the same day H.M.S. *Protector* steamed across Bransfield Strait to King George Island and on the following morning, again with skilled helicopter assistance, the distance between two triangulation stations in the vicinity of Admiralty Bay was measured as requested by the Directorate of Overseas Surveys as a check on the scale of the triangulation there. Later, on the same day, the survey party and the repaired *Nimrod* were transferred to R.R.S. *John Biscoe* with whom a rendezvous had been made that morning.

On the following day, 15 January, R.R.S. *John Biscoe* arrived at Deception Island where the opportunity was taken to re-occupy the magnetic station at the Argentine station and take observations for the vertical and horizontal components of the Earth's magnetic field.

Sailing thence on 16 January, the ship made passage south through the dramatic scenery of Neumayer and Lemaire Channels to the Argentine Islands, visiting the old British station at Port Lockroy and the American station at Anvers Island on the way. At the Argentine Islands, intercomparisons between the survey party's magnetometers and those of the British observatory were made. After delivering mail and stores, the ship sailed for Adelaide station and then Stonington Island, arriving at the latter on 20 January.

For some time back, from reports received, it had been clear that this was to be a good ice year, and on arrival in Marguerite Bay the area was found to be remarkably clear of ice, and freer in fact than the South Orkney Islands, 500 miles (805 km.) farther north, had been. It was therefore decided to undertake the survey in Marguerite Bay at the expense of the area off the Argentine Islands, as this opportunity might not recur for several years.

Surveys and Triangulation Link-up in Marguerite Bay

R.R.S. *John Biscoe* was not to be available for surveying for 10 days whilst she relieved the stations at Stonington and Adelaide Islands. The survey party therefore moved ashore into camp on Stonington Island and moorings were laid for *Nimrod*.

On the next day work was started on a triangulation scheme to provide control for the large-scale survey of Neny Bay. Until the triangulation link-up could be completed, it was necessary to accept temporarily the geographical position of the Stonington Island survey pillar and the azimuth of a common side, but a new base line was measured and an independent triangulation scheme established.

By the time R.R.S. *John Biscoe* arrived back at Stonington Island, *Nimrod* was sounding and the camp was left in charge of the Petty Officer while the Officer-in-Charge transferred to the ship.

The master of R.R.S. *John Biscoe* and the senior Decca engineer had just completed an air reconnaissance of possible Hi-Fix sites, so only a brief final inspection was necessary before landing the two Hi-Fix slaves; one on the southern of the Guébriant Islands and the other on an islet in the Faure Islands group. No calibration was necessary on a scale of 1 : 75,000 and on 5 February ship sounding on Hi-Fix began.

For 3 weeks progress was generally good with fine weather and continuing ice-free conditions. To begin with it was possible to sound for 24 hr. a day, but as the nights became longer the ship had to anchor overnight.

On 24 February, a rendezvous was made with H.M.S. *Protector* and 2 hr. later a helicopter was lifting an observing party on to Jenny Island to start the observations for linking the Adelaide and Stonington Islands triangulation schemes. Unfortunately, H.M.S. *Protector* was only able to stay for 2 days, but before she had to leave useful progress was made on the new task; the link-up eventually had to be completed from R.R.S. *John Biscoe*.

In the forenoon of 26 February, H.M.S. *Protector* left the area and R.R.S. *John Biscoe*, which had been away for 2 days killing seals for the scientific stations, resumed her surveying role.

On 5 March, the 1 : 25,000 survey of Neny Bay was completed by the camp party in *Nimrod*. The usual route of ships into the anchorage off Stonington Island was found to be deep and clear. The boat camp was lifted the same day and thereafter *Nimrod* worked from the ship, sounding and coastlining the vicinity of Pod Rocks and the entrance to Neny Fjord.

The ship sounding continued to go well, still with good weather and very little ice. Hi-Fix worked well with very few break-downs or lane-slipping and this was assisted by excellent radio communications. The slave sites, although nearly perfect from the surveying point of view, were not attractive as camp sites, being on very small islets, and it is to the credit of the Decca engineers and British Antarctic Survey personnel manning them that they remained cheerful and efficient for the whole of their 7-week sojourn in cramped and isolated conditions. A great factor in maintaining their high morale was the infallible reliability of the voice communications: at any time, any of their friends on board the ship could go up to the chart-room and have a talk with them and they even exchanged "record request" programmes with the stations at Adelaide and Stonington Islands.

As in the South Orkney Islands, so in Marguerite Bay, the gratitude of the survey party to Capt. T. Woodfield and the three deck officers of R.R.S. *John Biscoe* cannot be adequately expressed. The ship is short of deck officers for this sort of work and yet she was worked to the limit of her capabilities. At the beginning of the survey in Marguerite Bay, it was light all night and sounding continued for 24 hr. a day for 7 days with only two breaks. The Captain had to be on the bridge at least half of the time, and in ice or over shoals he took the ship himself; on these occasions two out of the three mates were often required on the bridge together, thus forfeiting their meagre time off watch. In the 7 weeks of Hi-Fix sounding only two Sundays were taken off. The usual Sunday concession was to anchor "early" at 18.00 and not weigh until 08.00 on Monday morning.

By 18 March, 2,400 miles (3,860 km.) of sounding, covering 600 sq. miles (1,550 km.^{2}), had been completed in the Marguerite Bay area. The general configuration of the sea bed had been revealed and found to be highly irregular with precipitous peaks rising to within a few feet of the surface from hundreds of fathoms. Several alarming but no dangerous shoals were found, and in some areas grounded icebergs prevented close examination of possible shoals.

On 19 March, and during the following few days, the two Hi-Fix slave camps were recovered and the observations necessary to complete the triangulation link-up were resumed. The first of these was the occasion of an accident which might have been serious. A rating of the survey party slipped down an ice slope on Lagotellerie Island and injured his back. Luckily, it was later found that the injury was slight, and the occasion will be remembered more as an exercise in mountain rescue than as a tragedy.

Two days later a party climbed Lagotellerie Island again, another party climbed Jenny Island, and the line between them was observed and measured. This was to be the last surveying operation in Marguerite Bay this season as the ship had to leave the area on the following day. The triangulation link-up was complete, but not to the accuracy originally hoped for; as it is, an accuracy of $\pm 1 \cdot 5$ m. at the Stonington Island end has been achieved.

End of the Season

On 24 March, R.R.S. *John Biscoe* sailed for the Argentine Islands, arriving there on the following day. The survey party's magnetometers were again compared with the scientific observatory's instruments and later, on the way back to Port Stanley, magnetic observations were obtained in the South Orkney Islands and in South Georgia.

These last few magnetic observations marked the end of the season as far as the Royal Naval Antarctic Survey Party was concerned. On the whole it had been a most rewarding season and one of exceptionally good weather and remarkably ice-free conditions. The assistance and willing co-operation offered by the British Antarctic Survey was outstanding, and it is hoped that the eventual production of the new charts resulting from the 1965–66 season's work will in some measure repay them for their labours.

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