Continental Shelf Northern Unit
Internal Report No. 78/11

Cruise Report 78/CS/06 Leg 4

Cape Shore

2 June - 16 June

1:250,000 sheets Cormorant (61°N to 62°N 0W to 2°E) and Shetland (60°N to 61°N 2°W to 0W)

by

R Holmes

CONTENTS

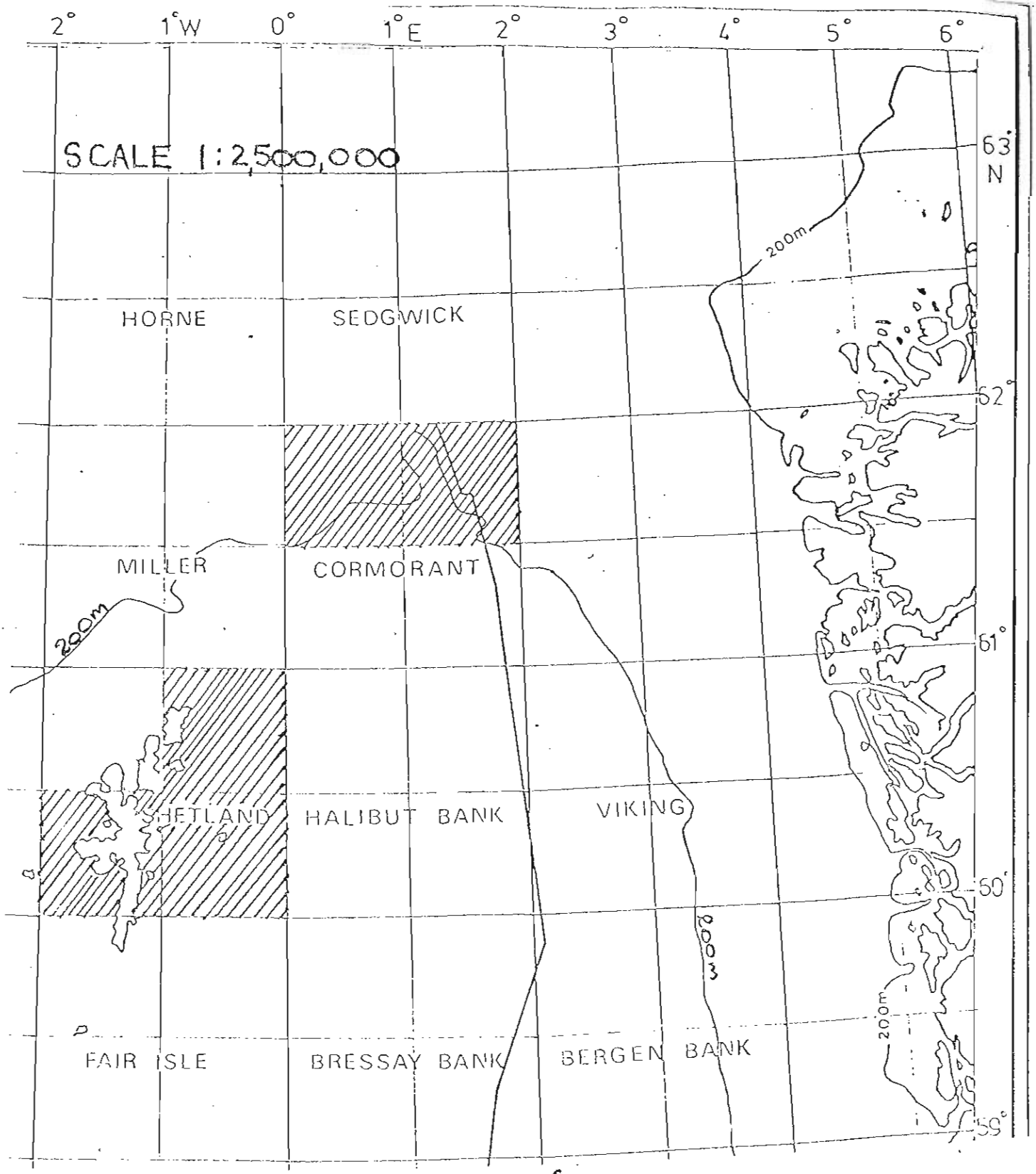


Fig 1. Area of coverage of cruise 78/CS/06 Leg 4 2 to 15 June 1978.

1:100,000 SHEETS WORKED.

Introduction

This was the fourth leg of the 1978 'Cape Shore' operations in the Cormorant and Shetland 1:250,000 sheets (Fig. 1). Previous legs had completed approximately 2/3 of the routine gravity core, grab sample and vibrocore work required to complete the Cormorant 1:250,000 sheet and approximately 1/3 of the work required to complete the Shetland 1:250,000 sheet. This leg achieved the main aim of completing routine sampling and vibrocore work in the Cormorant sheet, and contributed significantly towards completing routine sampling on the Shetland sheet. The deepest water vibrocore sites attempted by IGS were achieved without incident.

Summary

a) The following 100,000 sheets were worked: Cormorant NW, NE (completed); Shetland NE, SE, SW.

b) 17 deep water vibrocore sites were completed; 142 routine sites (grab, rock corer or sediment corer) were completed.

General

a) IGS equipment

VIBROCORER (6m)

Recovery averaged over 4m and full recoveries of 5m+ were common; no major downtime was experienced with the operation of the vibrocorer.

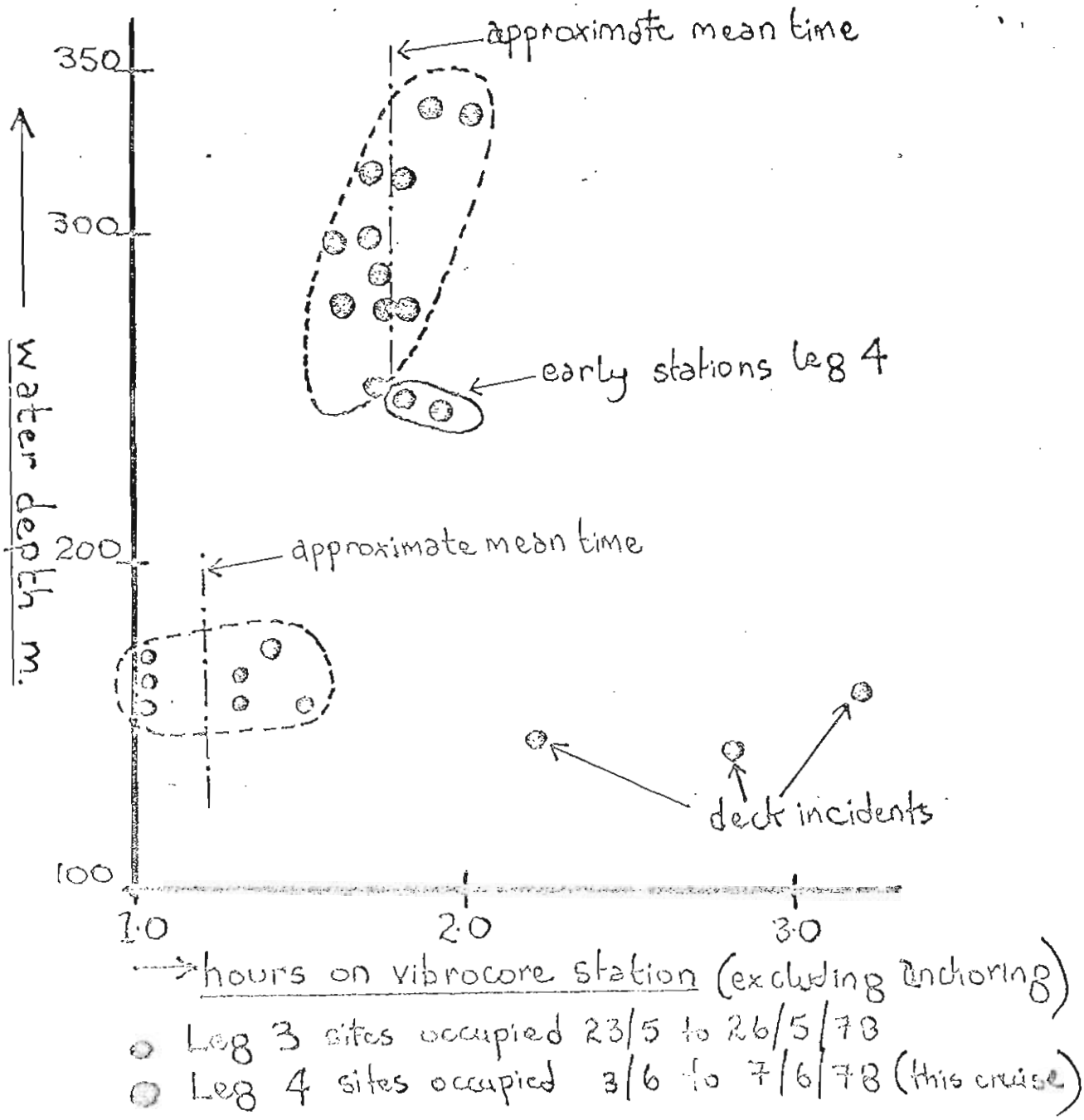
For the 16 sites in greater than 250m water depth the vibrocorer

electric cable was tied to the main hoist wire with thick sisal string intially at 10m intervals and later, with more experience, at 20m intervals. Tying on was ceased at a depth estimated to be 150m below sea level when the vibrocore was resting on the sea bed. The tying-on prevented excessive strain of the electric cable under its own weight, prevented cable trapping between the pot and frame and allowed a certain amount of sensitivity to be applied when hauling in the electric cable on these deep water sites. Twisting of the power cable around the hoist wire, occasionally severe, was experienced on the deepest water sites (see Appendix C for Wednesday 7 June). This may have been caused by torque in the vibrocore hoist wire, and the release of that torque on lowering the vibrocore.

To facilitate tying on operations the electric cable was marked at 10m intervals with yellow lassovic tape. Because 'snatch ' on the main hoist wire was imperceptible when the vibrocore reached the sea floor at great depths it was found necessary to count out the 10m marks in order to know when the vibrocore bottomed.

Each tie on point occupied approximately 25 seconds and on retrieval each cut of the tie approximately 8 seconds so that for stations in the order of 300m water depth a total of approximately 8 minutes was used on each station as a result of tying the electric cable to the hoist wire. It was found that in good conditions this time could be reduced by cutting the sisal string whilst the main hoist wire was moving on retrieval.

Fig 2. Time on vibrocore station vs. water depth



On average vibrocore stations at sites in the order of 250 to 340m depth took approximately 35 minutes longer than sites in the order of 150 to 180m water depth where no tying on was necessary and where vibrocoring was run in each case for 30 minutes (Fig. 2). However, the data presented in Fig. 2 show that the critical factor determining excess time spent on station vibrocoring was not in fact controlled by tying on operations, but by water depth, speed of hoist winch operations, and random incidents (causing scatter of data points on Fig. 2) whilst the vibrocore is on deck or on transit to and from the sea bed.

Tying on in deep water sites becomes more difficult with ship's roll and entails a certain amount of walking with the wires at the exposed position at the stern of the ship. For this reason it is strongly recommended that the stern should be kept mud free during such operations, and that care should be taken to ensure that the anchors are set as perfectly as possible so that the ship is head on to waves.

GRAVITY CORER

This worked in a generally satisfactory manner. 4" ID barrels were used (rather than 2½" NX barrels) because in marginal weather a sizeable sample could be taken for geochemistry/micropalaeontology in the event of grab failure. In addition, the larger diameter allowed statistically more meaningful shear vane and penetromenter tests to be reported for clay.

The low ship's freeboard and approximately 1m extension of the gravity core trough over the ship's stern meant that the period

of approximately 10 seconds, whilst the bowsing line was attached to the gravity core, was a time of considerable danger to IGS personnel when operating in force 5 or above (sea was easily scooped up or washed over the stern). An efficient work speed on this operation was essential due to the lively tendency of the ship to swing round quarter on or beam on to the sea in fresh winds and a natural reluctance on behalf of the ship's officers to use main engines to correct this swing whilst gravity coring. The bow thrust was apparently too weak to prevent the swing in these marginal conditions. Routine sampling was abandoned when short highly disturbed cores were being recovered.

One gravity core body, 5' x 4" barrel and adaptor was lost overboard when the wire parted above the 'Tellurit' splice. The gravity core hoist wire was examined periodically and the splice replaced as soon as it became worn (approximately 2 days routine sampling), so that the reason for the loss remains unsolved. Repairs to the gravity core trough (which tended to split along welded seams in the trough) occupied 50 minutes of down time when the welding could not be done under way in marginal weather. Two hours of downtime was also occupied in replacing the top 'U' guide to the nose of the gravity core trough which snapped off during operations in poor weather.

Due to non arrival of 4" x 5' barrels ordered for the start of this leg, and the loss of 3 remaining barrels subsequent to the start of this leg, samples after station 61/00/168 (Cormorant sheet) on 14.6.78 had to be taken with the 2½" ID barrels. Because of poor grab recoveries in marginal weather

after this station, most micropalaeontology and geochemical samples had to be taken from the top of these cores, and the samples were consequently smaller than ideally desired. Approximately 25 routine sample stations were sampled in this manner during the last 24 hours sampling time of the cruise, and a note of sample origin was made on each sample and sample description sheet.

SHIPEK GRAB

Grab operations were generally of unsatisfactory nature due chiefly to poor handling equipment and the lively nature of ship's movement.

The grab winch was very slow, taking over 10 minutes to run to 200m and back. In marginal weather (force 4, verging on 5) 3 attempts at sampling was common practice before enough sample was obtained or before grab sampling was abandoned. In such conditions the bow thrust seemed incapable of bringing and keeping ship's head to weather and the master and first mate were the only ship's crew capable of manoeuvering the bow round into the weather with ship's main engines. Without constant manoeuvering (following gravity coring) the ship wallowed quater on or beam on to weather, the shipek streamed at low angles on descent and increased the likelihood of poor recovery. In such a situation the position was exacerbated by wallowing on recovery, thus increasing the likelihood of washing the sample in transit. When this situation was impossible to avoid due to weather, routine sampling was abandoned. If the speed of the grab winch had been greater a sample could have been taken before the ship came round

beam to weather.

Other consequences of poor ship stability in rough weather were:

a) wire jumped off the top sheave (causing 1¼ hours downtime).

b) IGS personnel with poor physical strength had difficulty in controlling shipek swing, and cocking the shipek, so that it became dangerous to operate.

Flakes of paint from the shipek contaminated each sample. This must affect the trace element analyses that are intended to be carried out by the Geochemical Division.

DECCA MAIN CHAIN MK21, and TRACK PLOT

These were used in a routine manner on chains 0E and 6C and no functional problems were found. The ship's officers were not used to navigation by track plotter and were instructed as to its characteristics by IGS personnel. Main chain navigation was abandoned close to land in favour of radar range and bearing due to land effect around steep shorelines effecting the Decca. Radar was accurate and easy to operate around Shetland due to much work being less than 3 miles off-shore and the many prominent fix points available in the inshore areas.

SAMPLE STORAGE

Bottle sample storage was adequate and routine. Core storage was in palletised racks. Cores from the previous leg were found to have broken wax seals due to poor stacking in the wire

crates, and subsequent ship's movement allowing them to move and distort the crate. The worst cores were resealed, and then the whole securely lashed to prevent further movement during leg 4.

b) Ship's Equipment

ANCHORS AND ANCHORS WIRE

a) The ship's anchors were used for routine sampling in force 8 and 9 around Shetland to bring the bow into weather and prevent drift in the narrower Voes. These performed faultlessly.

b) The 3-point wire rope anchor system engaged whilst vibrocoring performed satisfactorily, but during operation were the source of considerable concern.

i) Spooling on operations of the two stern anchors involved use of guide lines across the deck which involved additional work hazards for tripping up etc. Anchors could not be safely drawn in whilst the barrel was taken out of the vibrocore.

ii) Approximately 200m of wire on each stern spool was badly worn (flattened cross section on outside of wire bundles; polygonal wire bundles on inside faces; abraded individual wires; broken individual wires (at least 1 per metre) ovoid total cross section. Although anticipated, a break did not occur.

iii) Two wire bundles approximately 300m above the starboard anchor were almost completely severed.

iv) The stern rollers were set so far back from the sponsons that the sponsons underwent severe abrasion from the wire so that they were deeply notched. Hard strips welded to the

sponson at the start of the leg failed to prevent such slicing.

v) On retrieval the rollers were too small to prevent great strain on the wire at acute angles e.g. if the stern winches were pulling in wire which was pointing towards the ship's bow, so that considerable stretching must have occurred on the outside curvature with compression on the inside. This situation decreases the safe working load of the wire. Luckily, because of operations in water sites greater than 200m depth, the worst situation of acute wire angles over the rollers with the most worn end sections of the wire did not occur. Shallower water anchoring situations must be expected to incur a much greater risk of wire breakage.

As the bow anchor rollers were forward of the ship's body the wire was not so worn and the loss risk attached to the bow anchor was minimal.

c) Fast laying of anchors was experimented with by steaming to sites with stern anchors trailing some distance aft. However, with two anchors trailing, a moderately tight turn crossed the anchors. With the starboard anchor trailing a moderately tight turn to port sliced the anchor wire into the gravity core trough. Time saved by trailing the port anchor only was marginal.

d) On deep water sites (250m) unless the anchors were walked down with the minimum ship's forward velocity they stood some chance of tumbling before resting. The tumbling was thought to be caused by a mixture of relatively steep gradient associated with the continental slope (during most of the cruise ship bows headed N or NW into the wind, and therefore the ship was laying stern anchors down-slope), steep edges and pinnacles

associated with rugged topography (2 to 4m amplitude) from ice-berg plough marks, and ship's movement on Atlantic swell. Anchor wire tangles resulting from such tumbles accounted for approximately 6 hours down-time.

e) On firm ground in deep water sites the stern anchors did not hold well. It is thought that such a situation was due to strain on stern anchors for the most part being downslope of their position (see above). The situation may have been eased by use of anchors with longer flukes, although due to the variety of ground anticipated during most cruises this suggestion is probably not worth pursuing.

SHIP'S CRANE

One hour downtime was incurred due to a fuse blowing, otherwise performance was satisfactory.

SHIP'S POWER SUPPLY (A/C)

Two fuses blew during this leg resulting in minimal down-time. The chief engineer warned of the possibility of break-down of a/c power due to inability to overhaul the generator whilst in port (due to other problems) but since approximately 44 hours downtime waiting on weather was lost during the cruise (most of it anchored up around Shetland at nights when inshore work became too dangerous), this complaint was not upheld.

c. Geology

The interpretation of the results is primarily the

responsibility of A C Skinner (Cormorant) and J A Chesher (Shetland). The following is a very brief summary of points of scientific interest discovered during the cruise.

A. Vibrocoring completed in the northern Cormorant area showed that compared to samples taken at around 200m water depth sediments changed from overconsolidated firm to stiff clays to slightly overconsolidated soft clays, or normally consolidated clays and sandy clays. The soil consistency changes correlated with olive greys and blacks with sulpides in the overconsolidated successions to greyish brown, olive brown clays with characteristically no sulphides and a generally more oxidised appearance. Reasons for clay consistency and oxidation state changes with water depth may be as follows:

i) Compared to shelf sediments approximately less than 200m below present sea level consolidation from grounded glacier ice has not affected slope sediments : ?due to a glacier ice calving line along the edge of the slope.

ii) Reworking by ice-berg ploughing (below approximately 180m depth) has resulted in re-constitution and oxidation of clays previously overconsolidated. In this case a confused micropalaeontology can only be expected from the cores.

iii) Dumping of glacier outwash on the slope following onset of deglaciation on the shelf and mainland. Relatively deep water northern slope areas were probably stable deposition areas for fines washed over the edge of the shelf from deltas and stormy very shallow shelf seas following early deglaciation.

B. Routine grab and core sampling in the Cormorant sheets showed a change in abundance of planktonic forams from

approximately 50% of carbonate in water depths around 180 to 200m water depth or less to greater than 90% in waters around 220 to 350m water depth. These changes obviously reflect transition downslope from shelf to slope conditions. Since it is hardly credible that planktonic foram supply across this boundary should only be controlled by abundance of tests within the water column, alternative suggestions for the transition can be made. These include differential removal of planktonic forams as lighter material (compared to pelecypod fragments and benthonic forams) to deeper water by bottom currents, and dilution of the proportion of planktonic debris by a higher input of benthonic species.

C. During sampling within the Shetland 1:250,000 sheet the prolific nature of benthonic life was obvious, and many macro samples were preserved in formalin. Outside the sheltered Voes routine samples predominantly consisted of coarse shelly sands with an abundance of lithic and shell gravel, commonly with serpulites and coralgal growths. The inner Voes generally contained finer sediments, commonly putrid below the first few cms. cover, and were obviously settling grounds for land debris and fines brought inshore from the more exposed open sea.

It is suggested that vibrocore samples within Voes with a rock bar at the entrance may be able to provide data to date transgression of sea into various Voes, and work out a eustatic model for the Shetland area.

Conclusions and Recommendations

a) The ship becomes unworkable in Force 5 (exposed to Atlantic conditons). Operations by IGS personnel became dangerous before sample recovery became unacceptable. A constant vigilance has to be maintained by ship's officers to lessen a very lively ship's roll and heave.

b) The critical factor during routine sampling is the speed of the shipek grab winch. It can be estimated that doubling the speed of operation of the grab winch on deep water sites (approximately 200m) will decrease the time on station by approximately 10 to 50%. It is therefore recommended that a much faster motor drives the shipek grab.

c) While approaching anchors points on the continental slope with the ship moving down-slope anchor tumbling and slip can be anticipated. Tumbling may be prevented by a slow approach before dropping anchors.

d) For deep water sites streaming of the vibrocore hoist wire is recommended prior to sampling in order to release some of the wire torque and prevent the electric cable wrapping round the hoist wire. A sail for the vibrocore may also be desirable to prevent such tangling.

Acknowledgements

The whole hearted and cheerful cooperation of the ship's master, Captain W Clyne, mates D McGhie and J Mahoney, Chief Engineer M Dunn and all the other ship's crew is gratefully

acknowledged.

Appendices

A. List of IGS Personnel

R Holmes	CSNU	Senior scientist, day geologist
S Brown	CSNU	Night geologist
P J Wiggins	CSNU	Technician
C Graham	CSNU	Night navigation, night lab.
Susan Paterson	CSNU	Day navigation
H Robertson	CSNU	Day lab.
B Tait	Geochem.	Night/day lab.
T Smith	Geochem.	Night/day lab.

B. Time analysis sheets

See copies attached.

C. Senior Scientist's Log (British Summer Time)

Thursday 1 June

1330	Handover of ship from D Evans to R Holmes, C Graham remains on ship, A Fyfe, N Ruckley, R Sutherland, W Lonie and A Davies leave ship, new scientific personnel take over (see appendix A). All ship's crew except for cook, one steward and ship's engineers also change.
1400	Lorry with miscellaneous spares and vibrocore frame arrives and is offloaded by quayside crane.
2000	Replacement steward debunks (objection to share cabin with other steward); replacement requested.
2400	In port.

Friday 2 June

0830	Stripping backing wire at base of vibrocore hoist wire.
1000	Refurbishing and replacing anchor rollers.
1505	Crane arrives ship (from Lerwick) to offload bow vibrocore anchor for onshore repair (ship's work).
1615	Crane departs for Lerwick; now confirmed that

	spare vibrocore electric cable and gravity core barrels (5' x 4") not available in Lerwick (from the St. Clair ferry), 1 box of miscellaneous spares on same consignment does, however, arrive: overtime forms posted from Edinburgh received. IGS ready to leave port.
1830	Completed ship's repairs on anchor rollers, and welded hard strips on starboard stern sponsons.
2055	Let go from Lerwick, steaming for site 126, 61°50'N 00°05'E (approx. 160 miles).
2400	Passing outer skerries, east Shetland, in Force 1, no swell.

Saturday 3 June

0745	Commence anchoring on vibrocore site 61/+00/126.
0910	Start vibrocore down, tying on electric cable to hoist wire at 10m intervals to within approx. 150m from sea surface.
0937-1007	Vibrocoring.
1010	Start vibrocore to surface.
1020	Vibrocore on stern, taking off barrel, ascertaining recovery, replace barrel.
1055	Picking up anchors.
1125	Start to stern to site 127, trailing anchors for quick lay.
1310-1445	Anchoring.
1450	Start vibrocore down.
1515-1545	Vibrocoring.
1615	Vibrocore on deck, angle iron guide rails on vibrorcore parted at weld.
1630-1720	Picking up anchors, steaming for site 128.
1840-1905	Anchoring
1908	Start vibrocore down.
1955-2025	Vibrocoring.
2110	Vibrocore on deck.
2120	Start pick up anchors, stern anchors crossed and fouled under starboard sponson.
2225	Stern anchors free, badly chafed wire rope adjacent to white metal link to starboard anchor, total wire thickness probably reduced by 1/3, waiting to lift bow anchor.
2248	Anchors up, start routine sampling sheet 61N 00E.
2400	Routine sampling, 3 vibrocore stations and 1 routine sample completed for day.

Sunday 4 June

0001-0542	Routine sampling, them steaming to vibrocore site.

0640	Started to anchor up vibrocore site 136, sheet 61°N 00E.
0700	Anchors down.
0705	Start vibrocre down.
0734-0804	Vibrocoring.
0815	Lifting vibrocore.
0845	Vibrocore on deck, start lifting anchors.
0930	Anchors up, steaming for next site.
1010	Start anchors down site 137.
1205	Anchors fixed after dragging on poor holding ground- too hard, or dragging downslope.
1215	Vibrocore in water.
1255-1325	Vibrocoring.
1330	Lift vibrocore.
1345	Vibrocore on deck.
1350-1455	Lifting anchors, start to steam to next site.
1530-1555	Anchoring up site 138.
1600	Vibrocore over side.
1625-1655	Vibrocoring.
1700-1735	Lifting vibrocore to deck, vibrocore on deck, splicing grab wire on deck.
1740-1830	Lifting anchors, start to steam for next site.
1920-1940	Anchoring up site 139.
1950	Start vibrocore down in record water depth (346m) overrun by approx. 50m wire due to lack of 'snatch' when hitting sea bottom.
2035-2105	Vibrocoring.
2110	Start vibrocoring.
2145	Vibrocore on deck, start pulling in starboard anchor, found starboard wire with 2 bundles almost severed through approx. 300m above anchor.
2235	Port anchor with 1 wrap of anchor wire around flukes and tangled under sponson. Pulley arrangement associated with grab davit modified to take new splice.
2400	Still attempting to unfangle ship's anchors. Four vibrocore stations and 6 routine station samples undertaken during day.

Monday 5 June

0001-0345	Port anchor brought to stern deck in very bad tangle with wire; cut through and refixed to anchor with a partial splice and 3 bulldog clips (all of incorrect size). Started routine sampling sheet 60/00/140, Force 1.
0630	Started laying anchors site 141 station 60/00/142.

0700	Finished laying anchors.
0705	Vibrocore in water.
0735-0805	Vibrocoring.
0810-0840	Lifting vibrocore, vibrocore on deck.
0845-0930	Lifting anchors, stern port wire wrapped round flukes.
1015	Untangled anchor, noticed slippage on bulldog clips (probably occure every time anchor is fixed to sponson). Steaming to next station.
1100-1138	Laying anchors site 143.
1140	Start vibrcore down.
1205-1235	Vibrocoring.
1305	Vibrocore on deck.
1320-1420	Lifting anchors, requested tighten up bolts on slipped bulldog clips.
1450	Bulldog clips tightened, steaming for site.
1515-1550	Anchoring up site 61/+01/216.
1555	Start vibrocore down.
1630	Vibrocore on sea bed.
1635-1705	Vibrocoring, start bring vibrocore up.
1755-1845	Lifting anchors, start routine sample pattern.
2400	Routine sampling, 3 vibrocore sites, 9 routine sites undertaken during day.

Tuesday 6 June

0001-0600	Routine sampling, force 2-3.
0625-0700	Laying anchors for vibrocore site 61/00/230.
0710	Start vibrocore down.
0800-0830	Vibrocoring.
0832	Hoisting up vibrocore, cutting ties to hoist wire on move.
0915	Vibrocore on deck.
0925-1005	Lifting anchors, then steaming to site 231.
1040-1110	Anchoring up on site.
1110	Start vibrocore down thereafter tying every 20m compared to 10-15m previously
1145-1215	Vibrocoring.
1255	Vibrocore up, cable trapped under pot (?too much untied electric cable to first tie)
1300-1400	Lifting anchors.
1430-1500	Laying anchors site 232.
1505	Vibrocore in water.
1530-1600	Vibrocoring.

1605-1640	Bringing vibrocore to deck, extracting barrel.
1645-1720	Lifting anchors then steaming to site 233.
1750-1820	Laying anchors.
1825	Start vibrocore down.
1900-1945	Vibrocoring.
2005	Vibrocore on deck.
2010-2055	Lifting anchors, then started routine sampling.
2400	Routine sampling Force 3. Four vibrocore sites, 10 routine sites completed during day.

Wednesday 7 June

0001-0640	Routine sampling, then start anchoring up for vibrocoring site 244.
0705	Finished laying anchors.
0720	Start vibrocore down, Force 4, NW chop, but no swell.
0750-0820	Vibrocoring.
0920	Vibrocore on surface: electric able very tangled round vibrocore hoist wire, electric cable free by cutting, tangle caused by enhanced ship's movement? or by combination of deep water site (340m), long tying interval (20m) and wire at base of hoist drum not having been used frequently - so that still retains much latent torque. Grab lost on site together with approx. 100m of 6mm wire, grab wire bundled on retreival.
1005	Vibrocore equipment untangled, streaming grab wire with large shackle - untangled satisfactorily.
1215-1250	Laying anchors site 245.
1255	Start vibrocore down, retaining pin drops out whilst angling over ship's stern, vibrocore retrieved on deck with gate tripped.
1335	Start vibrocore down again.
1340-1415	Vibrocoring.
1510	Vibrocore up on deck.
1515-1600	Lifting anchors in Force 5.
1700	On routine sample site in worsening weather; IGS repairing grab wire with double 'Tellurit' splice. Offshore Marine replacing snatch block (with missing nut) on A frame for gravity core work.
1750	Finished IGS 'Tellurit' splices.
1830	Finished replacing snatch block, start routine work in increasing swell.
2215	After 4 routine stations work abandoned in mixed NNW swell and SW chop; also getting few grab or gravity core samples (after 3 minimal returns from the 3 last stations).

2400	Running slowly before SW sea, large swell, Force 5-6. Two vibrocore sites and 11 routine sites completed during day.

Thursday 8 June

0001-0630	Standing to, waiting on weather, Force 5-6 steady.
0630	Steaming to re-occupy station that had no returns at all from sampling in poor conditions the previous evening.
0805	Start of routine sampling, Force 4, bowsing line to gravity core parted due to catching in sheaf: no injuries.
0900	Repaired and steaming to site 61/-01/252.
0945	Gravity core barrel lost by shearing at weld with base plate ; also top 'U' guide to nose of gravity core trough broken clean off, replaced barrel, repairing gravity core trough by welding on new 'U' guide (holes in guide out of alignment with those in trough)
1150	Finished welding trough (while running with sea), routine sampling continues with deck continually awash.
1450	Gravity core jumped out of the trough due to IGS winch operator not letting off slack.
1500	Gravity core back into trough, return to routine sampling.
2240-2250	Bent 4" x 5' barrel, replaced, old sheared bolts extracted, base plates holes on gravity core barrel do not match those on gravity core body! Holes filed out to match.
2350-2400	6mm wire jumped off top sheave on grab davit in heavy swell: sheave too high to easily dismantle and replace wire.
2400	Routine sampling Force 3, but heavy swell residual from morning. 10 routine samples for day total.

Friday 9 June

0001	Routine sampling in decreasing swell,
1500	Routine sampling delayed by replacing 'Tellurit' splice on gravity core wire, on station standing by.
1520	Splice completed, routine sampling continued, Force 3 increasing.
1800	Routine sampling suspended in Force 5-6 W, deteriorating, making way W to shelter, Nor Wick N E Shetland: forecast Wick radio 6-7, locally gale 8.

2400	Steaming slowly into weather Force 7 to shelter. 23 routine sites completed during day.

Saturday 10 June

0736	Anchors down sheltering in Nor Wick in Force 7.
1010	Anchors weighed, steaming for routine sites in Yell Sound sheet +60-02 (Shetland SW), Force 7-8 NW.
1335	Start routine sampling Yell Sound, using ship's bow anchors to hold to tide and wind; gravity core changed from 4" to 2½" ID.
1350-1400	Clutch slipping of Sykes winch, wire caught up at drum edge, then return to routine sampling.
2005	Routine sampling abandoned in strong ebb tide opposed to wind (NW) giving confused seas and poor recovery, no sampling in poor night light due to abundant skerries, and lack of large scale Admiralty charts.
2400	At anchor, Dales Voe, sheltering gale 8. 11 routine sample stations completed.

Sunday 11 June

0001	Anchored up, large grab sample taken (5 x 4lb jars) for flume experiments (H Allen); Decca found to be out on 2 lanes due to land effect, all subsequent inshore navigation by radar range and bearing.
0630	Routine sampling with gravity core (sediment or rock barrel), grab samples on sheet 60/-02, working clockwise round Shetland.
1120	Called by Sullom Voe harbour superintendant (on behalf of Capt. Flett) . Informed require works order no. for working within 3 miles of any coastline around Shetland, continued sampling without entering Sullom Voe harbour area.
1520	Referred to office for decision on clearance for Shetland works order no. - query passed via Barry (Research Vessel Service).
2225	Finished routine sampling in poor light in Force 9; anchored up off E. Shetland coast.
2400	24 routine sample stations completed, Captain refuses routine sampling operation unless he is on bridge directing.

Monday 12 June

0640	Commence heaving anchors for routine sampling. Two target areas - a) N of Bressay b) S of Lerwick both on east coast. Routine sampling Force 8 decreasing.

1845-1855	Power off laboratory, crane demobilised, standing on station waiting repairs.
1908	Last routine station on E coast completed NE of Sumburgh Head, making for W of Shetland to test weather, swell.
2130	Swell (W) and chop (NW) - confused bad seas approximately 15 miles northwest of Sumburgh Head.
2230	Swell and chop decreased as approaching lee of land south of Walls-Sandness peninsula, started routine sample operations.
2245	On station, working gradually W out of lee of land in decreasing weather.
2400	16 Routine sample stations occupied.

Tuesday 13 June

0001	Routine sampling W of Shetland.
0615-0645	Laying anchors for vibrocore site planned from [illegible] seismic - small basin between 2 rock outcrops.
0705-0735	Vibrocoring, approx. 150m water depth, no tying on (to hoist wire).
0800	Vibrocore on deck with small sample (2m) pinkish muddy sand, base jammed with pebbles and cobbles - which probably prevented penetration.
0805-0910	Lifting up anchors, then running to complete NW Cormorant sheet in Force 4.
2012	On locations start of routine sampling NW Cormorant in 6ft swell, Force 4, with gravity core sediment barrels changed back again from 2½"NX to 4".
2400	Routine sampling continues in increasing wind and sea, Force 5. 11 Routine stations completed for day.

Wednesday 14 June

0001	Routine sampling Cormorant NW.
0030	Gravity corer lost, wire parted just above 'Tellurit' splice, no injuries, sampling in marginal weather Force 5, whole gravity core replaced.
0215	Last 5' x 4" barrel bent, change to NX 2½" coring, sampling in Force 5, not ideal situation because grab giving poor recoveries in marginal weather. Ship's officers not able to bring ship round bow to sea once far out of line with weather, entailed severe wallowing and poorer sample recoveries than should have been possible with better ship's stability and a faster

	Shipek grab winch.
0600	Routine sampling in Force 5 gusting and veering from NW to NE. H Robertson with injured back after lifting crates in hold yesterday, continues after taking pain killers.
1950	Routine sampling sheet 61/00W completed, cleaning lab., samples to hold, cores lashed down, running for Lerwick.
2130	Splice the main brace, running for Lerwick in NE 5, decreasing 4.
2400	Steaming for Lerwick, 27 routine stations completed during day.

Thursday 15 June

0001-0630	Steaming for Lerwick, waiting on pilot.
0730	Tied up at town berth, Lerwick.
1330	Hand-over to D Evans: all IGS personnel from this leg due to leave ship for Edinburgh on Friday 16.6.78.

Appendix B. Time analysis sheets

IGS CONTINENTAL SHELF DIVISION

SHIP CAPE SHORE AREA BERWICK

SHIP TIME ANALYSIS

DAY MNTH YEAR
12 | 6 | 78

TIME (LOCAL) TO 0.1 hr.

Appendix B. Time analysis sheets

IGS CONTINENTAL SHELF DIVISION

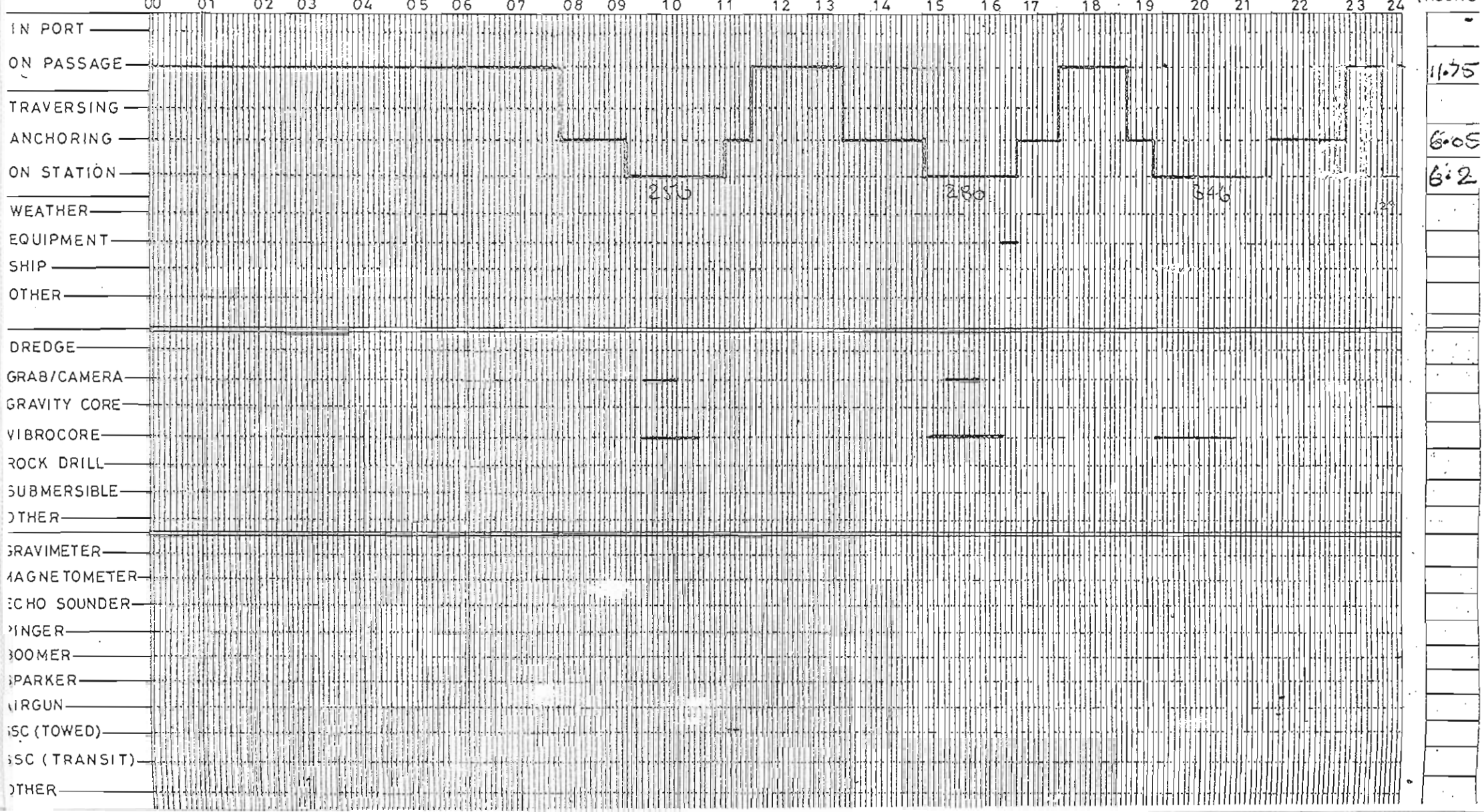
SHIP CAPE SHORE AREA CORMORANT

SHIP TIME ANALYSIS

DAY MNTH YEAR

| 3 | 6 | 78 |

TIME (LOCAL) TO 0.1 hr.



Appendix B. Time analysis sheets

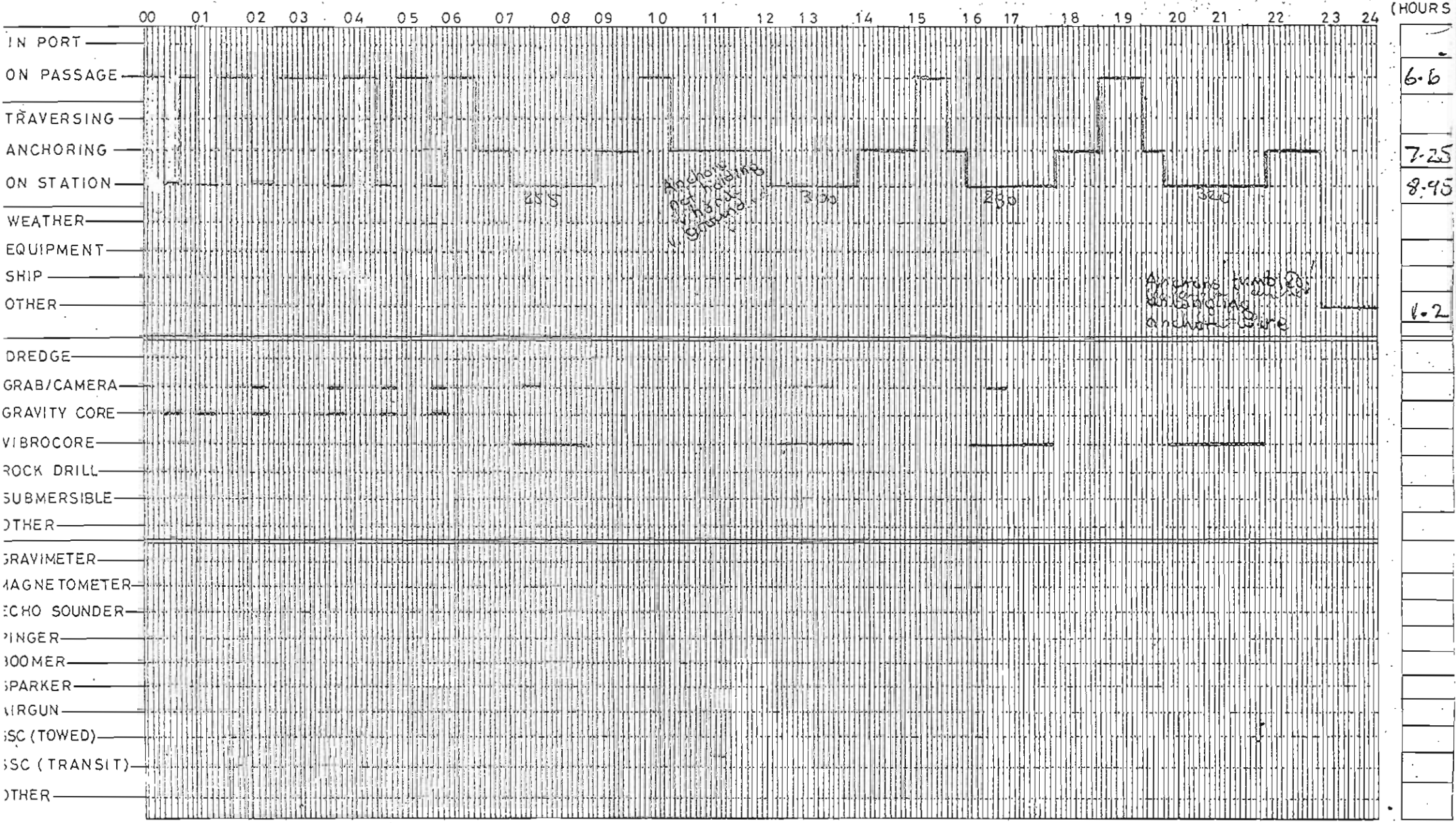
IGS CONTINENTAL SHELF DIVISION

SHIP "CAPE SHORE" AREA CORMORANT

SHIP TIME ANALYSIS

DAY MNTH YEAR
| 4 | 6 | 78 |

TIME (LOCAL) TO 0.1 hr.



IGS CONTINENTAL SHELF DIVISION

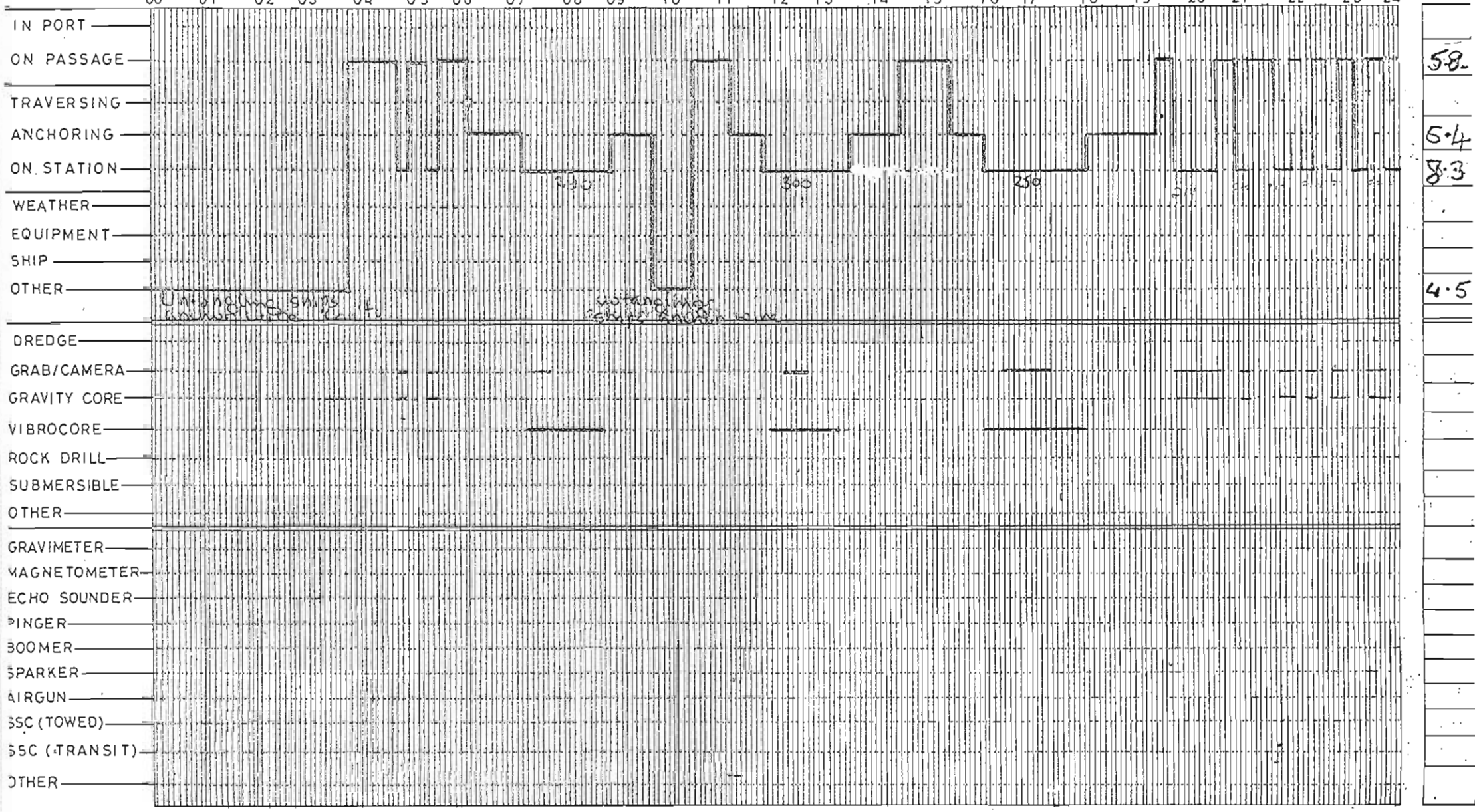
SHIP CAPE SHORE AREA CORMORANT

SHIP TIME ANALYSIS

DAY MNTH YEAR

5 | 6 | 78

TIME (LOCAL) TO 0.1 hr.



IGS CONTINENTAL SHELF DIVISION

SHIP CAPE SHORE AREA CORMORANT

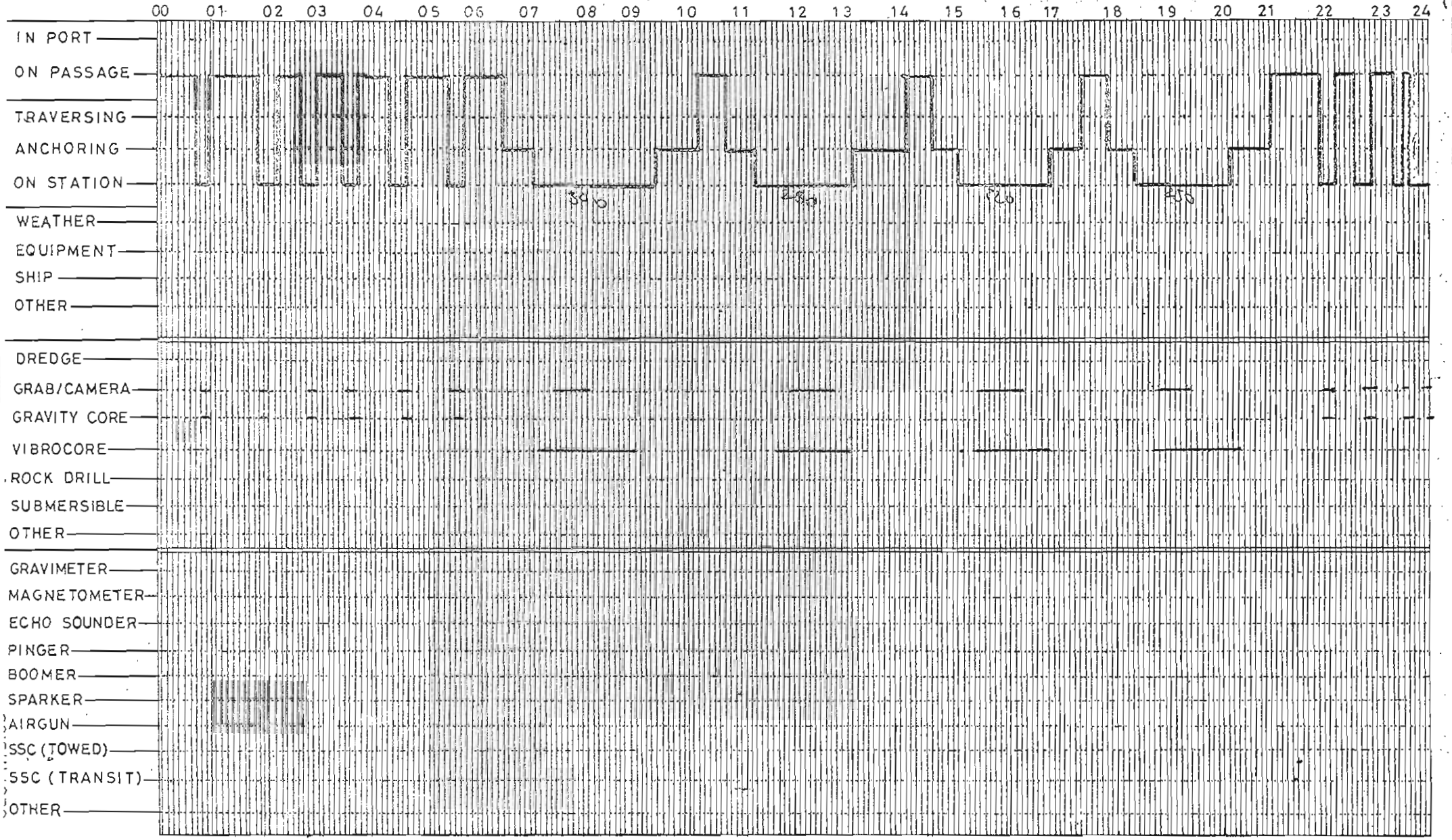
SHIP TIME ANALYSIS

DAY MNTH YEAR

| 06 | 06 | 78 |

TIME (LOCAL) TO 0.1 hr

TOTAL (HOURS



Appendix B. Time analysis sheets

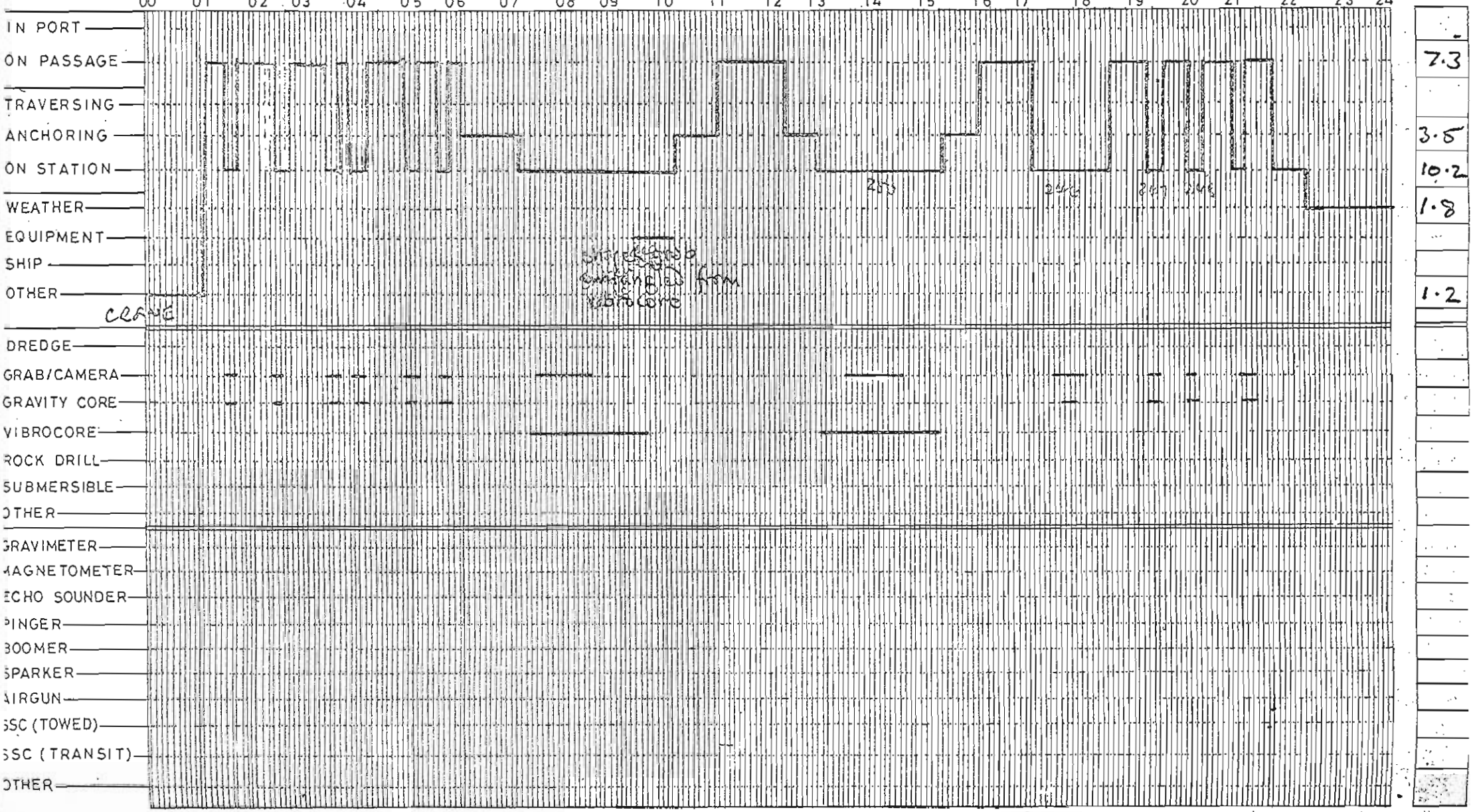
IGS CONTINENTAL SHELF DIVISION

SHIP CAPE SHORE AREA CORRIGANT.

SHIP TIME ANALYSIS

DAY MNTH YEAR
7 | 6 | 78

TIME (LOCAL) TO 0.1 hr.



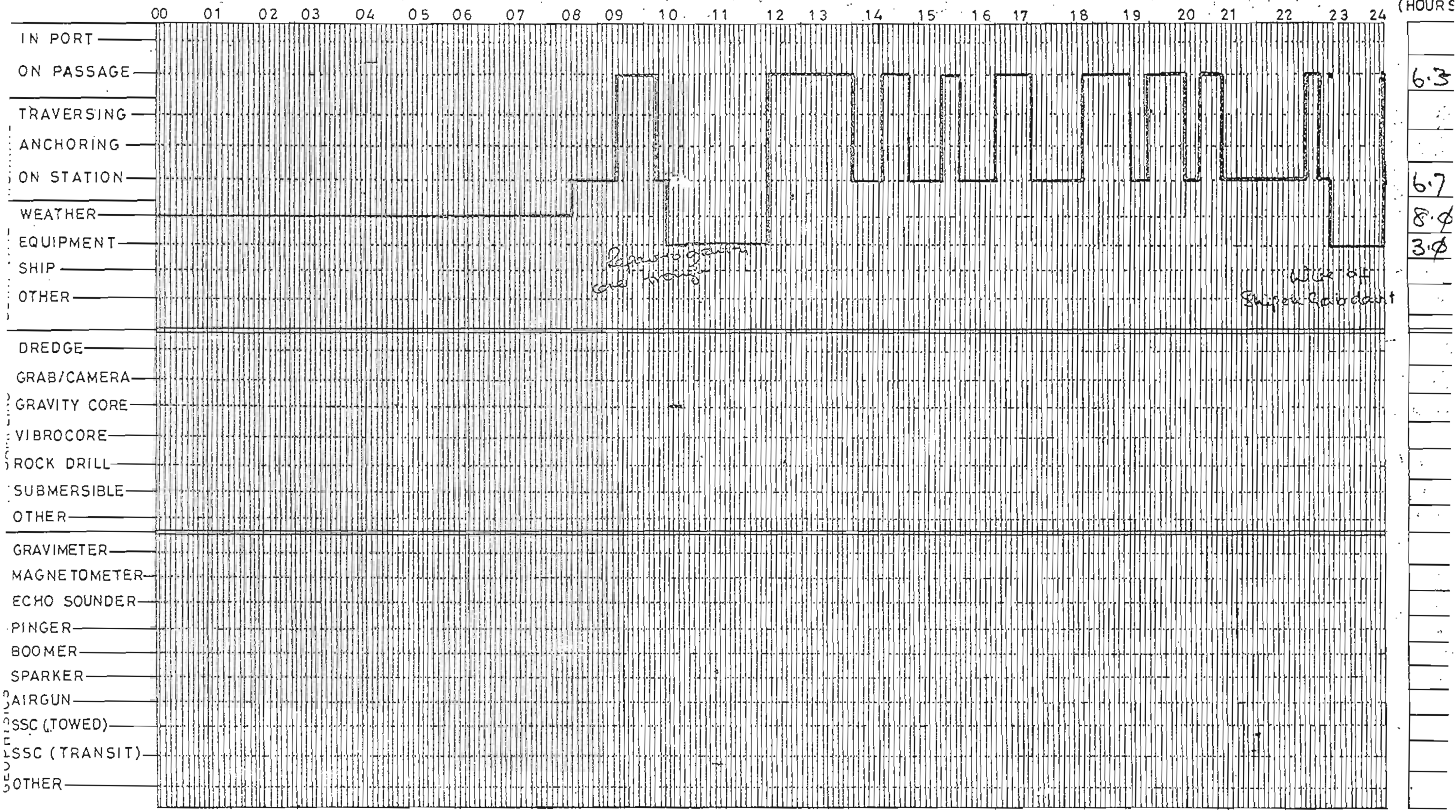
IGS CONTINENTAL SHELF DIVISION

SHIP TIME ANALYSIS

SHIP *CAPE SHORE* AREA *CORMORANT*

DAY MNTH YEAR
| ØB | Ø6 | 78 |

TIME (LOCAL) TO 0.1 hr.



Appendix B Time Analysis Sheets

IGS CONTINENTAL SHELF DIVISION

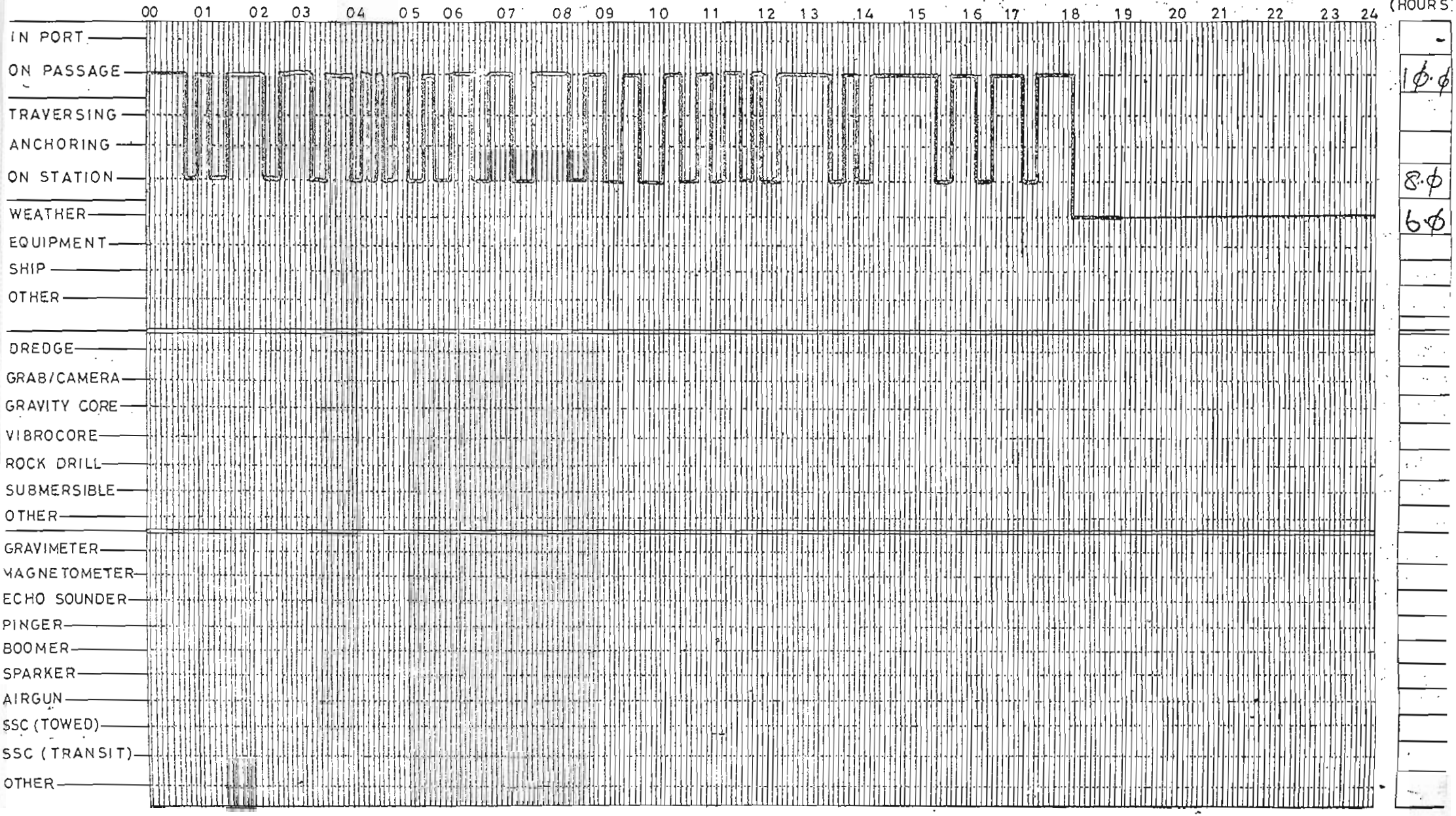
SHIP CAPE SHORE AREA CORMORANT

SHIP TIME ANALYSIS

DAY MNTH YEAR

09 06 78

TIME (LOCAL) TO 0.1 hr.



TOTALS (HOURS)

-

10.0

8.0

6.0

Appendix B. Time analysis sheets

IGS CONTINENTAL SHELF DIVISION

SHIP CAPE SHARP AREA EAST OF SHETLAND.

SHIP TIME ANALYSIS

DAY MNTH YEAR

10 06 78

TIME (LOCAL) TO 0.1 hr.

TOTAL (HOURS

6·3

7·6

13·9

Appendix B. Time analysis sheets

IGS CONTINENTAL SHELF DIVISION

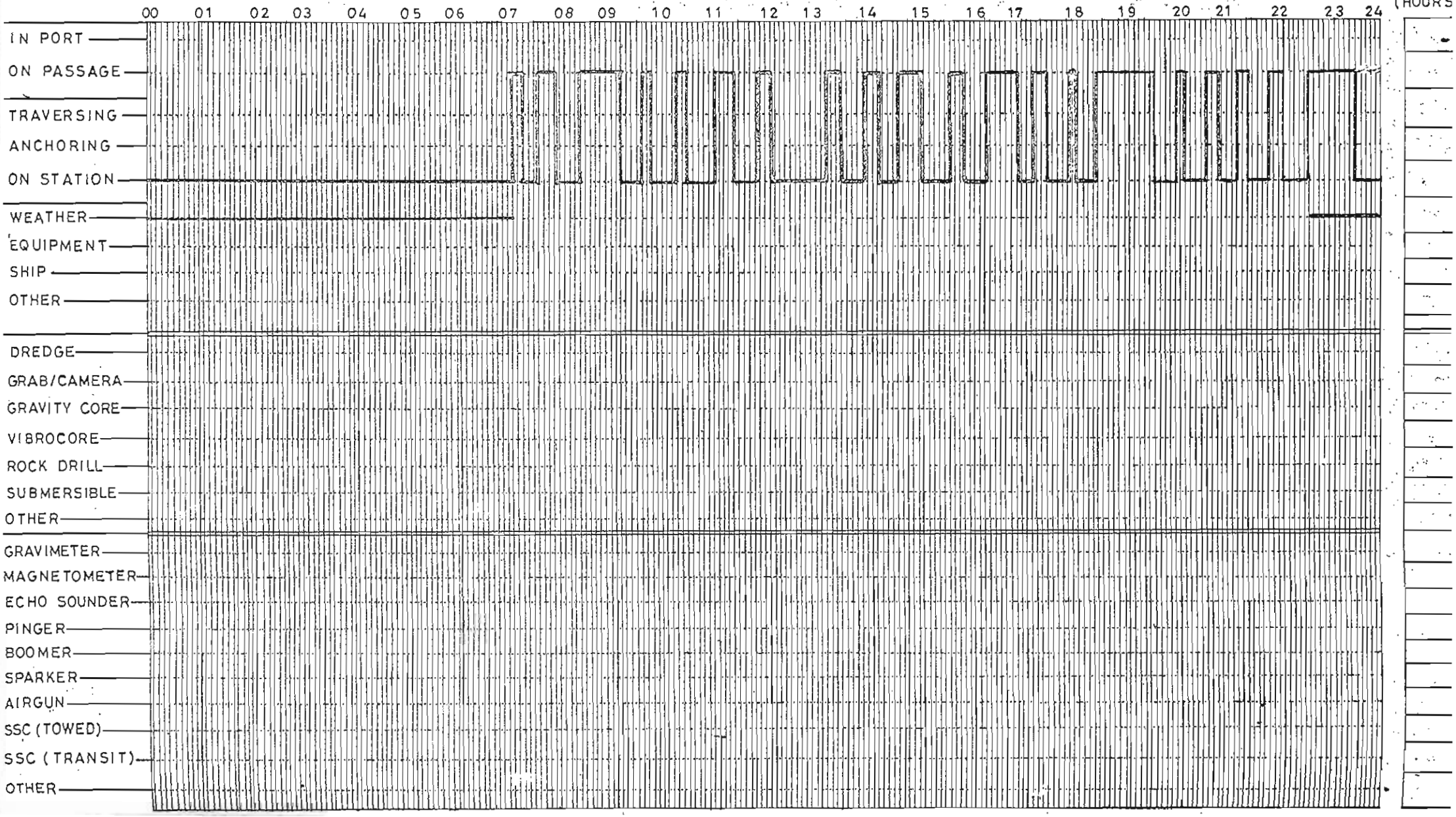
SHIP CAPE SHORE AREA EAST OF SHETLAND

SHIP TIME ANALYSIS

DAY MNTH YEAR

| 11 | 06 | 78 |

TIME (LOCAL) TO 0.1 hr.



Appendix B. Time analysis sheets

IGS CONTINENTAL SHELF DIVISION

SHIP TIME ANALYSIS

SHIP CAPE SHORE AREA EAST OF SHETLAND

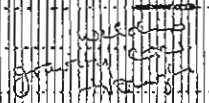
DAY MNTH YEAR
12 06 78

TIME (LOCAL) TO 0.1 hr.

TOTALS (HOURS

00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

IN PORT
ON PASSAGE
TRAVERSING
ANCHORING
ON STATION
WEATHER
EQUIPMENT
SHIP
OTHER
DREDGE
GRAB/CAMERA
GRAVITY CORE
VIBROCORE
ROCK DRILL
SUBMERSIBLE
OTHER
GRAVIMETER
MAGNETOMETER
ECHO SOUNDER
PINGER
BOOMER
SPARKER
AIRGUN
SSC (TOWED)
SSC (TRANSIT)
OTHER



Appendix B. Time analysis sheets

IGS CONTINENTAL SHELF DIVISION

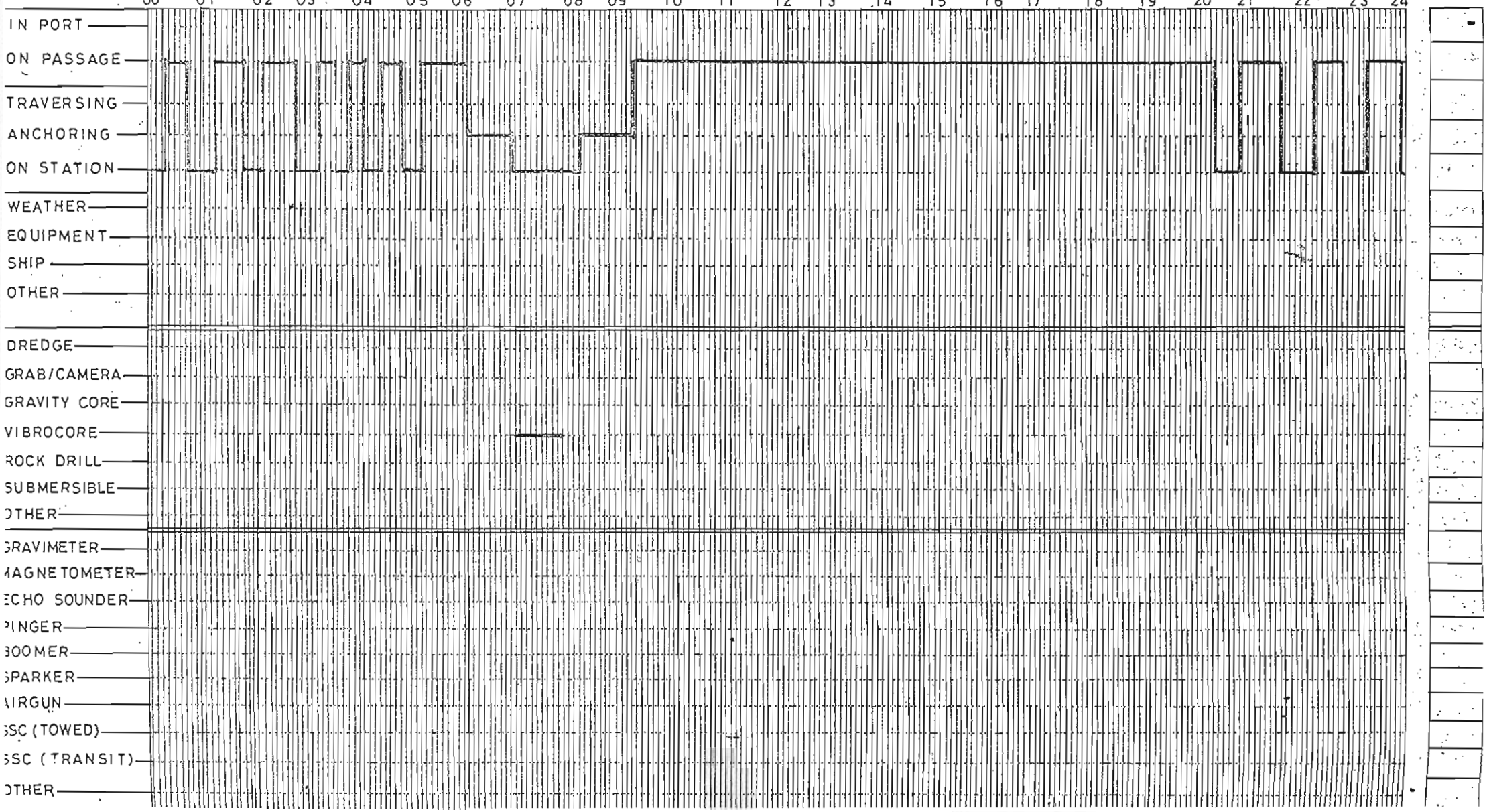
SHIP CAPE SHORE AREA WEST SHETLAND

SHIP TIME ANALYSIS

DAY MNTH YEAR

13	6	78

TIME (LOCAL) TO 0.1 hr.



Appendix B. Time analysis sheets

IGS CONTINENTAL SHELF DIVISION

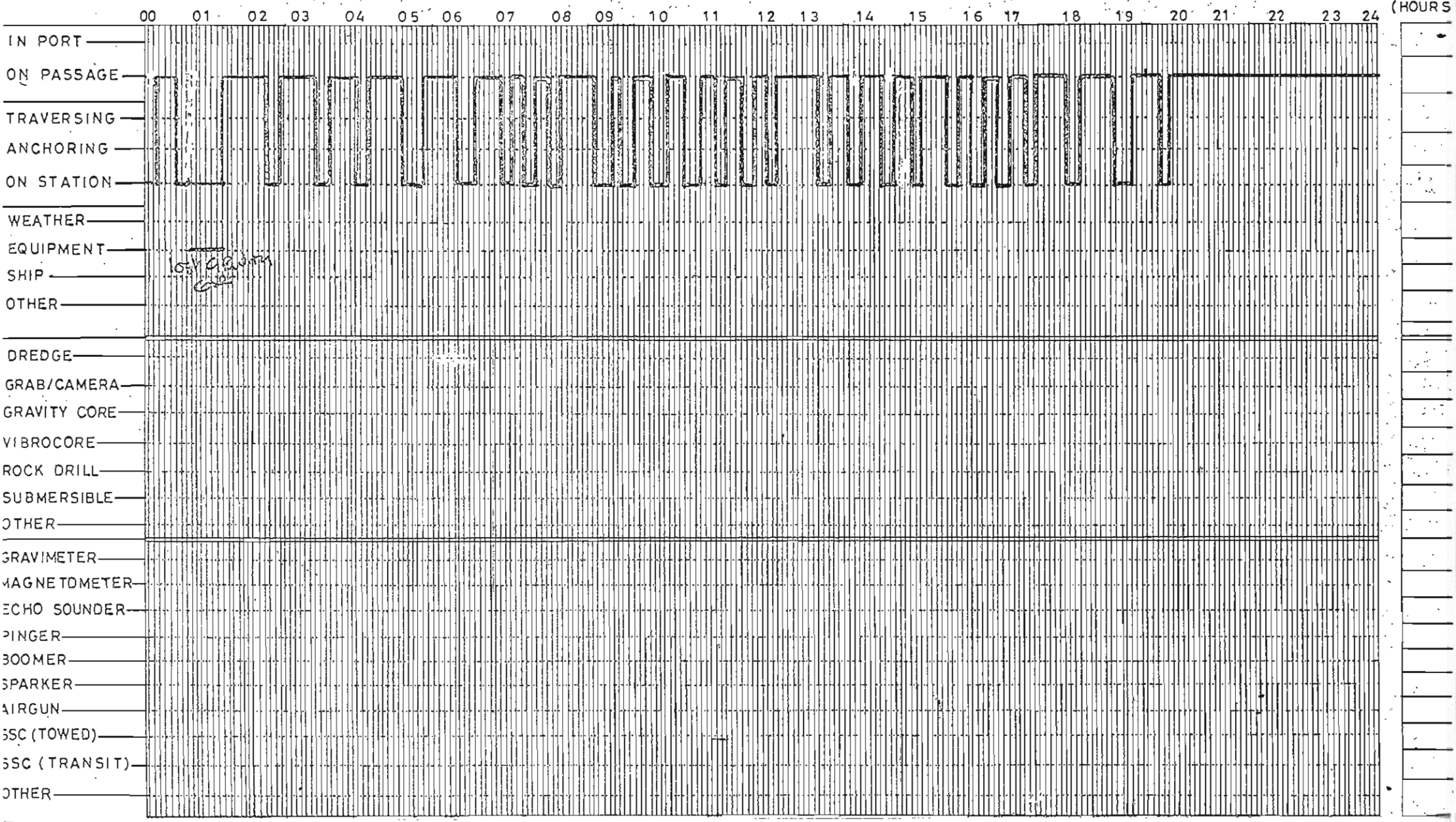
SHIP CAPE SHORE AREA CORMORANT NE

SHIP TIME ANALYSIS

DAY MNTH YEAR

14 06 78

TIME (LOCAL) TO 0.1 hr.



Appendix B. Time analysis sheets.

IGS CONTINENTAL SHELF DIVISION

SHIP CAPE SHORE AREA LERWICK

SHIP TIME ANALYSIS

DAY MNTH YEAR

15 06 78

TIME (LOCAL) TO 0.1 hr.

00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

TOTALS (HOURS)

IN PORT
ON PASSAGE
TRAVERSING
ANCHORING
ON STATION
WEATHER
EQUIPMENT
SHIP
OTHER

HAND-OVER LEG 5. D. EVANS

DREDGE
GRAB/CAMERA
GRAVITY CORE
VIBROCORE
ROCK DRILL
SUBMERSIBLE
OTHER

GRAVIMETER
MAGNETOMETER
ECHO SOUNDER
PINGER
BOOMER
SPARKER
AIRGUN
SSC (TOWED)
SSC (TRANSIT)
OTHER