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Final Report

King Point Coastal Zone Sediment Transport Study (Contractor's Report on Field Operations)

by

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SUMMARY

Dobrocky Seatech Ltd. was contracted by the Geological Survey of Canada to conduct a coastal zone data collection program at King Point on the Yukon coast of the Beaufort Sea. The project was funded by the Northern Oil and Gas Action Program (NOGAP), a research and planning program intended to anticipate research needs and management problems associated with Arctic hydrocarbon developments. King Point has been proposed as a site for port development, and information on the wind and wave climate, coastal geology and rates and directions of sediment transport is required. Data collected in this study are being used to provide input to coastal sediment transport model predictions for the King Point area.

A remote tent camp was established at King Point and occupied from August 24 to September 16, 1985. Field operations were conducted with rudimentary logistics support equipment and involved extensive use of SCUBA diving to deploy and recover equipment. The King Point barrier beach, lagoon and nearshore areas were surveyed extensively using theodolite, level and echo sounding techniques. Sediment samples were also collected from the active beach and nearshore areas. A recording Aanderaa weather station was established to measure wind speed, direction and barometric pressure.

Coastal currents were measured with five Aanderaa current meters deployed at 5, 7.5, 10, 12.5 and 15 m depths. The current meters were equipped with wave zone rotors. Wave characteristics were measured with two Sea Data directional wave and current meters deployed at 5.6 and 2.7 m depths. The shallowest wave meter was located within 20 m of the steeply sloping sand and gravel beach and measured nearshore wind and wave generated currents. Approximately daily measurements and observations were also made of the beach face environment and samples of suspended sediment were collected to coincide with nearshore current recordings.

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ACKNOWLEDGEMENTS

The following persons were directly involved with the field work portion of this project and contributed significantly to the success of the project:

Name	Affiliation	Responsibilities
Peter Morgan	Geological Survey of Canada	Scientific Authority, Project Manager
John Milne	Geological Survey of Canada	Field Assistant, Cook
Rick Gillie	Dobrocky Seatech Ltd.	Marine Geoscientist, Diver
Gar Fisher	Dobrocky Seatech Ltd.	Field Technician, Diver
Danny Gordon	Hunters and Trappers Association	Bear Monitor

Assistance, while in the field, was also provided by personnel from the Inuvik Scientific Resource Centre (in particular, David Sherstone, Scientist-in-Charge) and the Polar Continental Shelf Project (P.C.S.P.).

Dobrocky Seatech Ltd. gratefully acknowledges the opportunity to have taken part in the King Point Coastal Zone Sediment Transport Study and the support of the research effort by the Northern Oil and Gas Action Program (NOGAP) through the Geological Survey of Canada, Energy, Mines and Resources Canada.

1.0 INTRODUCTION

This report is a description of the field work conducted by Dobrocky Seatech Ltd. for the King Point Coastal Zone Sediment Transport Study. The study was conducted at King Point on the Yukon coast of the Beaufort Sea from 24 August to 16 September, 1985. Dobrocky Seatech Ltd. was contracted by the Atlantic Geoscience Centre, Geological Survey of Canada to assist with the study in the form of supplying equipment and personnel qualified to conduct (a) surveying and diving operations, (b) the deployment and recovery of oceanographic instruments and (c) coastal zone sediment transport studies. In addition, a report was to be prepared on the field operations, including a description of the equipment and methods used and an inventory of the data collected. The Geological Survey of Canada was responsible for supplying additional equipment, personnel and all logistics support between Inuvik and the field study site.

The study was funded by the Northern Oil and Gas Action Program (NOGAP), a research and planning program intended to anticipate research needs and management problems associated with Arctic hydrocarbon development. King Point has been proposed as a site for port development and information on the wind and wave climate, coastal geology and rates and directions of sediment transport is required. The data collected in this study are being used to provide input to coastal sediment transport model predictions for the King Point area.

The following report contains a brief description of the study area and the design of the field experiment followed by a detailed account of the instrumentation and techniques used and an inventory of the data collected. Finally, a brief discussion of the field program makes suggestions for alterations or improvements to the techniques used.

2.0 DESCRIPTION OF THE STUDY AREA

King Point is located on the Yukon coast of the Beaufort Sea (Figure 2.1). King Point forms a high (50 m) cliffed promontory with a coastal deposit of sand and gravel forming a barrier beach immediately to the southeast (Figure 2.2). The King Point barrier beach is approximately 1.9 km long and from 50 to 250 m in width and encloses a lagoon with maximum depths of 3 to 4 m. The coast to the northwest and southeast of King Point is composed of eroding cliffs of unconsolidated material (gravel, sand, mud and ice) with two smaller barrier beach coastal features to the southeast. The entire section of coastline is susceptible to erosion and deposition by Arctic periglacial and marine processes.

The coastal environment at King Point is controlled by a number of oceanographic and geologic factors. Based upon reviews of coastal processes at King Point (Gillie, 1985; Keith Philpott Consulting Ltd., 1985) and the Beaufort Sea in general (Blasco et al., 1983; Harper and Penland, 1982; Harper et al., 1985; Keith Philpott Consulting Ltd., 1985; Lewis and Forbes, 1975; and Owens and Harper, 1983), coastal features at King Point have in the past and are presently exhibiting significant coastal instability in response to oceanographic and geologic controlling factors.

The tide characteristics for King Point are available from predictions using the reference port of Tuktoyaktuk with corrections applied for the closest secondary port of prediction, at Shingle Point or Kay Point (Fisheries and Oceans Canada, 1985). The tide is mixed semi-diurnal with a mean water level of 0.3 m above chart datum. The mean tide range is 0.2 to 0.5 m and the large tide range is 0.1 to 0.6 m. Thus, the coastal environment can be defined as micro-tidal. However, the sea level is subject to larger and more rapid changes associated with storms and/or strong winds (Henry, 1975). Recorded extreme water levels measured at

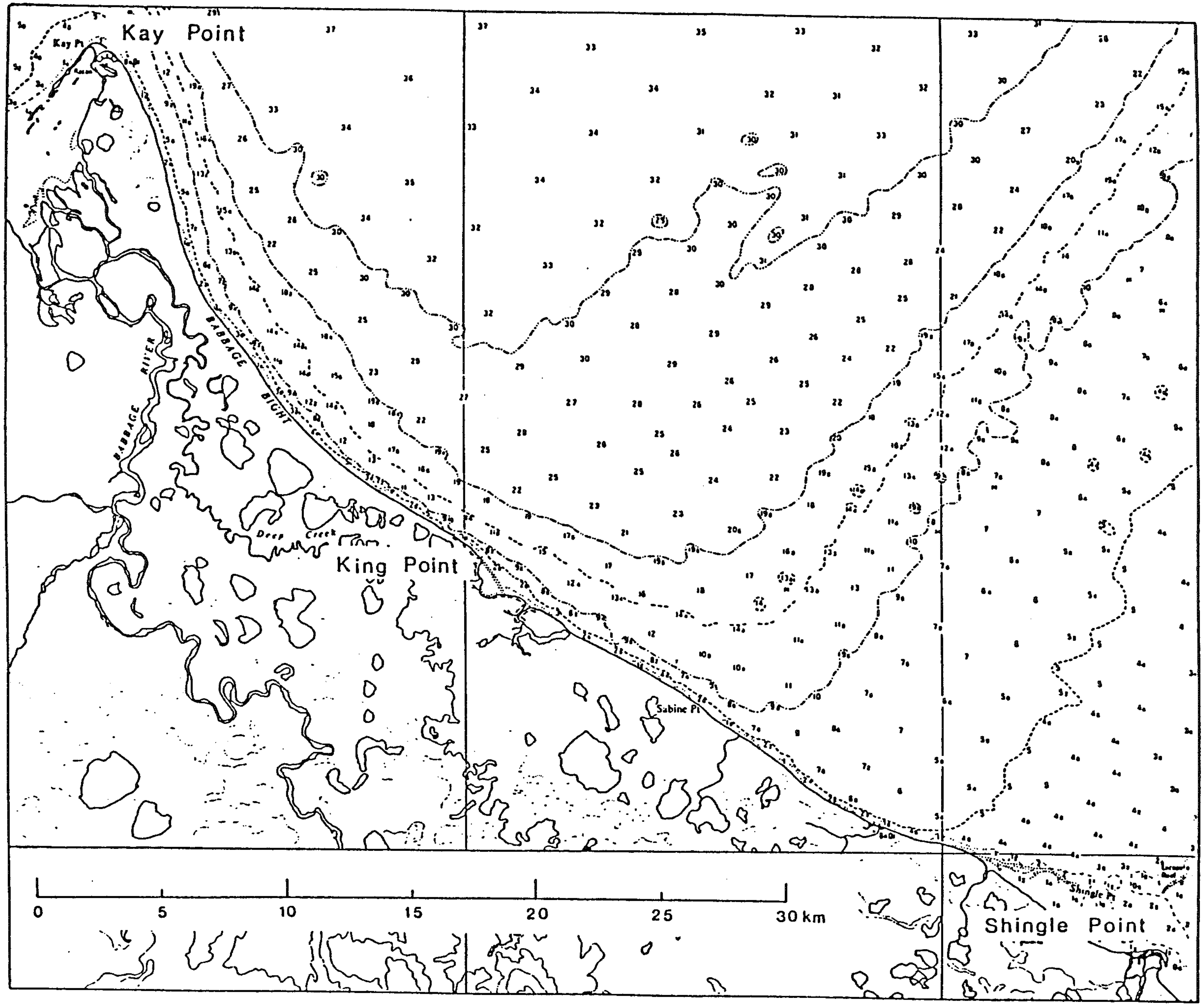


Figure 2.1 - Location of King Point on the Yukon Coast of the Beaufort Sea and relation to adjacent coastal features and offshore bathymetry (in metres). Reproduced from Canadian Hydrographic Service Chart #7602 (16 January, 1981 Edition).

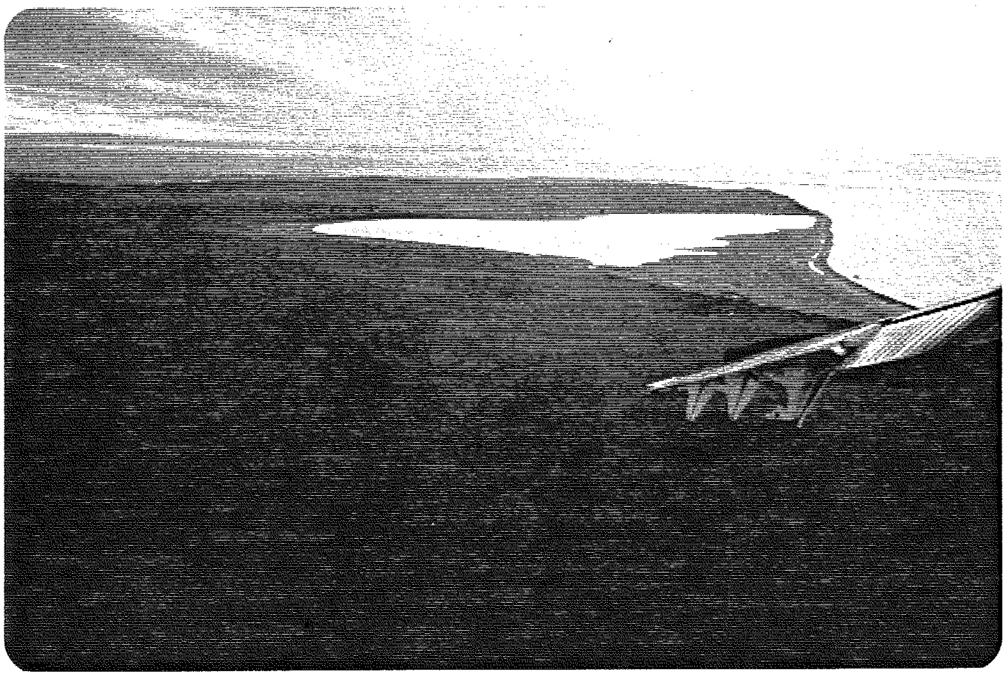


Figure 2.2 - King Point barrier beach and lagoon as viewed from the southeast (24 August, 1985)

Tuktoyaktuk vary from 2.3 m to -0.8 m. During the period of this study, the predicted tide varied between 0.2 and 0.6 m. In addition, periods of stormy weather also appeared to raise the water level above the predicted tide. The amount of this change can be derived from analyses of the pressure or tide data from the Sea Data instruments deployed over the study period.

Shore and sea ice are also important controls. The dates of freeze-up and break-up in Mackenzie Bay are widely variable from year to year. The navigation season, usually opening in July and lasting until late September, can be delayed by heavy ice until late August (Fisheries and Oceans Canada, 1981). During the period of this study, no sea ice was observed in the vicinity of King Point, although grounded ice floes had been present on the shore one week prior to the start of the field work (P. Morgan, pers. comm.). Offshore, the southern limit of permanent ice was in the order of 70 km at the end of July to 150 km at the end of September in a northeast direction from King Point. In this respect, the summer of 1985 was a poor ice year in that the permanent ice edge did not recede as far offshore as normal.

Wave generation and longshore sediment transport processes are directly affected by the geographic extent and length of the open water season and by the frequency, magnitude and direction of wave generating winds. In this respect, coastal processes of sediment erosion, transport and deposition display a high degree of variability in both time and space. Sediment transport rates vary in both amount and direction from year to year because of the short open water season and the likelihood of storm waves causing sediment transport to both the northwest or southeast. Therefore, significant amounts of longshore sediment transport occur in both directions along the King Point barrier beach, with a gross average estimate of 20,000 to 40,000 m^3/yr. (Keith Philpott Consulting Ltd., 1985).

The Yukon coast in general is experiencing chronic, ongoing coastal cliff erosion of variable amount, but on the average of about 0.6 m/yr. This cliff erosion provides the dominant source of beach and accumulated barrier beach deposits. In addition, the locus of deposition of sediment at King Point has changed with the rapid evolution of the former King Point spit and existing barrier beach (Gillie, 1985).

3.0 FIELD EXPERIMENT DESIGN

The field experiment was designed to collect information on the following geologic and environmental components of the King Point barrier beach coastal sediment transport system:

1. Morphology
   - the plan shape of the barrier.
   - profiles of barrier backshore, active beach and nearshore and lagoon bottom areas.

2. Sediment Characteristics
   - the sediments of the active beach and nearshore zones.

3. Wind Climate
   - the frequency and magnitude of wind speed, direction and barometric pressure.

4. Wave Climate
   - the wave spectral characteristics (wave height, period and direction) for nearshore and offshore areas.

5. Nearshore and Offshore Currents

6. Longshore Sediment Transport
   - the rates and directions of suspended load transport.

7. Beach Process-Response Changes
   - short term changes associated with storm histories.

The purpose of collecting this information was to develop an understanding of coastal zone sediment transport characteristics and to provide data which could be used to calibrate numerical models of sediment transport applicable to the King Point field site.

4.0 INSTRUMENTATION, TECHNIQUES, AND DATA INVENTORIES

A variety of instruments and techniques were used in this data collection program. Table 4.1 summarizes the major survey tasks and instrument systems used and the duration of survey days or deployment periods. A brief summary of daily field operations is provided in Appendix 1. Inventories of the data collected from each survey task and/or instrument system are contained in Appendices 2 to 6. All collected data (survey books, echo sounding records, sediment samples and instrument data tapes) are presently stored with the Geological Survey of Canada at the Bedford Institute of Oceanography, Dartmouth, Nova Scotia. The only substantive field data presented in this report are the results of the suspended sediment sample analyses and Littoral Environment Observation log sheets.

The camp was established at the southeast end of the barrier bar. Survey beach marks, beach observations and instrument deployments were referenced to survey bench marks (GSC #1, GSC #2) at this location (Figure 4.1).

4.1 PLAN SURVEY

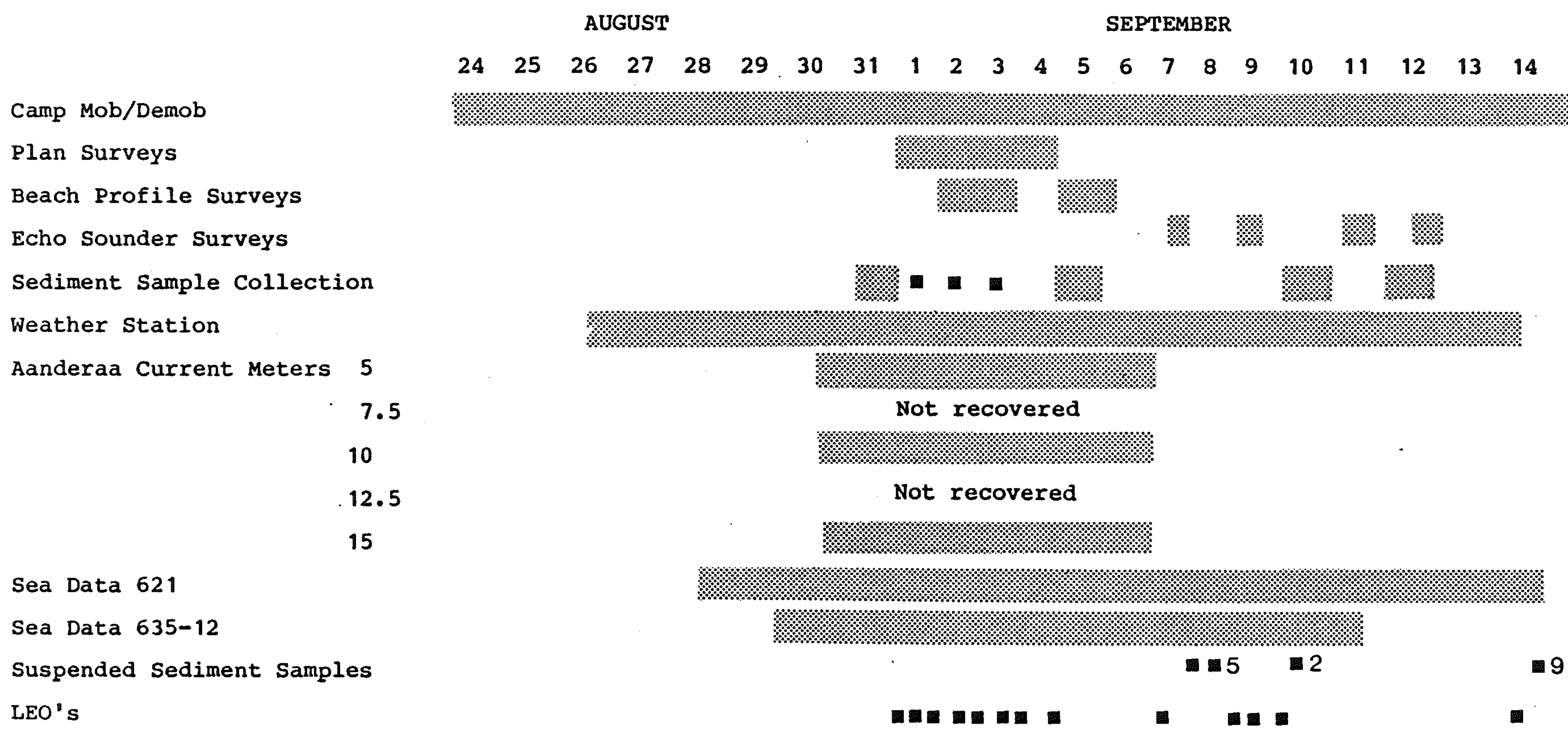
The plan survey comprised the following three major tasks:

1. Locate existing "bench marks" in the vicinity and establish any new bench marks as required.

2. Locate the position of the barrier bar with respect to the bench marks.

3. Designate a baseline extending the length of the barrier bar.

Table 4.1 **OPERATION PERIODS FOR SURVEY TASKS AND INSTRUMENT SYSTEMS**



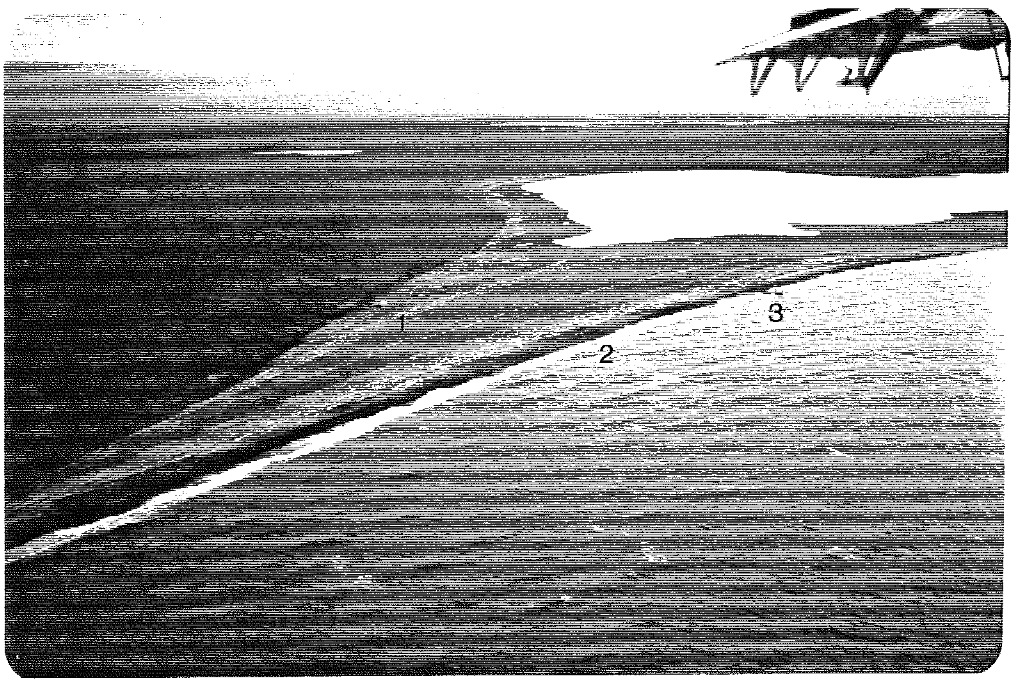


Figure 4.1 - Southeast portion of barrier beach. The location of the camp site (1) and the beach study site (2) are indicated. Also visible is the JODI-1 (3) which had dragged anchor and drifted onto the beach face (24 August, 1985).

The closest Government survey control points were located at KIN(1) near the summit of King Point and at Sing A-55, approximately 13 km to the southeast of the study site. However, neither of these stations were required because an extensive coring project had been conducted at King Point in the spring of 1985 and numerous bore hole positions existed. In addition, two new bench marks, GSC #1 and GSC #2, were established using horizontal angles obtained with the survey theodolite. GSC #1 and GSC #2 are steel pins with 11 cm diameter heads.

All plan survey work was conducted by Peter Morgan and John Milne using a digital theodolite provided by Dobrocky Seatech Ltd. Specifications of the theodolite are provided in Appendix 7. All control points used for the plan survey and all other field survey measurements have been retained by the Geological Survey of Canada in Dartmouth.

Once the location of GSC #1 and GSC #2 had been established a baseline was extended to the northwest and southeast along the barrier bar. This was achieved with azimuth sitings to define the baseline direction and the location of survey range bench mark stakes at 100 m or 200 m intervals with a tape measure. Subsequently, all survey range bench marks were levelled and related to GSC #1 and GSC #2 bench marks.

4.2 BEACH PROFILE SURVEYS

Profiles across the King Point barrier were surveyed from the lagoon waterline to water depths of 1 to 1.5 m below sea level on the active beach. A total of 17 profile lines were surveyed as indicated in Appendix 2. All beach profile surveying was conducted using a level, tape and survey rod. Elevation resolution was 0.01 m and horizontal distance resolution was 0.1 m. Profile data were collected at 5 m intervals or at a more frequent interval at changes in slope. Beach profile line orientation was perpendicular to the survey baseline. This was achieved by establishing temporary markers at 30 m from the baseline beach marks to use as range poles to maintain survey line orientation.

Figure 4.2 - Barrier beach profiling operations with survey level, tape and rod equipment at survey range + 1400 (3 September, 1985).

4.3 ECHO SOUNDER SURVEYS

Echo sounder surveys were conducted in the lagoon and nearshore areas. The major equipment used included a Zodiac and motor, Raytheon DE 719-B echo sounder with 12 VDC battery power supply, and electronic distance measurement (EDM) for the survey boat position. Minor equipment included a combination transducer and EDM reflector mount, bar check target and marked wire, range pole targets (0.6 by 1.2 m) and two-way hand held radios.

The survey echo sounder is capable of 0.1 m or +/- 0.5% depth resolution. Position fixes were given at a 20 to 50 m intervals with a resolution of +/- 1 m. Procedures for the set-up of the echo sounder included transducer draft compensation (0.25 m) and bar check calibration at the beginning and end of each survey day. The sounder was maintained in the "Standby" position between survey lines to stablize the instrument electronics.

The survey sounder performance was excellent. The EDM positioning system also performed well, except when fog prevented the infra-red beam from propagating. There were intermitent problems with the two-way radios. In general, the echo sounder survey produced excellent depth and position data sets. All echo sounder survey lines are listed in Appendix 3.

4.4 SEDIMENT SAMPLE COLLECTION

Surficial and bottom sediment samples were collected to define the sediment characteristics of the active beach and nearshore areas. Bottom samples were also collected by divers at the Aanderaa current meter deployment sites.

Beach sediment samples, at berm and mid-swash locations on the active beach, were collected at all 17 survey ranges. Nearshore samples were also collected with a small pipe dredge at 20 and 50 m off the shoreline. Details of all the samples collected are contained in Appendix 4.

4.5 WEATHER STATION

An Aanderaa weather station was deployed near the mid-point of the barrier beach (range 564 m, 46 m landward of baseline) to measure wind speed, wind direction and barometric pressure. Equipment specifications are contained in Appendix 7. Prior to deployment the instrument was checked with a Digiprint to verify the digital signal function for each of the recording channels.

The weather station operated from 26 August to 14 September without interruption. During this time the guyed mast (Figure 4.3) withstood estimated winds of over 80 km/hr with no motion of the components. The direction sensor was oriented to magnetic north using a hand held compass. At various times during the deployment, visual observations were made of wind direction at the weather station site to provide later confirmation of instrument function. The deployment sheet for the weather station, describing sampling information, is contained in Appendix 8.

4.6 AANDERAA CURRENT METERS

Five Aanderaa current meters were supplied by the Bedford Institute of Oceanography (BIO) to measure near-bottom currents offshore of the study site. The current meters were deployed in a line extending offshore between water depths of 5 to 15 m (Table 4.2).

The current meters were equipped with optional "paddle" rotors to improve the measurement of mean currents when influenced by oscillatory wave currents. The mooring hardware systems supplied by BIO were modified to improve the stability of the mooring. In particular, this included removing one of the original three Viny subsurface floats and inserting an isolation line to raise the current meter off the bottom. As deployed, the current meter was located at 1.4 m above the concrete block weight (Figure 4.4).

Figure 4.3 - Aanderaa weather station with mast, guy ropes and sensors (wind speed and direction, pressure) mounted at 10 m above ground level (26 August, 1985).

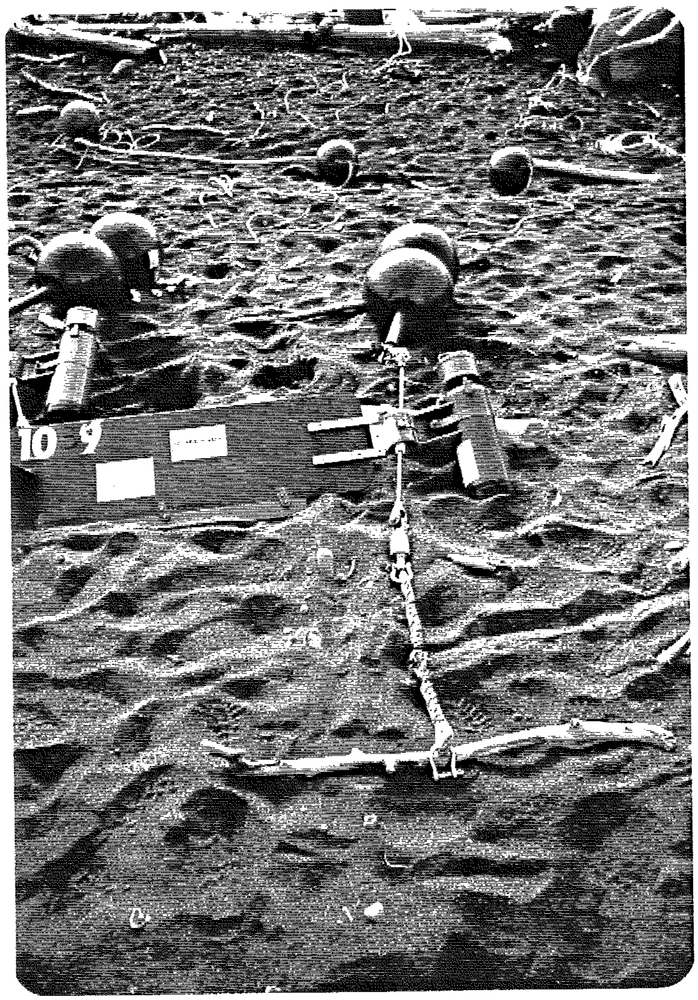


Figure 4.4 - Aanderaa current meter prior to deployment showing bottom shackle, isolation line, swivel, Aanderaa current meter and vane assembly, sub-surface Viny floats (two) and line to surface Viny float (30 August, 1985).

Prior to deployment all current meters were checked with a Digiprint to verify the digital signal function. After power-up, the instruments were then allowed to cycle for a few hours to verify current tape spooling operation.

The current meter moorings were deployed from the Zodiac using heavy boards lashed across the inflated pontoons to slide the concrete block off the side. The mooring was deployed by the "anchor last technique".

Table 4.2 Location Of Aanderaa Current Meters

Instrument Serial No.	Water Depth (m)	Distance Offshore (m)
1039	5	275
7135	7.5	663
217	10	932
7125	12.5	1,241
6404	15	1,700 (estimate)

All of the Aanderaa current meters were successfully deployed in the span of three hours on 30 August. SCUBA diving inspections were made on each mooring the following day. All instruments had been deployed correctly with rotors and vanes free to move with no fouled components. During this inspection, surface currents were directed to the southeast at approximately 0.2 to 0.3 m/s, but bottom currents were weak or non-existant. The presence of current drag from the surface float caused the instrument to be inclined about 10° to 20° from vertical.

Considering the relatively calm conditions during this inspection, it would not be unreasonable to assume a more severe angle of inclination of the instrument package during storm conditions because of high surface wind stress, currents and wave heave motion.

Of the five current meters that were deployed, only three were recovered. The current meters deployed at 7.5 and 12.5 m depths lost their surface marker buoys after a stormy period extending over two days (4, 5 September, 1985). Numerous attempts were made to drag for the ground lines which had been deployed with the moorings. Although a number of grapnel hook configurations and dragging operations were conducted, none proved successful. Of the three current meters that were recovered, one (at 15 m depth) was found fouled by its ground line. All three meters were released by the diver cutting the isolation line with a knife.

The three recovered meters were examined and found to be coated with bottom mud on parts of the instrument pressure cases and direction vanes. This indicates contact with the seabed at what must have been a severe angle of inclination from the vertical. In addition, one of the meters (at 10 m depth) had been dragged approximately 300 m to the southeast from its original site of deployment.

The internal function of the recovered current meters were also examined and it was found that one (from the 15 m depth) had experienced a tape spooling problem and very little data had been logged on tape. The other two meters exhibited correct function as determined by Digiprint interrogation of digital data and the integrity of the tape recordings.

4.7 SEA DATA DIRECTIONAL WAVE/CURRENT METERS

In order to record directional wave spectra and current velocities in the nearshore and offshore zones, two Sea Data instruments were deployed during the study. A Sea Data 621 directional wave/current meter was deployed in

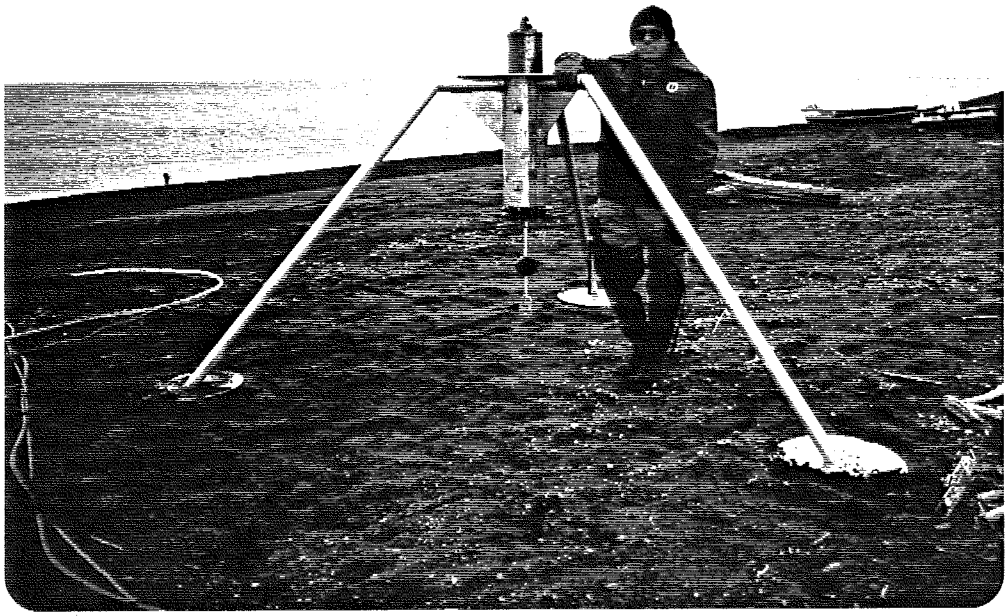


Figure 4.5 - Sea Data 621 directional wave/current meter in tripod frame after recovery (14 September, 1985).

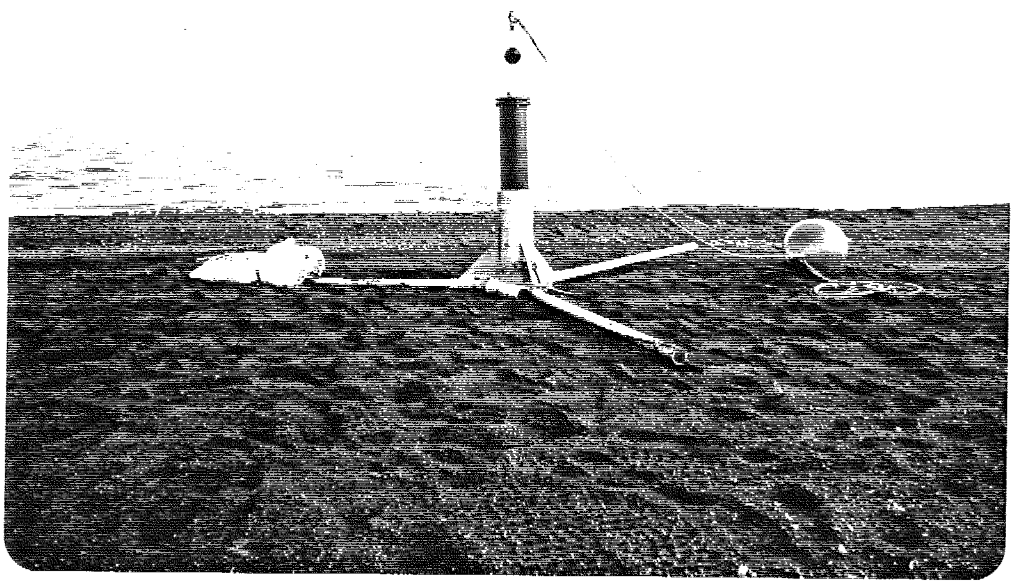


Figure 4.6 - Sea Data 635-12 directional wave/current meter in deployment frame after recovery. Also shown is line to surface float and Mesotech acoustic pinger at base of instrument (11 September, 1985).

2.7 m of water approximately 20 m from the shoreline. The surveyed position of the instrument was survey range +55 m and 117 m seaward of the baseline. A Sea Data 635-12 directional wave/current meter/tide guage was deployed in 5.6 m of water at approximately 399 m from the shore. A third Sea Data instrument had been ordered from the supplier and delivered as close to the field site as Tuktoyaktuk, but late delivery, logistics and time constraints prevented the instrument from arriving on site.

The Sea Data instruments were supplied by Coastal Leasing Inc. of Cambridge, Mass., USA. The instruments, as delivered, contained fresh batteries and a blank data tape cassette. To deploy the instruments, aluminum tripod frames (Figures 4.5, 4.6) were designed and fabricated by Dobrocky Seatech Ltd. In the field, the instruments were tested prior to start-up by performing all of the electronic and tape recording checks recommended in the manufacturer's manual. The appropriate burst sampling settings were then selected (see Appendix 8). Prior to deployment a zero current speed calibration check was performed by placing the electromagnetic current meter sensor in a large plastic bucket of still water for a single 20 minute sampling cycle. This was also repeated upon recovery of the instruments.

Deployment comprised assemblying the tripod and instrument on shore and carrying the entire package into the ocean in the case of the Sea Data 621 deployed near the beach, or transporting the instrument in the Zodiac to the offshore deployment site in the case of the Sea Data 635-12. Six sandbags (each weighing 40 kg) were then attached or placed on the legs of each tripod. Operation of both instruments was continuous for the entire deployment period. The only difficulty experienced with the moorings was discovered upon recovery of the Sea Data 635-12 which had fallen over sometime during the deployment. The Sea Data 621 was stable for the entire deployment period, apart from an initial period when the instrument settled 0.2 to 0.3 m into the sandy nearshore sediment because of scour processes around the tripod feet. Upon recovery, the Sea Data 635-12 was found to have only recorded data for 256 seconds every 3 hours instead of the intended 1024 seconds. Data from the Sea Data 621 was collected as intended. Complete details on the instrument sampling settings and operational characteristics are contained in Appendices 7 and 8.

4.8 SUSPENDED SEDIMENT SAMPLES

The transport of sediment in the coastal zone is often arbitrarily partitioned into suspended load and bed load. The relative proportions of suspended and bed load vary between beaches and with time depending upon sediment size characteristics and wave energy and longshore current conditions. Because the suspended sediment load consists of finer particles at some elevation above the seabed, it is relatively easier to sample the suspended load without disturbing the local seabed. Many optical and acoustic sensors have been designed and are available on a research level to monitor suspended sediment concentration. However, these sensors were not available within the limited mobilization time for this study. As an alternative, a previously used and reliable method of pumping samples of suspended sediment was used (Gillie, 1984).

The characteristics of the suspended sediment sampler are shown in Table 4.3, and sampling operations are illustrated in Figure 4.7. A gasoline powered pump is used to draw water through a 1.9 cm diameter hose. The hose intake was attached to one of the tripod legs of the Sea Data 621 nearshore directional wave/current meter. Flow velocities of 58 to 75 cm/s were sufficient to transport the fine sand in suspension at the sampler intake elevations used (20 and 50 cm above the seabed).

A total of sixteen suspended sediment samples were collected as identified in Appendix 5. All sediment sampled was fine sand or finer (minor amounts of silt/clay). Laboratory treatment of the samples consisted of washing with fresh water to remove salt, allowing the sediment to settle, decanting off the clear water, transferring the wet sediment to small plastic weighing dishes, drying in an oven, and then determining the dry weight of sediment.

Figure 4.7 - Collecting suspended sediment samples in 7 litre buckets. Also shown is water pump and hose to the nearshore Sea Data instrument (14 September, 1985).

The concentration of suspended sediment in units of gm/l were then derived. Concentration values ranged from less than 0.003 to 0.13 gm/l. These quantities can be combined with longshore current velocities measured concurrently by the Sea Data 621 current meter to derive the transport of suspended sediment for the prevailing conditions.

Table 4.3 Characteristics Of Suspended Sediment Sampler

Hose Dimensions:	
Length:	41.7 m
Internal Diameter:	1.9 cm
Cross-Section Area:	2.84 cm^2
Intake Elevation:	50 cm (samples 1 to 7), 20 cm (samples 8 to 16)
Sample Dimensions:	
Volume:	7.00 litres
Duration:	33 to 43 s
Hose Discharge Rate:	212 to 163 cm^3/s
Water Velocity:	75 to 58 cm/s
Travel Delay over Hose Length:	56 to 72 s

4.9 LITTORAL ENVIRONMENT OBSERVATIONS

The Littoral Environment Observation technique was initially established by the U.S. Army Corps of Engineers as a means of acquiring data on coastal phenomena at low cost. The technique employs simple measurements and visual estimates of littoral environment variables including: wind speed and direction; wave period, height, and angle of wave approach; longshore current speed and direction; the presence of rip currents and beach cusps; foreshore slope and beach sediment characteristics. The individual measurements are of reasonable, but limited, accuracy. However, the time series of observations is most useful in defining the variability and range of conditions at a particular site.

A LEO program was conducted at King Point between 1 and 14 September, 1985. During this period, thirteen observation sets were collected to define daily variations in some of the more significant sediment transport events. In this respect, observations were usually not made during low energy or virtually non-existent wave conditions. The results of the LEO program at King Point are presented in Appendix 6, along with definitions of the variables and methods used. Examples of some of the wave process and beach morphology conditions observed during the study are illustrated in Figures 4.8 and 4.9.

Figure 4.8 - Storm waves from the northwest approaching beach study site at oblique angle (4 September, 1985).

Figure 4.9 - Beach face with accreting swash bar during post-storm recovery (9 September, 1985).

5.0 DISCUSSION OF THE FIELD PROGRAM

In terms of the original objectives of the King Point coastal zone sediment transport study, the resulting field data collection program was successful in achieving these objectives. Among the more than a dozen major survey tasks and instrument systems that were utilized to collect data (Table 4.1), serious problems were only encountered with two of these. This included the loss of two Aanderaa current meters because of inadequate mooring system design and a limited problem with one of the directional wave/current meters (see Data 635-12) resulting from a combination of data acquisition and mooring instability faults. A separate item was the unavailability (in the field) of a third wave directional instrument which was intended for deployment at a deep water (20 m) offshore site.

In general, the camp facilities were adequate and could have been improved with fewer, larger tents equipped with wood-burning stoves. A three-wheel cycle was needed for the whole program. The Zodiac supplied was suitable for two-man work and surveying operations but was undersized for equipment deployment and diving operations with two divers and one boatman. An additional larger Zodiac would have been useful.

The plan survey objectives, including the establishment of bench marks and baseline, and the barrier beach profile survey objectives were achieved in their entirety. The instruments supplied to perform the survey work were appropriate and the techniques employed included redundant measurements to monitor and/or reduce errors. The echo sounder surveys of the lagoon and nearshore areas were also entirely completed. The echo sounder and positioning system provided excellent quality data for the production of corrected elevation and horizontal distance profiles. All required sediment samples were collected as planned, although the moderately heavy pipe dredge could only be handled with some effort from the Zodiac. The weather station erected for most of the time the field site was occupied

(Table 4.1), withstood gale force winds with correct operation of the electronic and recording functions.

Serious problems occurred with the Aanderaa current meter moorings which were only marginally adequate in low energy conditions and inadequate in high energy conditions. Modifications made to the moorings in the field to improve their stability and operation were not entirely successful and were limited by the lack of proper components. The basic mooring design included too small an anchor weight. Also, a direct line from the top of the subsurface Viny float assembly to a large surface buoy caused severe inclination and heave induced motion to the current meter. The quality of data collected by these instruments is suspect and should be examined closely for indications of the presence of these problems.

Of all the oceanographic instruments, the Sea Data 621 deployed nearshore was the most successful. The tripod mooring was very stable in high energy conditions and the instrument operation, in terms of electronic and recording functions, appears to have been correct. The partial failure of the Sea Data 635-12 mooring tripod was due to insecure ballasting of the tripod legs with sandbags. The loss of the sandbags, combined with or due to the lifting motion induced by wave heave on the large surface buoy, was also a factor in mooring instability.

The operation of the suspended sediment sampling system was successful, although more samples could have been collected if the sampler had been mobilized and emplaced in the field at an earlier date in the field program. However, it is felt that the determination of the relative significance of suspended sediment transport at King Point can be assessed with this data set.

The Littoral Environment Observation program, combined with general observations of beach face sediment transport processes, provided further insight into important phenomena associated with coastal sediment transport along the King Point barrier beach. In this last respect, field measurements of the total or bed load component of longshore sediment transport at King Point has not been attempted. This field measurement will not be easily accomplished because of the steep sand/gravel beach face and intense swash zone wave action which is present during storm conditions. However, it appears to be the predominant mode of longshore sediment transport and an attempt at measuring it, by direct or indirect means, should be undertaken.

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Daily Field Operations

DATE	ACTIVITIES
14 Aug/1985	- Contract award received by telex from DSS.
14-23 Aug	- Mobilization of field equipment, including lease equipment from suppliers. - Ship freight from Victoria to Inuvik.
23 Aug	- Dobrocky Seatech Ltd. personnel (Rick Gillie, Gar Fisher) travel Victoria to Edmonton. Overnight in Edmonton.
24 Aug	- Travel Edmonton to Inuvik. Met by Peter Morgan at airport. - Receive freight at Pacific Western, combine with earlier shipment and prepare for trip to King Point. - Travel Inuvik to King Point. - Unload freight from Twin Otter on air strip and carry food and necessities from air strip to camp for the night.
25 Aug	- Carry more food and freight from air strip to camp site, approximately 0.6 km distance. - Assist with securing pontoon boat higher on beach. - Erection of camp tents. - Twin Otter arrives with remaining freight.

DATE	ACTIVITIES
26 Aug	- Erect Aanderaa weather station near middle of the barrier bar. - Unpack and assemble assorted equipment, including Zodiac and aluminum frames for Sea Data instruments. - Antler Air flight with personnel gear and supplies.
27 Aug	- Transport more equipment along beach from strip to camp site using Zodiac. - Received 3-wheel vehicle from P.C.S.P. to expedite equipment transport and field survey operations. - Mobilize Sea Data 621 directional wave/current meter. - Modify Aanderaa current meter moorings.
28 Aug	- Transport remaining freight from air strip to camp using 3-wheeler. - Complete mobilization of Sea Data 621, including "O" speed calibration check at 18:00. Deployed Sea Data 621 at approximately 19:30 in 2.6 m of water about 20m from the shoreline. - Continue to mobilize Aanderaa current meter moorings and deployment system from Zodiac.

DATE	ACTIVITIES
29 Aug	- Mobilize Sea Data 635-12 directional wave/current meter. - Deploy Sea Data 635-12 at approximately 18:00 in 5.6 m of water. - Mobilize Aanderaa current meters and check out function with Digiprint. - Make further preparations and modifications to Aanderaa mooring components.
30 Aug	- Continue to assemble Aanderaa mooring hardeware. - Deploy all five Aanderaa current meters using Zodiac and shore range poles to position along Instrument Range.
31 Aug	- Performed diving inspections on all current meters previously deployed. - Collected bottom sediment samples at each location and checked serial numbers of Aanderaa instruments at each location. - Searched for and located shore bench mark locations required for plan survey operations. - Notified Dobrocky Seatech Ltd. office of successful deployment of instruments and that survey work was proceeding as scheduled.

DATE	ACTIVITIES
1 Sept	- Conducted survey operations on shore. - Placed G.S.C. #1 and G.S.C. #2 bench marks in ground. - Surveyed baseline along barrier bar 1,700 m to northwest and 375 m to southeast from G.S.C. #2 B.M. - Surveyed plan position of bench marks.
2 Sept	- Barrier spit levelling at ranges +600, +500, +400, +300 and +200. - Assisted with arrival of Doug Devoe (O'Connor and Associates) and equipment.
3 Sept	- Conducted Littoral Environment Observations (LEO) at 09:00. - Barrier bar level surveys at ranges -100, -200, +800, +1000, +1200, +1400, +1600 and +1700. - Photographs from King Point, overlooking northwest end of barrier bar. - Conducted LEO at 18:00.
4 Sept	- Stormy weather previous night with wind, rain and snow. - Tie-in level survey of baseline range bench marks from G.S.C. #2 to +1700 m and back again, to close survey.

DATE	ACTIVITIES
5 Sept	- Tie-in level survey of baseline range bench marks from G.S.C. #2 B.M. to -100, -200, -300, and -375 ranges. - Survey location of front range pole of instrument range. - Survey location of weather station. - Assist with loading of O'Connor and Associates equipment into Twin Otter. - Complete active beach portion of level survey profiles. - Collect sediment samples on all range lines at mid-point of swash zone and active beach berm. Bag and store all samples for subsequent shipment.
6 Sept	- Waves and winds have subsided after storm. - Verify that surface floats and ground line floats are missing from Aanderaa current meters deployed at 7.5 and 12.5 m depths. Also verify that current meter at 10 m depth has drifted approximately 300 m to the southeast. - Attempt to drag (unsuccessfully) for ground lines on current meters missing surface floats. - Decision is made to recover remaining Aanderaa current meters deployed at 5, 10 and 15 m. All current meters on beach by 15:30. - Clean up camp and tent.

DATE	ACTIVITIES
7 Sept	- Continue dragging operations for unmarked current meters. - Operations successful. - Bring Zodiac across barrier bar into lagoon to conduct echo sounder surveys. Echo sounder surveys conducted until 18:30 when fog prevents further operations. - Disassembled Aanderaa current meter moorings.
8 Sept	- Gale force winds from the southwest prevent survey operations in lagoon and sea. - Prepare suspended sediment sampling system and deploy on nearshore Sea Data current meter. - Collect suspended sediment samples at 22:00.
9 Sept	- Collect four suspended sediment samples between 00:00 (midnight) and 00:10. - Conduct LEO at 09:00. - Continue echo sounder survey of lagoon. - Complete echo sounder survey of lagoon. Move Zodiac back to sea side of barrier spit. - Mobilize for echo sounder survey of nearshore zone, but fog prevents commencement of survey operations. - Conduct LEO at 18:00.

DATE	ACTIVITIES
10 Sept	- Conduct LEO at 09:00. - Fog conditions prevent echo sounder surveying. - Attempt to drag for current meter at 7.5 m depth. - Collect bottom sediment samples of nearshore zone at 20 m distance from beach for all ranges. - Collect suspended sediment samples at 15:00.
11 Sept	- Recovered Sea Data 635-12 instrument. - Checked Sea Data 621 instrument and adjusted suspended sediment sample hose inlet at 0.20 m height above seabed. - Fog cleared about 16:00. Conducted echo sounder surveys for remainder of day, until 23:30.
12 Sept	- Conducted echo sounder survey of ranges -300 and -375 to complete echo sounder survey. - Position two marker bouys at original position of missing Aanderaa current meters at 7.5 and 12.5 m. Attempt to drag for mooring ground lines. - Collect bottom sediment samples of nearshore zone at 50m from the beach. - Pack recovered instruments for return shipment. - Conduct echo sounder survey along -4 m and -6 m isobaths. - Demobilize echo sounder and positioning equipment.

DATE	ACTIVITIES
13 Sept	- Gale force winds from the southwest most of day prevents work at sea. - Demobolize equipment, pack for shipment and transport to air strip freight site. - Survey-in position of Sea Data 621 instrument. - Clean up camp and tent in preparation for demobilization.
14 Sept	- Conduct LEO at 09:00 - Collect nine suspended sediment samples between 09:00 and 09:20. - Demobilize weather station at approximately 11:00. - Attempt further dragging for Aanderaa current meter at 7.5 m depth. - Recover Sea Data 621 instrument at approximately 19:00, conduct "0" speed check and carry to camp for the night.
15 Sept	- Strong northwest winds rose during night. Necessary to recover boats which had drifted along beach tied to large logs. Lost some equipment buried by sand on upper beach. Sea level reached the highest point of survey. - Snow in morning. - Removed cassette tape and packed Sea Data 621 instrument. - Demobilized and packed freight and transported to air strip. - Demobilized part of camp in preparation for departure.

DATE	ACTIVITIES
16 Sept	- Ground level blizzard conditions during morning with blowing snow, and north-northwest winds of gale force. - Winds abate gradually during day and weather moderates. - Informed by P.C.S.P. that Twin Otter on floats will be used to demobilize field camp. Proceed to move all freight from air strip to lagoon beach. - Three Twin Otter flights during day to transport all freight and personnel to Inuvik.
17 Sept	- Packing and readying freight in Inuvik for return shipment to Victoria.
18 Sept	- Dobrocky Seatech Ltd. personnel travel Inuvik to Victoria.
19 Sept	- Freight shipped from Inuvik, with exception of air compressor which is withheld from air transport.

Beach Profile Survey Lines

BEACH PROFILE SURVEY LINES

Survey Range	Survey Dates Inactive Barrier Portion	 Active Beach Portion
-375	--	5 Sept./85
-300	--	"
-200	3 Sept./85	"
-100	"	"
000	2 Sept./85	"
+100	"	"
+200	"	"
+300	"	"
+400	"	"
+500	"	"
+600	"	"
+800	3 Sept./85	"
+1,000	"	"
+1,200	"	"
+1,400	"	"
+1,600	"	"
+1,700	"	"

Echo Sounder Survey Lines

A. Lake (Lagoon) Echo Sounder Survey Lines

Survey Range	Date	Time	Distance Fix Interval (m)
+ 200	7 Sept/85	17:00	10
+ 300	7 Sept/85	17:20	10
+ 400	7 Sept/85	17:42	20
+ 500	9 Sept/85	10:00	20
+ 600	9 Sept/85	11:04	20
+ 800	9 Sept/85	11:29	20
+ 1,000	9 Sept/85	11:42	20
+ 1,200	9 Sept/85	12:00	20
+ 1,400	9 Sept/85	12:41	20
+ 1,600	9 Sept/85	13:03	20

B. Nearshore Echo Sounder Survey Lines

Survey Range	Date	Time	Distance Fix Interval (m)
000	11 Sept/85	17:30	20
+ 100	11 Sept/85	17:55	50
+ 200	11 Sept/85	18:12	50
+ 300	11 Sept/85	18:25	50
+ 400	11 Sept/85	18:40	50
+ 500	11 Sept/85	18:56	50
+ 600	11 Sept/85	19:08	50
+ 800	11 Sept/85	19:22	50
+1,000	11 Sept/85	19:34	50
+1,200	11 Sept/85	20:01	50
+1,400	11 Sept/85	20:16	50
+1,600	11 Sept/85	20:35	50
+1,700	11 Sept/85	20:56	50
- 100	11 Sept/85	21:56	50
- 200	11 Sept/85	22:10	50
- 300	12 Sept/85	11:42	50
- 375	12 Sept/85	12:00	50

C. Alongshore Echo Sounder Survey Lines

Two survey lines were run alongshore at the -4 m and -6 m depth contours to assess the occurrence of bottom scour and trench features.

Sediment Samples Collected

A. Aanderaa Current Meter Deployment Site Sediment Samples

(Hand grab samples collected by divers on 31 August, 1985).

Sample Id.	Distance Offshore (m, approx.)	Depth (m, approx.)	Comments
1	275	5	Stiff, grey mud
2	663	7.5	Sand (1 cm thick) over stiff grey mud. Sand only sampled.
3	932	10	Sand (0.5 cm thick) over stiff grey mud.
4	1,241	12.5	Thin "dusting" of silt over less stiff grey mud.
5	n/a	15	Softer grey mud. Divers knees sink into bottom.

B. Littoral Environment Observation Site Sediment Samples

(Samples collected by hand from mid-swash slope of beach)

Sample Id.	Date
6	21:00, 1 September, 1985
7	21:00, 2 September, 1985
8	18:00, 3 September, 1985

C. **Beach Sediment Sample Sites**

(Collected by hand on active beach on 5 September, 1985).

Sample Id.	Survey Range	Berm (B) or Mid-Swash (MS) Sample
10	- 375	MS
11	- 375	B
12	- 300	MS
13	- 300	B
14	- 200	MS
15	- 200	B
16	- 100	MS
17	- 100	B
18	000	MS
19	000	B
20	+ 100	MS
21	+ 100	B
22	+ 200	MS
23	+ 200	B
24	+ 300	MS
25	+ 300	B
26	+ 400	MS
27	+ 400	B
28	+ 500	MS
29	+ 500	B
30	+ 600	MS
31	+ 600	B
32	+ 800	MS
33	+ 800	B
34	+ 1,000	MS
35	+ 1,000	B
36	+ 1,200	MS
37	+ 1,200	B
38	+ 1,400	MS
39	+ 1,400	B
40	+ 1,600	MS
41	+ 1,600	B
42	+ 1,700	MS
43	+ 1,700	B

D. Nearshore Sediment Sample Sites

(Grab samples collected with pipe dredge at 20 m (10 September) and 50 m (12 September, 1985) from the shoreline at the time of the survey)

Sample Id 20 m	50 m	Survey Range
50	71	- 375
51	72	- 300
52	73	- 200
53	74	- 100
54	75	000
55	76	+ 100
56	77	+ 200
57	78	+ 300
58	79	+ 400
59	80	+ 500
60	81	+ 600
61	82	+ 800
62	84	+ 1,000
63	85	+ 1,200
65	86	+ 1,400
66	87	+ 1,600
67	88	+ 1,700

Suspended Sediment Sample Data

Suspended Sediment Sample Data

Sample Id.	Date	Time (MDT)	Sample Height (cm)	Concentration (gm/l)
1	8 Sept/85	22:00	50	0.10
2	9 Sept/85	00:01	50	0.09
3	9 Sept/85	00:04	50	0.06
4	9 Sept/85	00:06	50	0.05
5	9 Sept/85	00:08	50	0.05
6	10 Sept/85	15:06	50	>0.003
7	10 Sept/85	15:10	50	
8	14 Sept/85	09:04	20	0.06
9	14 Sept/85	09:06	20	0.08
10	14 Sept/85	09:08	20	0.04
11	14 Sept/85	09:10	20	0.13
12	14 Sept/85	09:12	20	0.05
13	14 Sept/85	09:14	20	0.04
14	14 Sept/85	09:16	20	0.07
15	14 Sept/85	09:18	20	0.07
16	14 Sept/85	09:20	20	0.12

NOTE:

1. All samples were 7 litres.
2. Sample durations varied from 33 to 43 sec.
3. Sample delay between hose intake and outlet was approximately 60 seconds.

Littoral Environment Observations

SUMMARY OF LITTORAL ENVIRONMENT OBSERVATIONS

No.	Date	Time
1	1 Sept./85	09:00
2	1 Sept./85	15:00
3	1 Sept./85	21:00
4	2 Sept./85	09:00
5	2 Sept./85	21:00
6	3 Sept./85	09:00
7	3 Sept./85	18:00
8	4 Sept./85	18:00
9	7 Sept./85	12:00
10	9 Sept./85	09:00
11	9 Sept./85	18:00
12	10 Sept./85	09:00
13	14 Sept./85	09:00

LITTORAL ENVIRONMENT OBSERVATIONS

Definition of terms and measurements, relative to King Point field site.

WIND DIRECTION: Direction (true) the wind is coming from.

WIND SPEED: Estimate to within +/- 5 km/hr.

WAVE PERIOD: The average period of groups of well-formed waves. Usually a range or series of independent determinations is presented.

BREAKER WAVE HT: An estimate of the range and maximum wave height at the break point.

BREAKER WAVE ANGLE: An estimate of the angle the breaking wave crestline makes with the shoreline. The angle of the wave crest is measured from the shoreline to the left (NW) or to the right (SE), depending upon the direction of wave propagation.

BREAKER WAVE TYPE: Spilling, plunging, surging and combinations are considered.

LONGSHORE CURRENT DIRECTION: Direction current is flowing toward, either to the left (NW) or to the right (SE).

LONGSHORE CURRENT SPEED: Usually measured at a point immediately beyond the line of breaking waves by timing a floating object drifting along the beach past fixed marks.

RIP CURRENTS: Presence and spacing.

BEACH CUSPS: Presence and spacing.

FORESHORE SLOPE: Measured with an Abney level at the mid-swash and top of the swash.

SURF ZONE WIDTH: Estimated between the limits of wave downwash and upwash in the swash zone.

LITTORAL ENVIRONMENT OBSERVATIONS

LOCATION: King Pt., Yukon Coast	OBSERVER: R.D. Gillie
DATE: 1 September 1985	TIME: 09:00

WIND DIRECTION: Calm — WIND SPEED: Calm

WAVE PERIOD: 3.3 to 4.0 s

BREAKER WAVE HT: 0.2 to 0.4 m

BREAKER WAVE ANGLE: 15° to 20°, to the left (NW)

BREAKER WAVE TYPE: Plunging/Surging

LONGSHORE CURRENT DIRECTION: To the left (NW)

LONGSHORE CURRENT SPEED: 0.16 to 0.20 m/s

RIP CURRENTS: Not present

BEACH CUSPS: Not present

FORESHORE SLOPE: Not measured

SURF ZONE WIDTH: 2 m

REMARKS:

(1) Photographs taken of beach.

LITTORAL ENVIRONMENT OBSERVATIONS

LOCATION: King Pt., Yukon Coast

OBSERVER: R.D. Gillie

DATE: 1 September 1985

TIME: 15:00

WIND DIRECTION: E to SE

WIND SPEED: 8 km/hr

WAVE PERIOD: 3.0, 3.1, 3.3 s

BREAKER WAVE HT: 0.3 to 0.5 m

BREAKER WAVE ANGLE: 15°, to the left (NW)

BREAKER WAVE TYPE: Plunging/Surging

LONGSHORE CURRENT DIRECTION: To the left (NW)

LONGSHORE CURRENT SPEED: 0.19 to 0.22 m/s

RIP CURRENTS: Not present

BEACH CUSPS: Not present

FORESHORE SLOPE: Not measured

SURF ZONE WIDTH: 2 m

REMARKS:

LITTORAL ENVIRONMENT OBSERVATIONS

LOCATION: King Pt., Yukon Coast   OBSERVER: R.D. Gillie

DATE: 1 September 1985   TIME: 21:00

WIND DIRECTION: SW   WIND SPEED: 8 km/hr

WAVE PERIOD: 4.0, 4.1, 4.2, 5.0 s

BREAKER WAVE HT: 0.3 to 0.6 m

BREAKER WAVE ANGLE: 10°, to the left (NW)

BREAKER WAVE TYPE: Plunging/Surging

LONGSHORE CURRENT DIRECTION: To the left (NW)

LONGSHORE CURRENT SPEED: 0.14 to 0.22 m/s

RIP CURRENTS: Sometimes present, after large set of waves

BEACH CUSPS: Not present

FORESHORE SLOPE: 6° (mid-swash), 9° (top of swash)

SURF ZONE WIDTH: 5 m

REMARKS:

(1) Photographs taken of beach.

(2) Sediment sample collected from mid-swash.

LITTORAL ENVIRONMENT OBSERVATIONS

LOCATION: King Pt., Yukon Coast	OBSERVER: R.D. Gillie
DATE: 2 September 1985	TIME: 09:00

WIND DIRECTION: Calm — WIND SPEED: Calm

WAVE PERIOD: 5.0, 5.0, 5.1, 5.1 s

BREAKER WAVE HT: Usually 0.4 to 0.8 m; largest waves 1.0 m

BREAKER WAVE ANGLE: <1°, to the left (NW)

BREAKER WAVE TYPE: Plunging/Surging

LONGSHORE CURRENT DIRECTION: Inconsistent, usually to the left (NW)

LONGSHORE CURRENT SPEED: 0.04 to 0.06 m/s

RIP CURRENTS: Not present

BEACH CUSPS: Not present

FORESHORE SLOPE: 5° (mid-swash), 9° (top of swash)

SURF ZONE WIDTH: 6 to 8 m

REMARKS:

(1) No local winds in previous night, but significant swell has been generated offshore.

(2) Very regular swell arriving at shore at low angle to beach.

(3) Waves had overtopped berm in previous night.

(4) Observations of angle of wave approach and longshore curents at other beach locations between range 000 and +600, indicated the following:

Range Line	Wave Angle	Longshore Current
+600	5°, to the right (SE)	to the right (SE)
+150	0°	no current
000	1°, to the left (NW)	to the left (NW)

(5) Therefore, under the present wave conditions there is a convergence of the longshore current at approximately range +150 m.

LITTORAL ENVIRONMENT OBSERVATIONS

LOCATION: King Pt., Yukon Coast — OBSERVER: R.D. Gillie

DATE: 2 September 1985 — TIME: 21:00

WIND DIRECTION: E to SE — WIND SPEED: 10 to 15 km/hr

WAVE PERIOD: 4.5 to 5.5 s

BREAKER WAVE HT: 0.5 to 1.0 m

BREAKER WAVE ANGLE: <10°, to the left (NW)

BREAKER WAVE TYPE: Plunging/Surging

LONGSHORE CURRENT DIRECTION: To the left (NW)

LONGSHORE CURRENT SPEED: 0.14 to 0.16 m/s

RIP CURRENTS: Not present

BEACH CUSPS: Not present

FORESHORE SLOPE: 5° (mid-swash)

SURF ZONE WIDTH: 10 m

REMARKS:

(1) Photo taken of beach.

(2) Mid-swash sediment sample collected.

(3) Longshore current flow to left (NW) enhanced by wind stress on water surface.

LITTORAL ENVIRONMENT OBSERVATIONS

LOCATION: King Pt., Yukon Coast — OBSERVER: R.D. Gillie

DATE: 3 September 1985 — TIME: 09:00

WIND DIRECTION: NNW — WIND SPEED: 8 km/hr

WAVE PERIOD: Swell (4.5, 4.7, 5.0 s), Wind Seas (2 s)

BREAKER WAVE HT: Swell (0.2 to 0.5 m, max. 0.8 m), Seas (<0.3 m)

BREAKER WAVE ANGLE: Swell (<1°, to the right, SE), Seas (30° to right, SE)

BREAKER WAVE TYPE: Plunging/Surging

LONGSHORE CURRENT DIRECTION: To the right (SE)

LONGSHORE CURRENT SPEED: 0.06 to 0.08 m/s

RIP CURRENTS: Not present

BEACH CUSPS: Not present

FORESHORE SLOPE: 4° to 5° (mid-swash)

SURF ZONE WIDTH: 6 m

REMARKS:

(1) Small accretional berm has formed at top of swash zone in association with subsiding wave heights.

(2) Longshore current primarily due to surface wind stress.

(3) Observed breaking waves at ranges +800 and +1000 at 12:00. Wave period and height similar to above. Wave angle notably larger at 5° - 10° to the right, generating a longshore current to the SE.

LITTORAL ENVIRONMENT OBSERVATIONS

LOCATION:	King Pt., Yukon Coast	OBSERVER:	R.D. Gillie
DATE:	3 September 1985	TIME:	18:00

WIND DIRECTION: NNW — WIND SPEED: 20-30 km/hr

WAVE PERIOD: Broad spectrum of seas (2-4 s)

BREAKER WAVE HT: 0.3 to 0.6 m

BREAKER WAVE ANGLE: Broad spectrum (5° to 30° to right, SE)

BREAKER WAVE TYPE: Plunging/Surging

LONGSHORE CURRENT DIRECTION: To the right (SE)

LONGSHORE CURRENT SPEED: See remarks, average 0.31 m/s

RIP CURRENTS: Not present

BEACH CUSPS: Not present

FORESHORE SLOPE: 5° at mid-swash

SURF ZONE WIDTH: 3 m

REMARKS:

(1) Photographs taken of beach.

(2) Sediment sample collected at mid-swash.

(3) A swell from the NNE (wave period 5 s, wave height 0.3 to 0.5 m) was decreasing throughout the day. Then, very suddenly, at approximately 17:00, wind started blowing from NNW at 20-30 km/hr, with seas rapidly increasing in size.

(4) Longshore current measurements were made between 17:00 and 17:15 as follows:

Current Speed (m/s)	Position
0.31	Immediately outside break-pt.
0.30	Immediately outside break-pt.
0.29	Immediately outside break-pt.
0.50	Partly in swash zone
0.33	Outside break-point
0.83	Entirely in swash zone

LITTORAL ENVIRONMENT OBSERVATIONS

LOCATION:	King Pt., Yukon Coast	OBSERVER:	R.D. Gillie
DATE:	4 September 1985	TIME:	18:00

WIND DIRECTION: NNW — WIND SPEED: 30-50 km/hr

WAVE PERIOD: Broad spectrum of seas (2 to 5 s)

BREAKER WAVE HT: 0.5 to 1.5 m

BREAKER WAVE ANGLE: 5° to 15°, to the right (SE)

BREAKER WAVE TYPE: Plunging/Surging (see Remarks)

LONGSHORE CURRENT DIRECTION: To the right (SE)

LONGSHORE CURRENT SPEED: Estimate 0.3 to 0.4 m/s

RIP CURRENTS: Not present

BEACH CUSPS: Not present

FORESHORE SLOPE: 5° at mid-swash

SURF ZONE WIDTH: 10 to 15 m

REMARKS:

(1) Some larger waves started to break by spilling approximately 10 m offshore of usual break-point. This location coincided approximately with location of Sea Data 621 instrument.

(2) Very intense swash zone turbulence. Mean longshore surf zone currents greater than 1 m/s, with higher instantaneous values.

LITTORAL ENVIRONMENT OBSERVATIONS

LOCATION: King Pt., Yukon Coast	OBSERVER: R.D. Gillie
DATE: 7 September 1985	TIME: 12:00

WIND DIRECTION: NNW — WIND SPEED: 10-15 km/hr

WAVE PERIOD: Swell (4 to 4.5 s), Seas (1 to 2 s)

BREAKER WAVE HT: 0.4 to 0.8 m, some larger waves

BREAKER WAVE ANGLE: <1° for swell, to the left (NW)

BREAKER WAVE TYPE: Plunging/Surging

LONGSHORE CURRENT DIRECTION: To the left (NW)

LONGSHORE CURRENT SPEED: Not measured

RIP CURRENTS: Present during and after sets of larger waves, 5-8 m longshore spacing

BEACH CUSPS: Shallow cusps present, 5-8 m spacing

FORESHORE SLOPE: 5° at mid-swash

SURF ZONE WIDTH: 6 to 8 m

REMARKS:

(1) Although wind is from NNW, longshore currents generated by breaking waves are to the right (NW).

(2) The beach face continues to show accretion associated with post-storm swash processes.

(3) High tide, at approximately 11:00, allowed waves to over-top berm and infill runnel.

LITTORAL ENVIRONMENT OBSERVATIONS

LOCATION:	King Pt., Yukon Coast	OBSERVER:	R.D. Gillie
DATE:	9 September 1985	TIME:	09:00

WIND DIRECTION: Calm — WIND SPEED: Calm

WAVE PERIOD: 3 to 4 s

BREAKER WAVE HT: 0.2 to 0.4 m

BREAKER WAVE ANGLE: <5°, to the right (SE)

BREAKER WAVE TYPE: Plunging/Surging

LONGSHORE CURRENT DIRECTION: To the right (SE)

LONGSHORE CURRENT SPEED: Not measured

RIP CURRENTS: Not present

BEACH CUSPS: 3 to 4 m spacing

FORESHORE SLOPE: 5° at mid-swash

SURF ZONE WIDTH: <2 m

REMARKS:

(1) Beach profile in recovery phase, after storm of previous night.

LITTORAL ENVIRONMENT OBSERVATIONS

LOCATION: King Pt., Yukon Coast OBSERVER: R.D. Gillie

DATE: 9 September 1985 TIME: 18:00

WIND DIRECTION: NW WIND SPEED: 5 km/hr

WAVE PERIOD: 4 to 5 s

BREAKER WAVE HT: 0.3 to 0.5 m

BREAKER WAVE ANGLE: 5°, to the right (SE)

BREAKER WAVE TYPE: Plunging/Surging

LONGSHORE CURRENT DIRECTION: To the right (SE)

LONGSHORE CURRENT SPEED: Not measured

RIP CURRENTS: Not present

BEACH CUSPS: Not present

FORESHORE SLOPE: Not measured

SURF ZONE WIDTH: Not measured

REMARKS:

LITTORAL ENVIRONMENT OBSERVATIONS

LOCATION: King Pt., Yukon Coast   OBSERVER: R.D. Gillie

DATE: 10 September 1985   TIME: 09:00

WIND DIRECTION: NNW   WIND SPEED: <5 km/hr

WAVE PERIOD: 3 to 4 s

BREAKER WAVE HT: 0.3 to 0.6 m

BREAKER WAVE ANGLE: 0°

BREAKER WAVE TYPE: Plunging/Surging

LONGSHORE CURRENT DIRECTION: No current present

LONGSHORE CURRENT SPEED: No current present

RIP CURRENTS: Small rips associated with cusps

BEACH CUSPS: 1-2 m spacing

FORESHORE SLOPE: Not measured

SURF ZONE WIDTH: 2-3 m

REMARKS:

(1) Photographs of beach taken.

LITTORAL ENVIRONMENT OBSERVATIONS

LOCATION:	King Pt., Yukon Coast	OBSERVER:	R.D. Gillie
DATE:	14 September 1985	TIME:	09:00

WIND DIRECTION:	Calm	WIND SPEED:	Calm
WAVE PERIOD:	Swell, in prominent sets, 4-5 s		
BREAKER WAVE HT:	0.5 to 1.0 m		
BREAKER WAVE ANGLE:	15° to 30°, to the right (SE)		
BREAKER WAVE TYPE:	Plunging/Surging		
LONGSHORE CURRENT DIRECTION:	To the right (SE)		
LONGSHORE CURRENT SPEED:	0.20 to 0.23 m/s		
RIP CURRENTS:	Inconsistent, weak development, with sets of larger waves		
BEACH CUSPS:	Not present		
FORESHORE SLOPE:	5° (mid-swash), 9° (top of swash)		
SURF ZONE WIDTH:	6-8 m		

REMARKS:

(1) Suspended sediment samples (9 in total) were taken between 09:04 and 09:20.

Equipment Brochures

APPENDIX 7

EQUIPMENT BROCHURES

1. Topcan Digital Theodolite

2. Topcan AT-F Auto-Level

3. Hydro-Dista EDM

4. Raytheon Echo Sounder

5. Aanderaa Weather Station
   - 12-Channel Datalogger DL-1
   - Wind Speed Sensor
   - Wind Direction Sensor

6. Aanderaa Recording Current Meter (RCM)

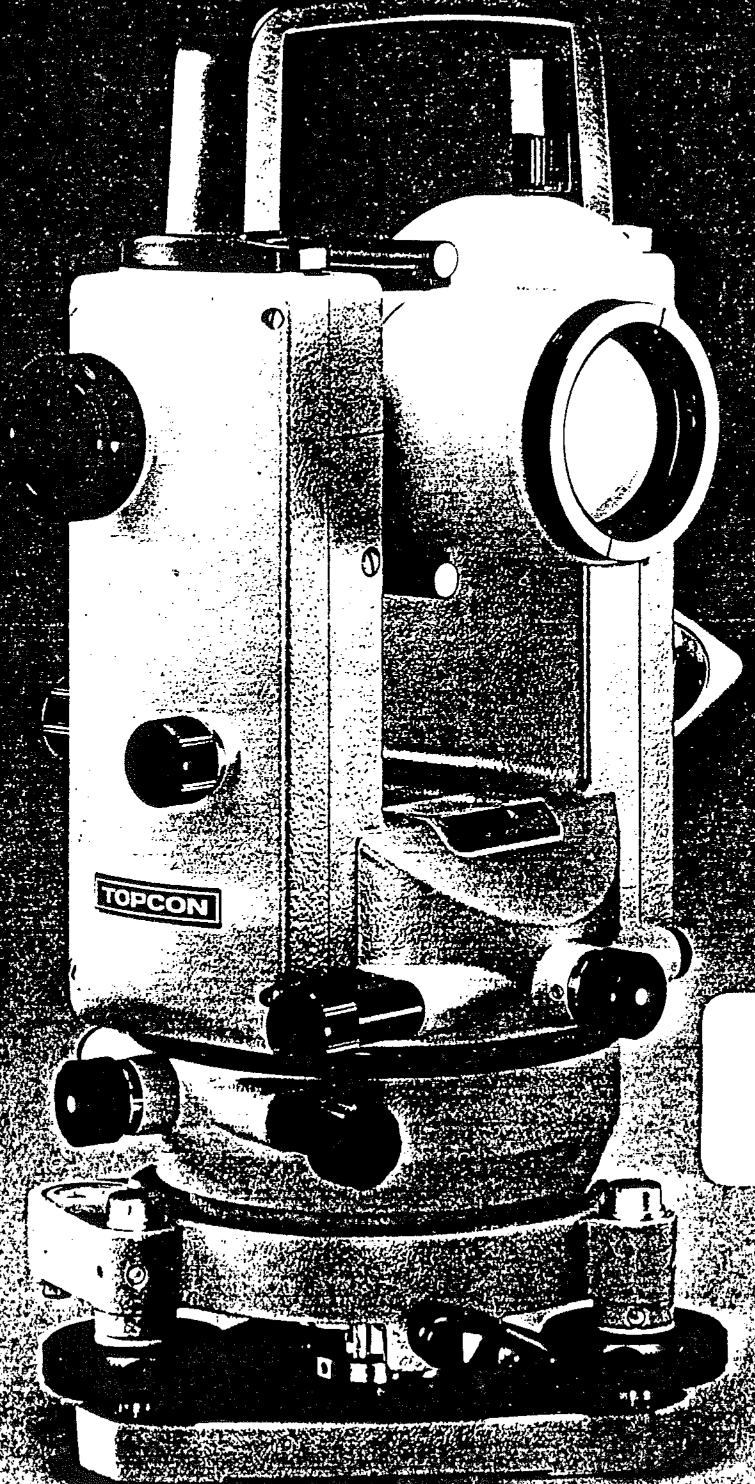
7. Sea Data 621 Directional Wave/Current Meter

8. Sea Data 635-12 Directional Wave/Current Meter and Tide Recorder

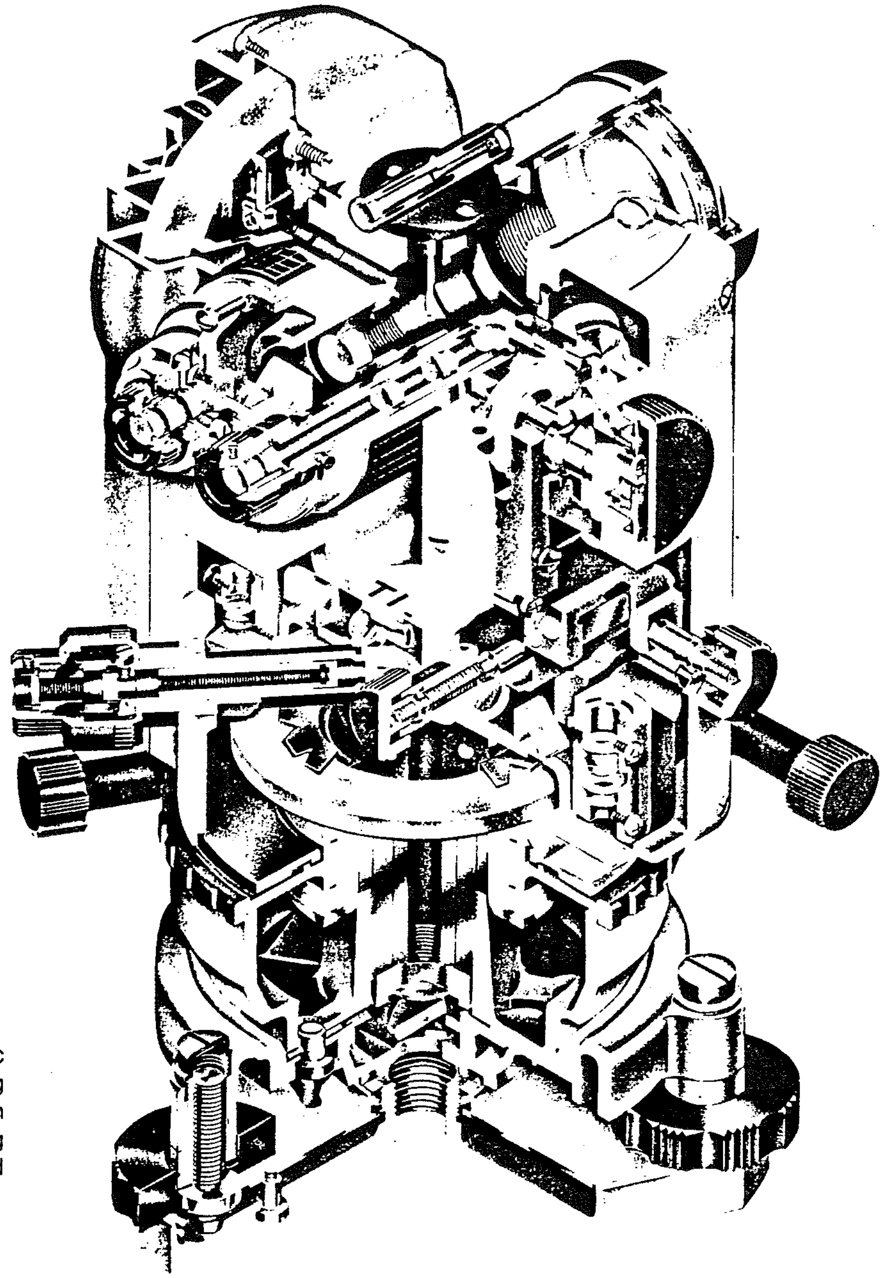
TOPCON

TL-6DE

DIGITAL THEODOLITE



SPECIFICATIONS



Telescope	
Length	152mm
Objective lens	42mm
Magnification	30×
Relative brightness	1.96
Field of view	1 20′
Resolving power	3″
Minimum focus	1.5m
Stadia constant	0
Stadia ratio	100
Horizontal Vertical Circles	
Diameter	70mm
Material	Glass
Division(numbered)	1′
Micrometer reading(numbered)	6″
Loupe magnification	40.5×
Automatic Vertical Circle Indexing	
Range	±5′
Setting accuracy	±0.25″
Level Sensitivity	
Circular level	10′/2mm
Plate level	30″/2mm
Optical Plummet Telescope	
Image	Erect
Magnification	3×
Focusing range	0.5m to infinity
Field of view at 1.3m	120mm diameter
Detachable Tribrach	
Number of screws	3
Tripod screw	5/8″ ×11 threads
Weight	
Instrument	4 kgs.
Plastic carrying case	3.3 kgs.

The Model TL-6DE Theodolite is supplied in a plastic carrying case, together with lens cap, carrying handle, compact illuminator, plumb bob set, silicon cloth, plastic cover and accessory case containing plumb bob hook, adjusting pins, screwdriver and cleaning brush.

TOPCON

TOKYO OPTICAL CO., LTD.
75-1 Hasunuma-cho, Itabashi-ku, Tokyo 174, Japan.
Telex: 272-2384 Phone: 03-967-1101

TOPCON INSTRUMENT CORPORATION OF AMERICA
65, West Century Road, Paramus, New Jersey 07652, U.S.A.
Telex: 134338 Phone: 201-261-9450

TOPCON EUROPE B.V.
Groothandelsgebouw, P.O. Box 29039, 3001 GA Rotterdam, Netherlands
Telex: 23783 Phone: 127279

TOPCON DEUTSCHLAND GmbH
Krefelderstrasse 19-21, D-4156 Willich 1, West Germany.
Telex: 8531981 Phone: 02154 427061 - 6

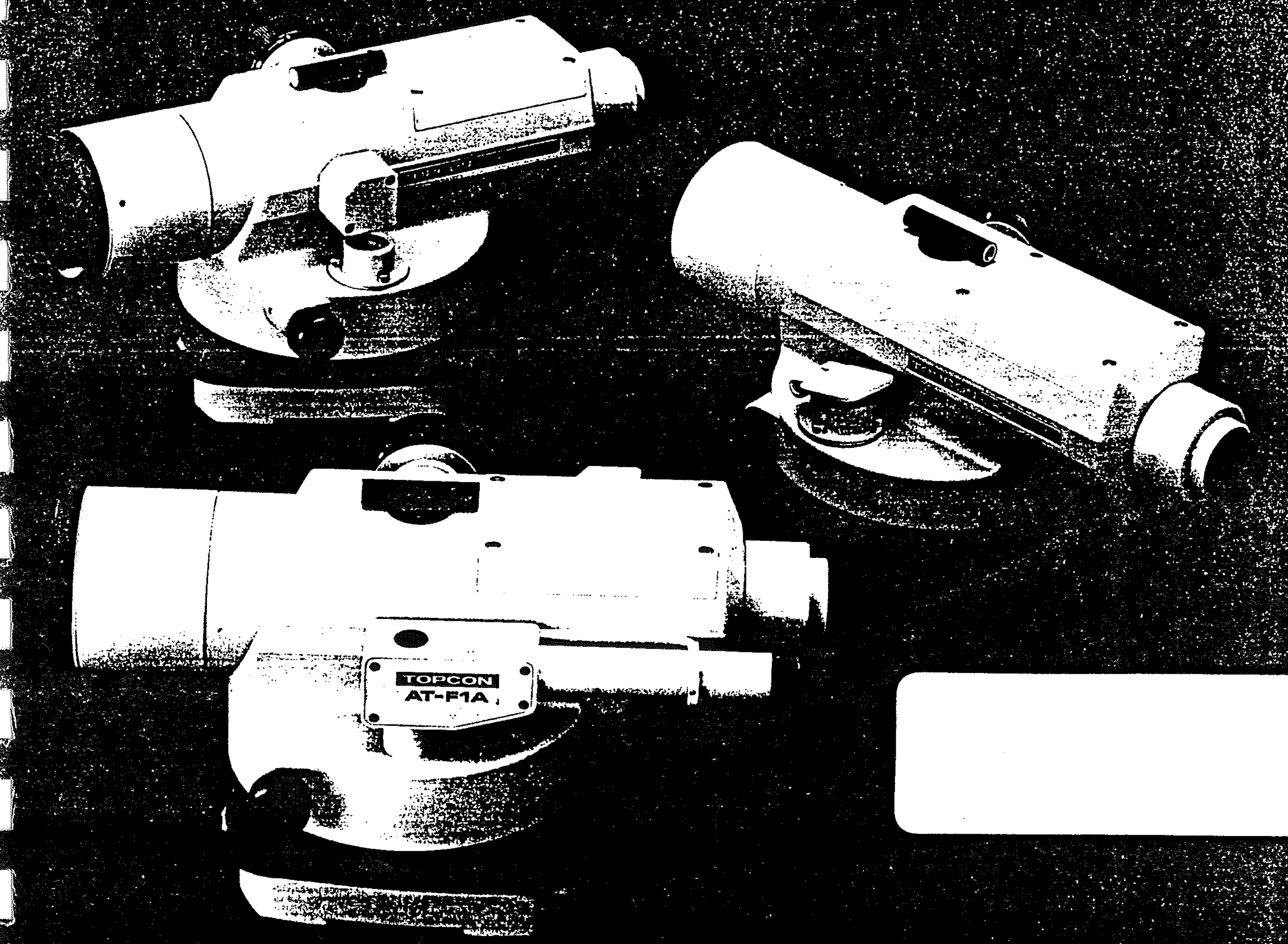
TOPCON SINGAPORE PTE. LTD.
International Plaza, 10 Anson Road, No. 23-12, Singapore 0207.
Telex: 26622 Phone: 2218824

Subject to changes in design and or specifications, without advance notice.

TOPCON

AT-F SERIES

AUTO-LEVELS



SPECIFICATIONS

Telescope

Length	
AT-F1A/AT-F1	258.5mm
AT-F2	253.0mm
Image	Erect
Magnification	32×
Objective lens	45mm
Relative brightness	1.98
Field of view	1° 20′
Resolving power	2.5″
Minimum focus	1.5m
Stadia constant	0
Stadia ratio	100

Circular Level

Sensitivity	10′/2mm

Automatic Leveling

Setting accuracy	±0.3″
Compensating range	±12′

Accuracy in 1 Km Double Run Leveling

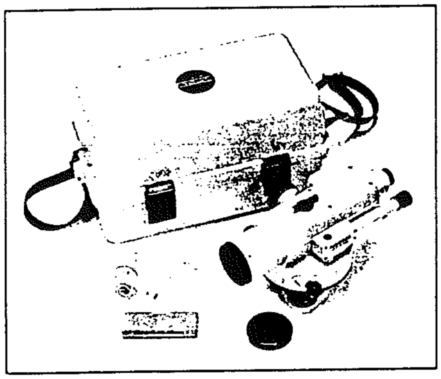
Without optical micrometer	±1.0mm
With optional optical micrometer	±0.4mm

Horizontal Circle

Model AT-F1A	
Material	Glass
Diameter	90mm
Minimum division	10′ or 10^c
Microscope magnification	25×
Model AT-F2	
Material	Metal
Diameter	97mm
Minimum division	1° or 1^g
Loupe magnification	4.5×

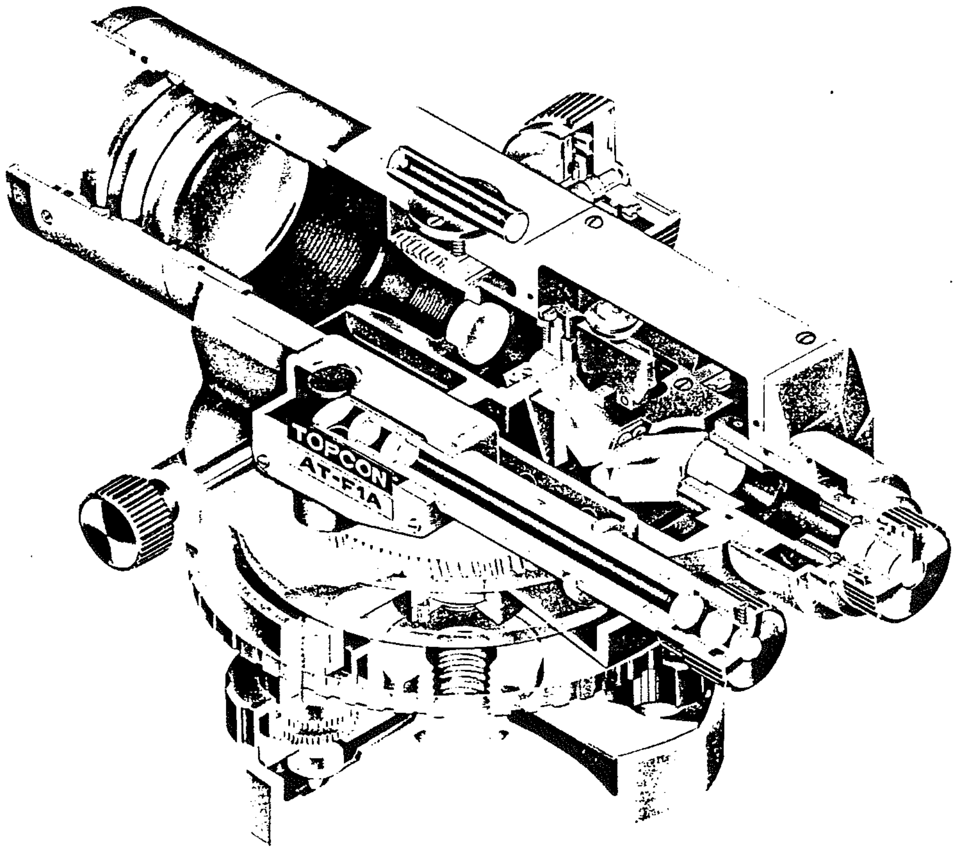
Weight

Model AT-F1/AT-F2	2.1 kgs.
Model AT-F1A	2.4 kgs.
Plastic carrying case	2.8 kgs.



Complete with lens cap, plumb bob set (AT-F1A/AT-F2), silicon cloth, plastic cover and accessory case with two adjusting pins and two screwdrivers (AT-F1A/AT-F1) or one adjusting pin and one screwdriver (AT-F2) plus one cleaning brush.

Subject to changes in design and/or specifications, without advance notice.



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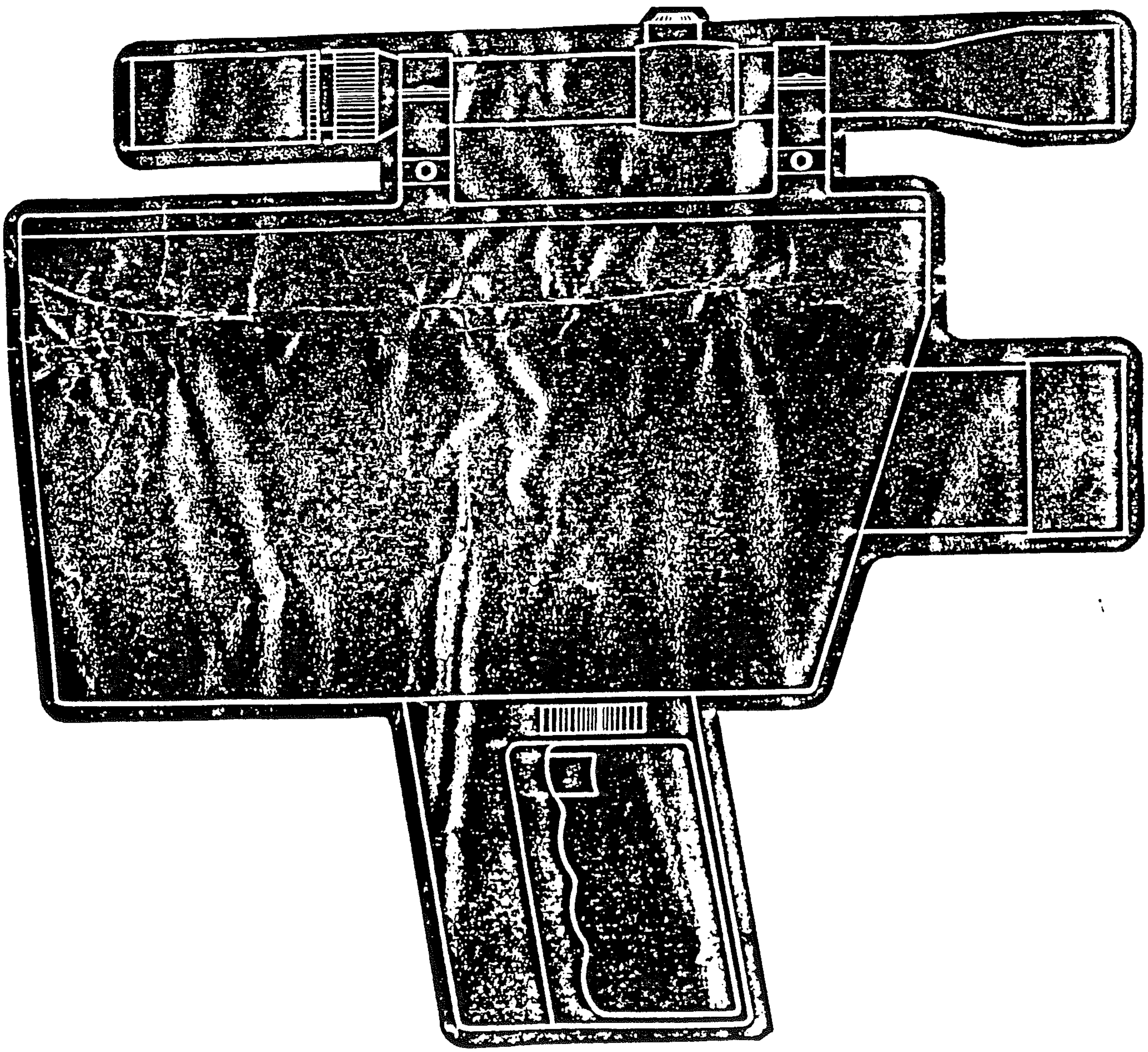
TOPCON SINGAPORE PTE. LTD.
International Plaza, 10 Anson Road, No. 23-12, Singapore 0207.
Telex: 26622 Phone: 2218824

[redacted]

HD2 HYDRO-DISTA

For Dynamic Range Measurement

HYDROGRAPHIC SURVEY
DYNAMIC POSITIONING
SETTING OUT
MICRO-WAVE CALIBRATION

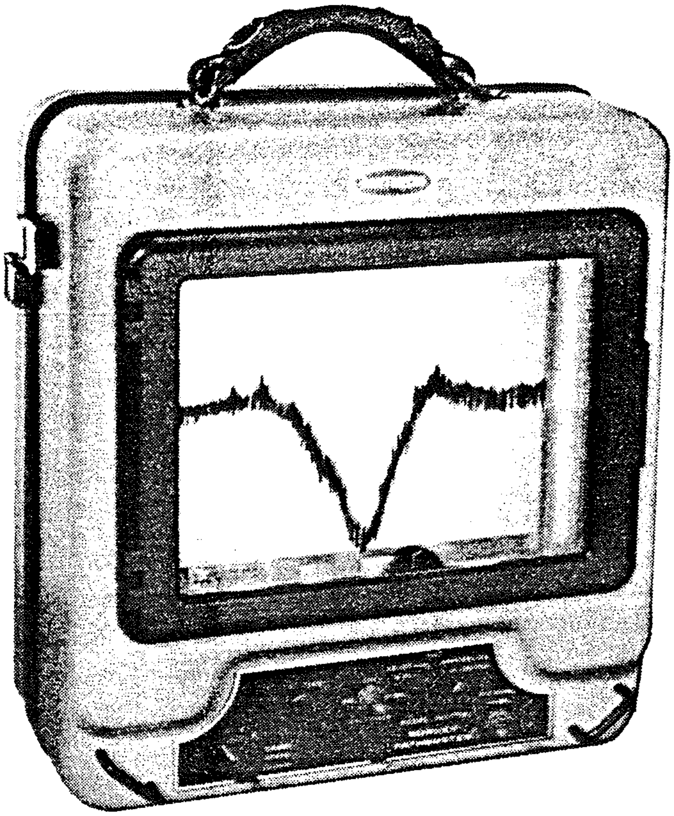


Capable of providing f
moving targets, the P

Spe...mentation for

n are more

Range	According ... maximum in excess of 2,500 metres. (Model LR in excess of 4,500 metres)
Resolution	Display and Data Output - 0.1 metre.
Accuracy	Range dependant - the accuracy is better than 0.5 metres $\pm d^{-3}$, where d is the range measured.
Display	5 digit LED display.
Data Output	Parallel BCD - TTL level positive true.
Transmitter	Pulsed output, infra-red. **Peak Power** - 30 watts. **Pulse Repetition Rate** - 400 per sec. (Model LR 300 per sec.) **Pulse Length** - 25 n.sec. **Wave Length** - 904 n.metres. **Beam Spread** - 2 m.rads (8 metres at 1,000 metres). **Safety** - Conforms to Class 1 BSI 4803 (1977). Maximum irradiance 3.75 + 10^4 wm^{-2}.
Battery.	Internal sealed lead-acid 12V 5.7aH provides up to 2.5 hours continuous operation.
Charger.	13.8V constant voltage from 220V A.C. 110V A.C. or 24V D.C. powered chargers available as an option.
Mounting.	Hand held using pistol grip supplied or by standard surveying or camera tripod threads.
Dimensions	Ranging Head - 140 × 145 × 270mm Power Supply - 185 × 75 × 170mm
Weights	Ranging Head - 3 Kgs. Power Supply - 6 Kgs. (including Battery)



RAYTHEON
DE-719B RECORDING DEPTH SOUNDER.

The RAYTHEON DE-719B depth sounder is a very portable survey instrument used for high resolution recording of bottom topography in water depths to 120 meters. Low power consumption, ease of set up and rugged construction make it ideal for use on small vessels.

FEATURES:

- 4 selectable chart speeds.
- Fix mark.
- Tide/draft compensation.
- 12 VDC operation.
- British or metric chart paper.

SPECIFICATIONS:

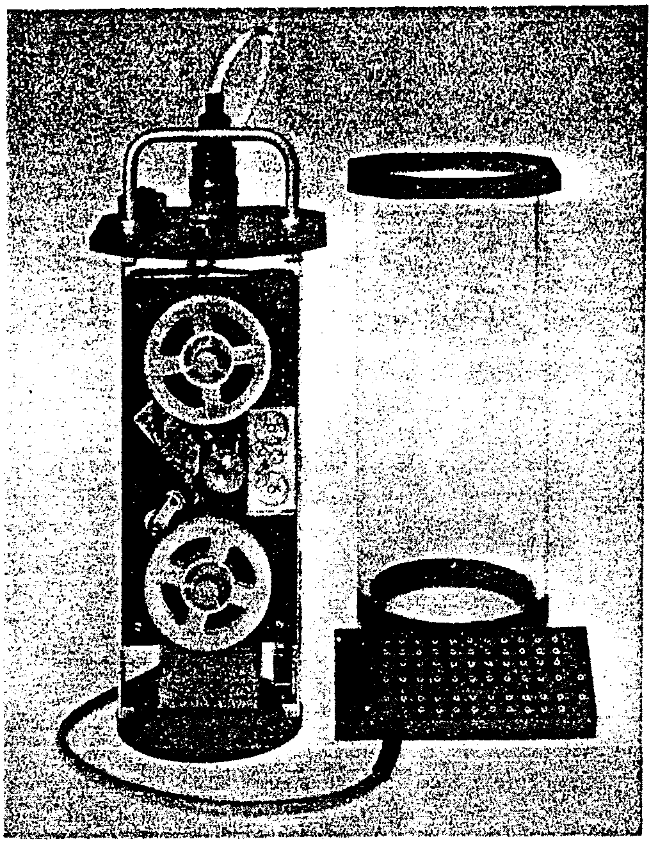
Depth Range:	0-120m., in 4 selectable ranges.
Sounding Rate:	534 soundings/min.
Accuracy:	± 0.5% ± 2.5cm. of indicated depth.
Operating Frequency:	208 KHz.
Transducer:	8° beam width at - 3 db.
Dimensions:	height: 45 cm. width: 39cm. depth: 23 cm.
Weight:	17.2 kg.

Dobrocky SEATECH

AANDERAA INSTRUMENTS

DATA COLLECTING INSTRUMENTS FOR LAND, SEA AND AIR

FANAVEIEN 13
P.O. BOX 160
5051 BERGEN, NORWAY
TEL.: (05) 27 40 30
TELEX 40049



Picture shows datalogger removed from housing, and Connector Board 2371B. This connector permits easy connection of sensing element wires.

12-CHANNEL DATALOGGER DL-1

A self contained datalogger for recording environmental data at sea or on land.

Price FOB Bergen:

Datalogger DL-1
(including Connector Board 2371B)

This weatherproof, battery operated and fully self contained datalogger has been developed to record data in places where no electricity supply is available.

Analog signals from 12 different channels, are converted to digital data and stored on 1/4 inch reel to reel magnetic tape. The first channel is reserved for the instrument's reference number and the remaining 11 for the measured data. The capacity of a full tape reel (600 ft.), is equal to 6 months of recording at one hour intervals.

Sensors of the standard Aanderaa three - wire half bridge type will plug directly to the connector board of this datalogger. Sensors with voltage or digital output can be used when connected via signal conditioning units. These units are moulded into epoxy and plug onto the connector board. *See overleaf*

The datalogger is normally triggered at preset intervals by a built in quartz clock, but external triggering is also possible. Parallel with recording of data the same signals are routed to the connector board output jacks for remote reading.

Aanderaa Instruments offers various equipment for reading tape from this datalogger. Such equipment permits direct plots of recorded data, conversion to 1/2 inch magnetic tape, or direct computer infeed of data. A mail service providing these services is also available.

SPECIFICATIONS

MEASURING SYSTEM:

Self balancing bridge with sequential measuring of twelve channels, recorded on magnetic tape. Each channel is represented as a ten bit binary word. The first channel gives a fixed reference reading, acting as a control and identification of the instrument.

Bridge Voltage: −6 volts, pulsed

Scanning Range: 1/22 of bridge voltage, symetrical around bridge midpoint.

Measuring Speed: 4 seconds, each channel.

SENSING ELEMENTS:

Halfbridges: 3-wire halfbridge sensors plug directly to connector board. Preferred resistance each arm, 2000 ohms.

Sensors with voltage output: The following converters are available (connect directly to connector board).

mV-Converter 2190: range 0 to ± 136mV
mV-Converter 2190B: range 0 to + 272mV
mV-Converter 2190C: range 0 to − 272mV
mV-Converter 2190D: range 0 to + 5000mV
mV-Converter 2190E: range 0 to − 5000mV

Digital Sensors: Pulse Counter 2271 is available for counting pulses 0 − 1023. Based on contact closure.

RECORDING SYSTEM:

Type: Reel to reel 1/4 inch magnetic tape.

Coding: 10 bit binary words (short and long pulses) in serial form.

Storage Capacity: 5000 samplings using 600 feet of magnetic tape on 3 inch reels.

CLOCK:

Type: Quartz Crystal Clock 2574

Accuracy: Better than ± 2 sec/day within 0°C to 20°C.

Sampling Intervals: 0.5, 1, 2, 5, 10, 15, 20, 30, 60 and 180 minutes, selectable by interval selecting switch.

External Triggering: A six volts positive pulse to output terminal on connector board will activate the instrument.

REMOTE READING (telemetry):

− 5 volts binary pulses, available on connector board output terminals.

POWER:

Battery 2291: 9 volts 5Ah., alkaline type (6 Mallory MN 1400).

Size: 63 x 50 x 80mm.

OPERATING TEMPERATURE:

− 4 to 40 degress C.

MATERIALS:

Top End Plate: PVC plastic and nickel plated bronze.

Housing: Acryl (PMMA)

Connector Board: Epoxy (Araldit D)

WEIGHT:

Net weight: 4 kg.
Gross weight: 9 kg.

DIMENSIONS:

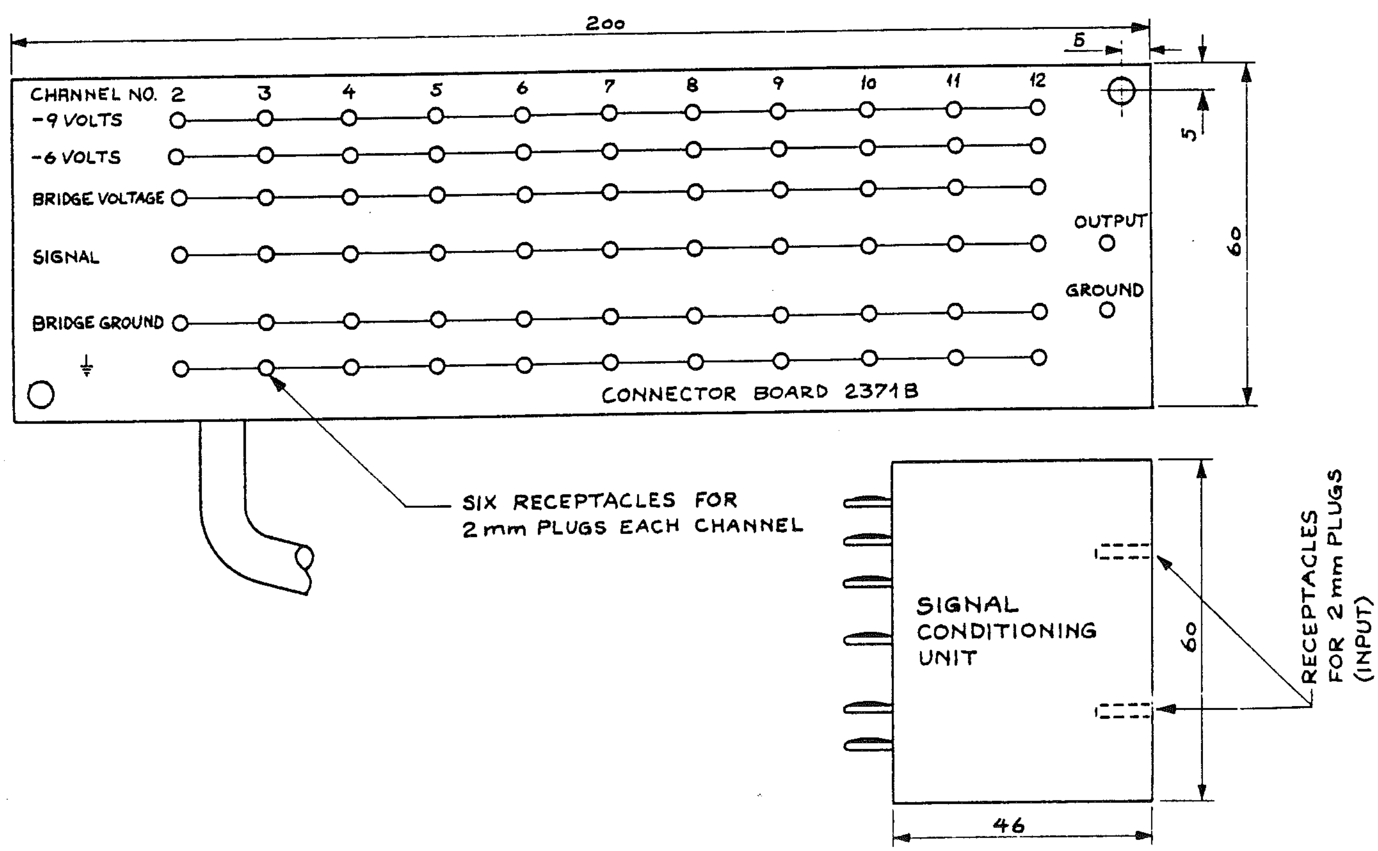
Height including handle: 380mm
Size of endplate: 140 x 140mm

PACKING:

Plywood instrument case, 19 x 22 x 60 cm.

WARRANTY:

One year aganist faulty materials and workmanship.



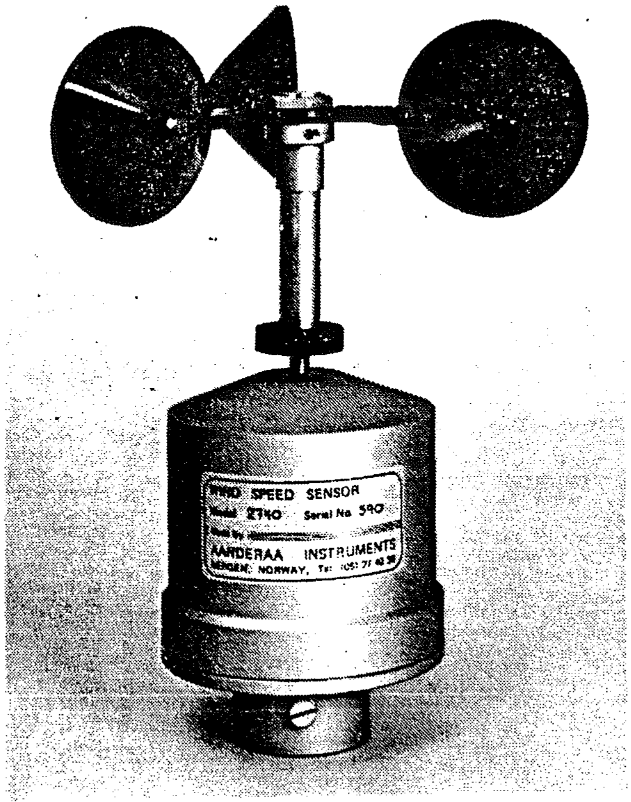
Distributors:

Canada: Aanderaa Instruments Ltd., 560 Alpha St., Victoria, B.C. V8Z 1B2, Tel. (604) 386-7783, Telex 049-7390
USA: Aanderaa Instruments Inc., 30F Commerce Way, Woburn 01801, Mass., Tel. (617) 933-8120, Telex 94-0555
Asia: Union Engineering Ltd., 29-4 Sakaemachi-dori, Ikuta-Ku, Kobe 650-91, Japan, Tel. (078) 391-5947, Telex J78913
France: Nereides, 66 Boulevard de Mondetour, 91400 Orsay, France, Tel. (Paris) 907 20 48, Telex 691518

AANDERAA INSTRUMENTS

FANAVEIEN 13
P.O. BOX 160
5051 BERGEN, NORWAY
TEL. BERGEN 27 40 30
TELEX 40049

DATA COLLECTING INSTRUMENTS FOR LAND, SEA AND AIR



WIND SPEED SENSOR 2740

(Average and Maximum Speed)

This sensor will measure the average and maximum wind speed during the sampling interval. It is designed for use with Aanderaa Datalogger DL-1

Price FOB Bergen,

The Wind Speed Sensor 2740 consists of a three-cup rotor on top of an aluminium housing that is designed for easy mounting on a 25 mm vertical tube. The rotor bearings consist of two stainless steel ball bearings, protected by a surrounding skirt. The lower end of the skirt is furnished with a magnet.The magnet's rotation is sensed by a reed contact located inside the housing.

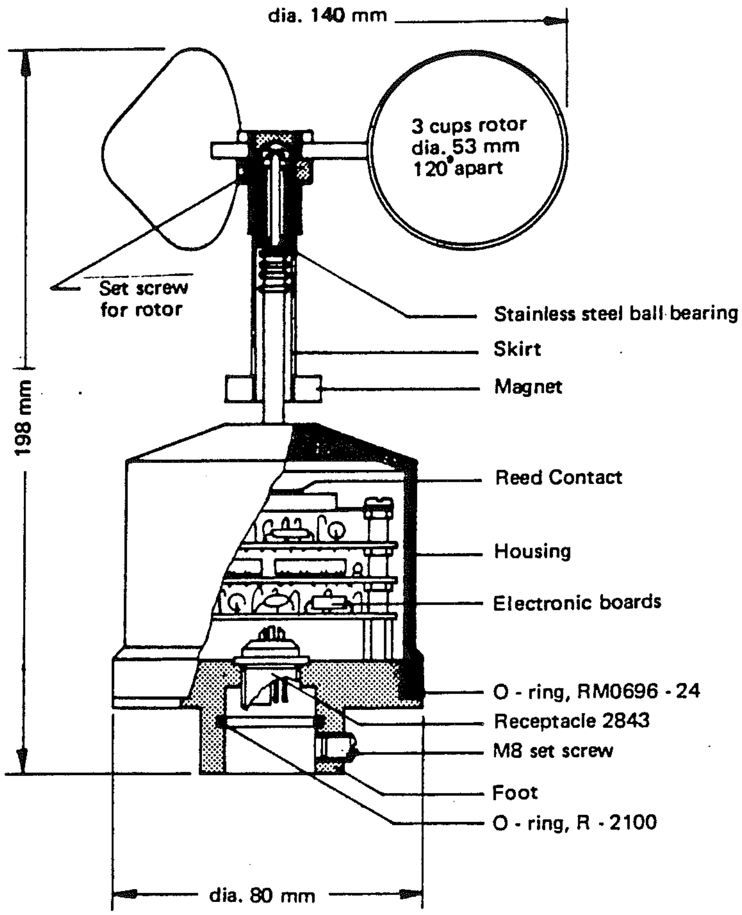
The sensor employs a new principle, whereby the arithmetic mean of the wind is always obtained regardless of the length of the sampling interval, provided it is greater than 8 seconds and does not exceed 3 hours. The maximum wind speed is the highest speed that has occurred over a 2 second period at any time during the sampling interval.

When a reading is to be taken, the arrival of −6 volts from the datalogger resets the electronic counters, and the shift registers are subsequently advanced by the bridge voltage pulses, which enable the data to enter the datalogger in digital form.

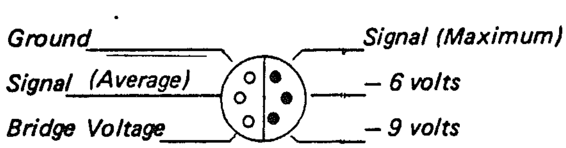
Both average and maximum wind speed will have the same conversion factor for calculation of speed in meters per second. The factor is independent of sampling interval used.

The counter requires a continuous voltage supply to operate. This voltage supply is obtained from the datalogger's main battery (9volts). Current consumption is in the range of 100 - 365 microamperes from this battery, dependant upon wind speed.. The higher the wind speed, the greater the current consumption will be.

DATASHEET D151, FEBRUARY 1982



Threshold speed:	30-50 cm/sec
Range:	up to 60 m/sec.
Accuracy:	± 2% or ± 20 cm/sec whatever is greater.
Calibration factor:	1.194 m wind way for each revolution. Two counts each rotor revolution.
Operating temperature:	−40 to + 50°C
Formula Wind speed (m/sec.):	N · 0.0746 N = datalogger reading
Net. weight:	0.5 kilograms
Packing:	Plywood case 360 x 280 x 105 mm
Gross weight:	4.1 kilograms (add 0.7 kg for Sensor cable 2842)
Electrical connection:	Receptacle mating Lemo plug F2306 or Aanderaa plug 2828.



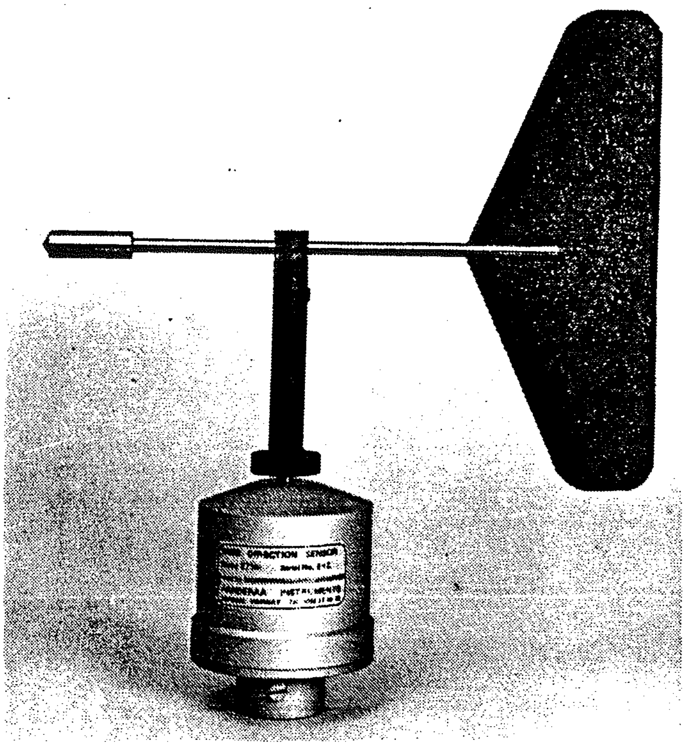
Receptacle 2843
Plug side view

Sensor Cable 2842 (10m cable with watertight plugs), is available for connecting this sensor to the connector board of the Aanderaa Datalogging System. Other lengths, or separate plugs and cables, are available on request.

AANDERAA INSTRUMENTS

FANAVEIEN 13
P.O. BOX 160
5051 BERGEN, NORWAY
TEL. BERGEN 27 40 30
TELEX 40049

DATA COLLECTING INSTRUMENTS FOR LAND, SEA AND AIR



WIND DIRECTION SENSOR 2750

A sensor to measure wind direction, designed for use with Aanderaa *Datalogger DL-1*.

Price FOB Bergen, ...–

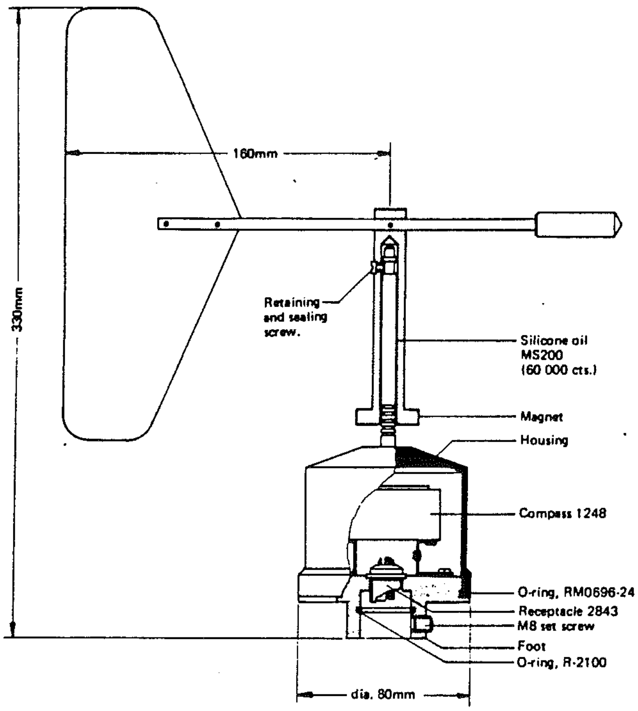
This wind direction sensor consists of a light wind vane which can turn on a vertical pivot, mounted on top of an aluminium housing that is designed for easy mounting on a 25 mm vertical tube. The vane is coupled magnetically to a following device with electrical read-out (Compass 1248) inside the housing.

When direction is to be read, the following device is clamped by applying current to a clamping coil inside it. In this way, the wind direction is given as a potentiometer setting. A set of resistors are connected to the compass to make the signal compatible with the datalogger.

For the purpose of damping the vane movements, the space between the pivot and the surrounding PVC skirt is filled with silicone oil. The oil damping will oppose rapid changes in the wind direction, but will permit the vane to line up even with very light wind.

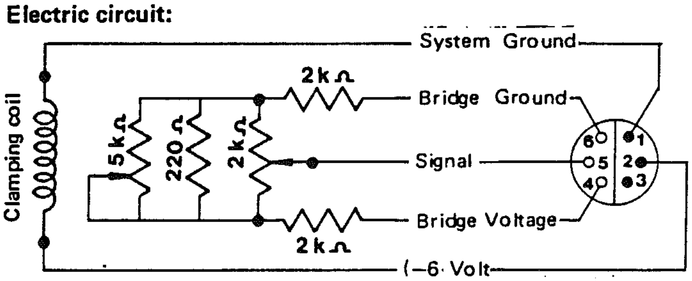
The housing is furnished with a mark that must be orientated towards north for true reading. When properly orientated, this sensor will cause the datalogger to read 0 for wind coming from north, and 256, 512 and 768 for wind coming from east, south and west recpectively.

DATASHEET D144, FEBRUARY 1982



Threshold speed:	Less than 30 cm/sec.
Accuracy:	Better than ±5°C
Operating temperature:	−40 to + 50°C
Direction (Deg. Magn.):	1.5 + 0.349 · N (N = Datalogger reading)
Mounting:	On vertical tube with OD 25 mm
Weight:	0.6 kilograms
Packing:	Plywood case 360 x 280 x 105 mm
Gross weight:	4.2 kilograms (add 0.7 kg for Sensor cable 2842)
Electrical connection:	Receptacle mating Lemo plug F2306 or Aanderaa plug 2828.

Electric circuit:



Receptacle 2843
Plug side view

Sensor Cable 2842 (10m cable with watertight plugs) is available for connecting this sensor to the connector board of the Aanderaa Datalogging System. Other lengths, or separate plugs and cables, are available on request.

Check of sensor

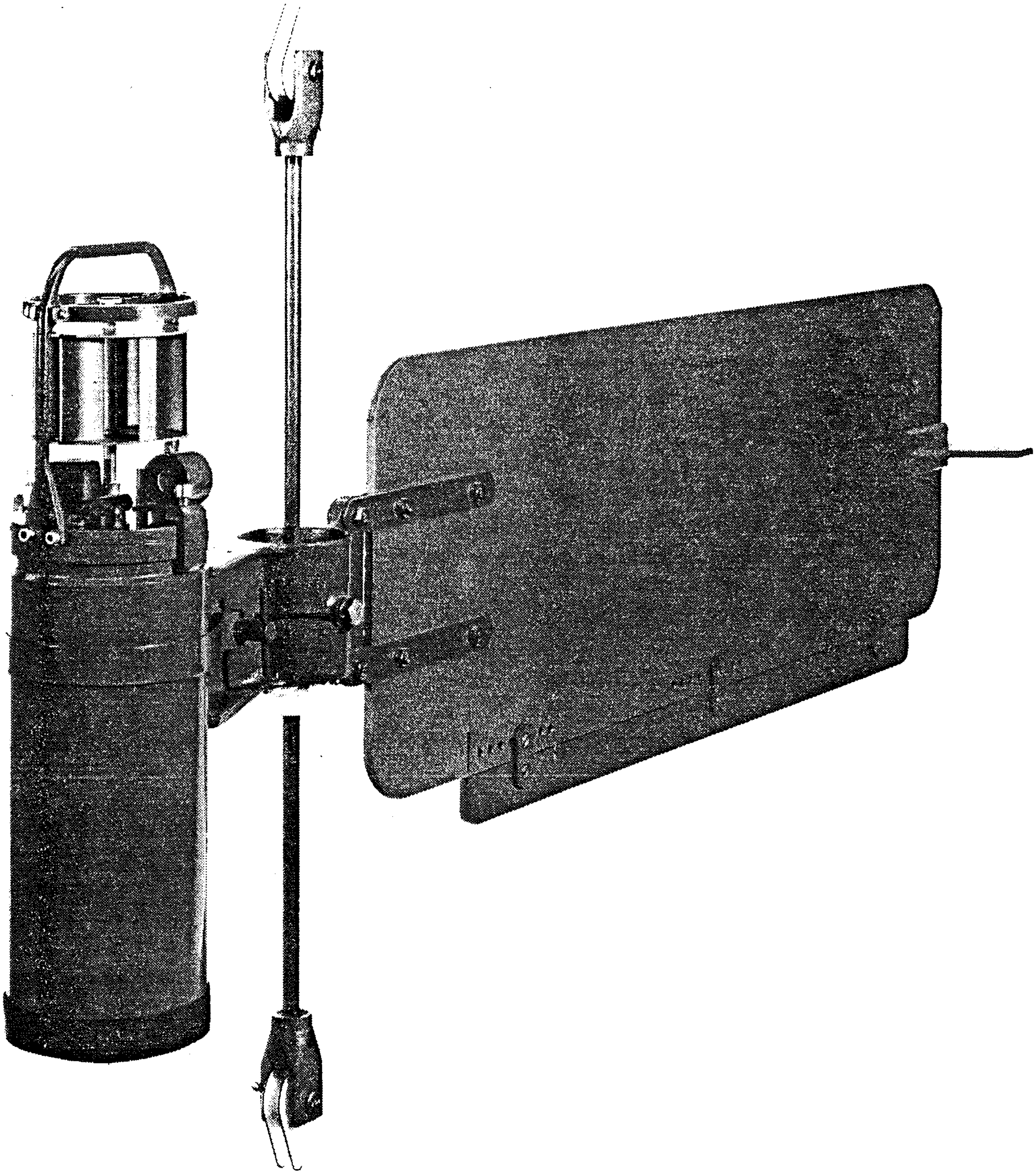
Serial No. ....

DIRECTION Degrees M	0	30	60	90	120	150	180	210	240	270	300	330
DATALOGGER Reading N												

All points within ±5°

Date................ Sign. ....

Equipment Specifications



AANDERAA
RECORDING
CURRENT METER.

The Aanderaa RCM4 (and RCM5) is a self-contained instrument which measures and records current speed, current direction, water temperature, conductivity, and pressure. Data is recorded on ¼" magnetic tape for post-recovery processing and plotting in SEATECH's offices.

Dobrocky
SEATECH

Sea Data

621 DWCM

DIRECTIONAL WAVE RECORDER/CURRENT METER

621-DS-485-1 04/19/85

THE 621 CAN STAND UP TO THE JOB

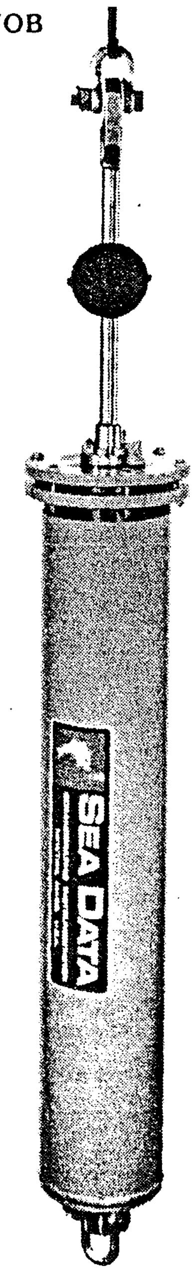
The **621 Directional Wave Recorder/Current Meter** is our newest directional wave sensor. Designed with state-of-the-art technology, the **621 DWCM** measures pressure and 2-axis currents (puv) with every measurement scan to provide a detailed record of wave height and wave orbital velocity.

An outstanding feature of the **621** is its 'smart' data cruncher approach to data processing. The **621** vector-averages wave measurement scans and efficiently formats the data before writing to tape, and thus enhances the capability of the instrument. In addition, the data cruncher provides many self-checking and error-correcting features. Because of its added features, the **621** is a possible replacement for our respected Model 635-9 Directional Wave Recorder. (However, the **621** uses a lower-cost strain gauge pressure sensor, which is less sensitive than the 635-series quartz sensor.)

The **621** is a versatile instrument: it can be used as a current meter, as well as a directional wave recorder. The instrument has switch settings to operate at the slower settings suitable for monitoring turbulence and measuring mean current velocity. However, at these slow measurement intervals, the **621** cannot take concurrent directional wave measurements, as can our 635-12.

The **621** DWCM relies on the ideal cosine tilt-response of the Marsh-McBirney electromagnetic current sensor, on the sensitivity of a Sensometrics pressure sensor, and on an 8-bit digital optical-wheel compass for an accurate measure of near-surface currents. Continuous quarter-second sampling, and in-situ selectable vector-averaging of the data are provided by the Sea Data SB-10 'Sea Brain' data cruncher. High-density recording methods and a high capacity battery pack allow for deployments of over a year in length. Offering data recording in any one of five selectable data formats, the **621** is ready to do many types of experiments.

Sea Brain is a trademark of Sea Data Corporation.



APPLICATIONS

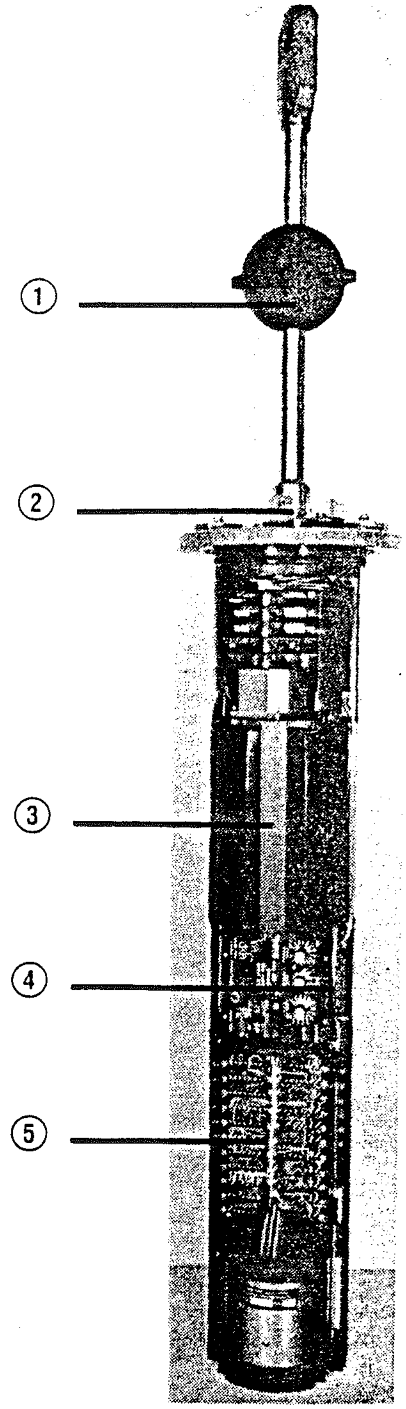
- SURFACE WAVES
- SITE-SURVEYS
- BEACH EROSION STUDIES
- INLET SURVEY WORK
- TURBULENCE STUDIES

HIGHLIGHTS

- **Switch-selectable puv wave recording rates down to 0.5 seconds**
- **Mature 'Sea Brain' data cruncher with 32-bit arithmetic**
- **DIP switch selection of five operating modes, each with its own unique data format**
- **Switch-selectable burst data or simple mean data, both with averaging intervals from 0.5 to 4096 seconds**
- **Fully vector-averaged north and east current measurements**
- **Seiche and internal wave measuring capability**
- **Marsh-McBirney spherical electromagnetic current sensor**
- **Reliable Sea Data Model 610 recorder with 15-megabit capacity**
- **Inexpensive molded fiberglass alkaline battery pack**
- **A variety of additional sensors available using 6″ card electronics**
- **Suitable for independent deployments of over a year in length**
- **RS-232C test interface**
- **Internal self-checking features**
  1. Unique 'mooring rotation rate' compass checking
  2. Zero-offset subtraction for zero drift
  3. Calibration mode at the start of every burst
  4. Processor and CRC autocheck of ROM at powerup
- **Easy-to-use operator's manual**

Sea Data Corporation • One Bridge Street • Newton, MA 02158 USA • (617)244-3216 • Telex: 951107

THE 621 DWCM HAS GUTS



THE CURRENT SENSOR ①

The Marsh-McBirney flow sensor combines fractional centimeter resolution with a durable design; the Marsh-McBirney sensor is ready for the conditions at any deployment site.

THE PRESSURE PORT ②

The pressure sensor port on the **621** is an oil-filled Swage-lok fitting. This simple design allows direct pressure measurements without the inherent complications of an bellows arrangement, etc. The **621** pressure sensor is a special strain gauge with wire-wound compensation resistors and an electron-beam welded vacuum reference chamber.

THE BATTERY ③

The **621** is powered by the the SDB-9, a rugged alkaline battery. The SDB-9 is comprised of stacks of fresh alkaline cells cast in polyurethane inside a molded fiberglass shell. The battery is leakproof and easy to replace. Lithium batteries are available by special request.

THE RECORDER ④

The Sea Data model 610 cassette recorder used in the **621** DWCM utilizes a rough industrial 200 step-per-revolution stepping motor with unique 8-phase current-source drive, and writes on four tracks at an 800 bpi density. High-density writing is thus accomplished without sacrificing reliability. The recorder electronics employ all CMOS circuitry to minimize power drain, yielding a typical standby consumption of less than 0.3 mA for the **621** (this includes all of the other electronics too). The recorder is internationally recognized for its precision and reliability; there are currently more than 2000 units in use in the field.

THE ELECTRONICS ⑤

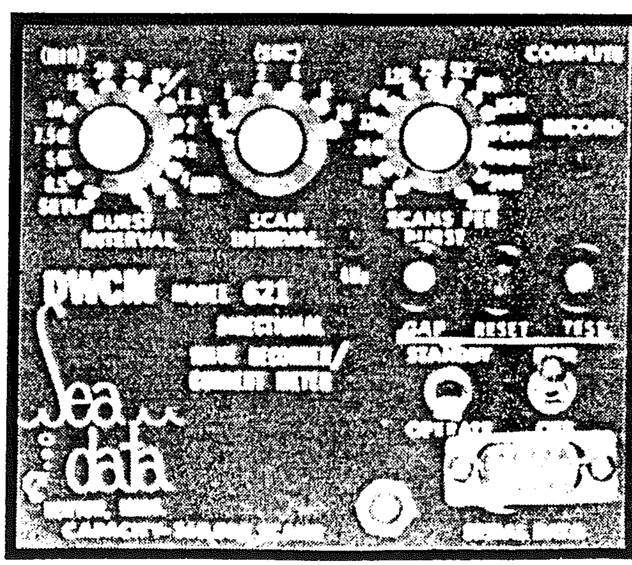
The **621** employs all CMOS circuitry to minimize power drain. All electronics are unpotted, enabling most repairs to be made by simply replacing the offending board. Periodic recalibration is not necessary, except for the EMI sensor.

THE PRESSURE CASE (not pictured)

The standard pressure case for the **621** is constructed of 6061-T6 aluminum with a welded-bottom endcap. All outside surfaces of the case, including the endcap, are given a corrosion-resistant SANFORD hard-coat, and are overcoated with polyurethane paint. Zinc anodes complete the corrosion-protection picture. All cases and endcaps are pressure tested to 3500 psi.

FRONT PANEL

A straight-forward front panel allows the user to program the measurement rate for optimum capacity. The **621**'s averaging rate is determined by the s tings of the BURST INTERVAL (time interval between the beginning of c rrent recording bursts), SCAN INTERVAL (current measurement interval during a burst), and SCANS PER BURST (duration of recording burst) rotary switches. A number of test features can be activated from the front panel. One such feature allows direct monitoring of the sensor data without data-c incher processing. These test features help eliminate the last-minute worries associated with long-duration experiments. A series of LEDs that flash during operation provide reassurance that the instrument is sampling and r ording data.



LONG-TERM DEPLOYMENTS

The **621** has two power sections: one for the recorder and the logic electronics, and the other for the EM sensors. In general, the battery is sufficient to power both of these sections for at least one full experiment, using one full data tape. In some cases, several tapes may be written and frequently several experiments may be powered by a single battery.

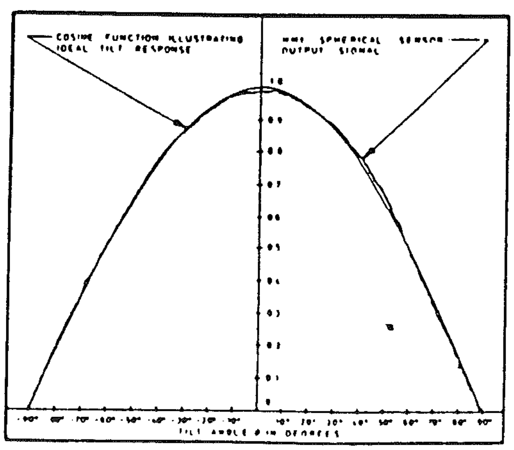
In burst mode, the **621** can write 360,000 north, east vector-averaged current velocity data sets on a 450′ tape. Internal wave measurements are practical: for example, with 24 8-second averaged measurements every 15 minutes, the **621**'s data tape will last 156 days and the EM sensor's battery has 20% of its power to spare. In continuous operation with 8-second averaging, the data tape lasts 33 days but with only a 15% power-safety margin.

Bottom turbulence climates from surface waves are also easy to measure. If 128 points at 1-second intervals are measured each 15 minutes, the tape will last a month and two tapes may be written with one battery.

Full-fledged directional surface-wave recording is the **621**'s forte. If 'traditional' wave measurement programming is employed (3-hour burst intervals with 1024 1-second scans per burst), a 450′ cassette tape would take a month and a half to fill. This example offers an idea of how the fast settings can be combined with long burst intervals to offer an accurate long-term look at waves.

THE MARSH MCBIRNEY SENSOR

The **621** uses the Marsh-McBirney electromagnetic flow sensor to measure instantaneous current velocity, which is then converted to north and east averages by the SB-10 data cruncher. This sensor is claimed to be 'THE ONLY COMMERCIALLY AVAILABLE SENSOR THAT CAN ACCURATELY MEASURE NEAR-SURFACE OCEAN CURRENTS' due to nearly ideal cosine horizontal and vertical responses. Housed in a four-inch rubber sphere on a steel extension from the **621 DWCM** housing, the sensor is rugged enough to withstand exceptional storm forces, and is more linear at intermediate currents than smaller versions.



Vertical tilt response of the Marsh-McBirney sensor.

A VARIETY OF DATA FORMATS

The **621** offers five switch-selectable data formats for optimized data storage. Three bursting formats are included, one of which contains an additional vector-mean for the burst data. The **621** also offers one bursting data mode identical to that of the original 620 BCM; this is the only format without vector-averaging. The five formats differ in bit length and the format in which the current velocity data is recorded. In addition to the current velocity data, each record format includes some combination of the following parameters: time, pressure, temperature, compass rate-of change, compass reading, and information on the positions of the rotary switches.

PROPERTIES OF EACH RECORD FORMAT

	DW	BACM	BURST-ONLY	COMPACT	BCM
VELOCITY AVERAGE FOR EACH RECORD	.	X	.	X	.
8 CURRENT VELOCITIES PER RECORD	X	X	X	.	.
8 PRESSURE WORDS PER RECORD	X	.	.	.	.
TOTAL NUMBER OF BITS PER RECORD	328	296	256	104	316
TOTAL DATA CHAR. IN RECORD	82	74	64	26	79
CALIBRATION MODE	X	X	X	.	X
RECORD CAPACITY 450′ TAPE:	42,745	46,675	52,737	104,123	51,402
300′ TAPE:	28,496	31,117	35,158	69,415	34,268

SEA BRAIN DATA CRUNCHER

The SB-10 is a versatile data processing board, containing an 80C85 CMOS microprocessor, that processes data with a compactly-written 8K bytes of program, as directed by switches on the front panel. The special circuitry employed by the SB-10 allows the microprocessor to shut down when in sleep mode, and thus dramatically reduces current drain (0.3 mA).

An 8-bit DIP switch on the SB-10 allows for the selection of recording formats and data processing modes. As an example, the ZERO-OFFSET and CAL features may be disabled by changing the DIP switch settings.

Four of the five signal channels in the **621** are digitized with integrating A/D converters that perform continuous integration of the input signal. A delta-sigma converter is employed, along with a 32-bit software accumulator in the data cruncher, to insure low noise and data integrity over long intervals. The data cruncher divides the integrated data by the time interval determined from the SCAN RATE switch to provide a true average, independent of the interval. (An integrator or averager is the optimum filter for noisy or varying signals, consistent with the Nyquist sampling criteria.)

The data averaging occurs 1024 times per second and vector calculations are performed for each 250 milliseconds. Thus for a typical 3-minute mean data value, 768 vector averages are performed.

621 DWCM GENERAL SPECIFICATIONS

SENSORS 2-Axis Water Velocity, Magnetic Direction, Depth and Temperature

CONTROLS

Toggles:	POWER/OFF, STANDBY/OPERATE, GAP, RESET, TEST
Rotary Switches:	BURST INTERVAL, SCAN INTERVAL, SCANS PER BURST
LED Indicators:	COMPUTE, RECORD, 4Hz

WATER VELOCITY

Sensor:	2-axis Marsh-McBirney 4.0-inch EM sphere with low-voltage electronics
Range:	+/- 300 cm/sec
Resolution:	0.15 cm/sec (12-bits)
Threshold:	0.15 cm/sec (12-bits)
Noise:	less than 0.2 cm/sec (rms, typical, with 4 sec. or slower scanning)
Error:	steady-state: less than 2 cm/sec + 2% of signal

DIRECTION

Sensor:	#218 Digicourse 8-bit digital optical-wheel compass in Sea Data #418 gimbal mount
Resolution:	1.4°
Accuracy:	instrument heading 1.4° water direction 5° with typical mild currents, (due to small X,Y velocity ratio errors)
Tilt Range:	operational +/-40° from vertical

TEMPERATURE

Type:	YSI 0.1°C endcap-mounted interchangeable thermistor
Range:	-4.5°C to +34°C
Accuracy:	+/- 0.1°C
Resolution:	0.01°C

DEPTH

Sensor:	custom Sensometrics Strain Gauge
Conversion:	12 bits
Range:	100 psi fs (standard); other depths by request
Accuracy:	1%
Hysteresis:	0.4%
Resolution:	1/2 sec: 0.05%; 1 sec and slower: 0.025%

DATA STORAGE

Medium: Standard digital certified 300' or 450' cassette tapes

Formats:

Format	Character Count	Description
DW	82	burst, average, pressure
BACM	74	burst and average
Burst-Only	64	burst only
Compact	26	average only
BCM	79	same as 620 BCM

TIMEBASE

Crystal:	2.097152-MHz quartz crystal
Stability:	Stable to +/- 1 ppm over +5°C to +40°C
Accuracy:	Better than 30 seconds per 12 months

BURST PROGRAMMING

Burst Interval:	0.5, 5.0, 7.5, 10, 15, 20, 30, 60 min., 1.5, 2, 3, 4, 6 hours, and continuous
Burst Duration:	8, 16, 24, 32, 64, 128, 256, 512, 600, 1024, 1200, 2048, 2400, 4096 scans
Scan Rate:	0.5, 1, 2, 4, 8, 16 sec.
Typical Duty Cycle:	from 5 to 30% as determined by above switches

POWER

Standard:	SDB-9 Sea Data 3-section 30-Ahr Alkaline battery pack (for single experiments)
Optional:	SDB-9L Sea Data 7-section 75-Ahr Lithium battery pack (for multiple experiments, more than 9 months at fast measurement intervals, etc.)

BATTERY CAPACITY OF THE SDB-9

BATTERY SECTION	VOLTAGE (fresh)	TYPICAL CAPACITY SDB-9
Recorder	18	10 Ahr (both
Electronics	15	together)
EM Sensor	+/- 9	20 Ahr

ELECTRONICS RACK

Size:	33 inches long by 5.8 inches I.D.
Cards:	9 cards; 3 unused card slots

DATA MONITORING

VDM Form:	The data written to the digital recorder may be monitored directly by a VDM plugged into the SERIAL DATA jack. This is serial data with separate SHIFT and DATA lines, MSB first, (measured just before 4-bit "paralleler" for the tape head).
RS-232C:	300, 600, 1200, or 2400 baud ASCII hexidecimal binary data with CR-LF separating each record (switch-selectable)
Logic Levels:	0 and +10 volts (most terminals and computers will accept this); optional +/-8 volt converter available for full RS-232 standard

PRESSURE CASE

Material:	6061-T6 aluminum, rated to 3500 psi
Finish:	Sanford hard-coat anodize overcoated with polyurethane paint
Size:	case: 7.0" diameter by 37.5" long. overall: 9.0" diameter by 57.5" long
Weight:	operational: 87 lbs air, 34 lbs water; with crate: 153 lbs, less battery: 139 lbs
EM sensor:	1.0"-diameter type-316 stainless steel rod
Tension:	in-line tension up to 5000 pounds
Hardware:	Crosby Galvanized steel shackles, 0.75" pin with glass fiber insulators, optional side-mounted tabs with nylon insulators

Specifications subject to change without notice.

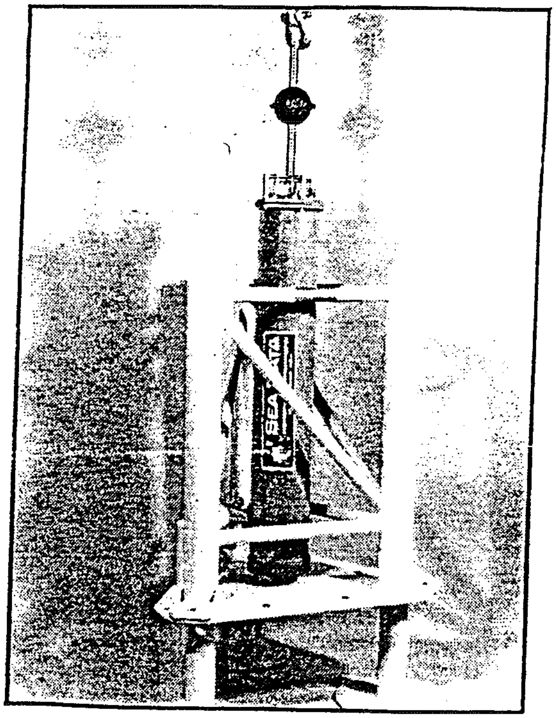
Contact Sea Data or your area representative for additional information on the 621 DWCM or any other Sea Data Product. Your area representative is:

Sea Data Corporation • One Bridge Street • Newton, MA 02158 USA • (617)244-3216 • Telex: 951107

635-12

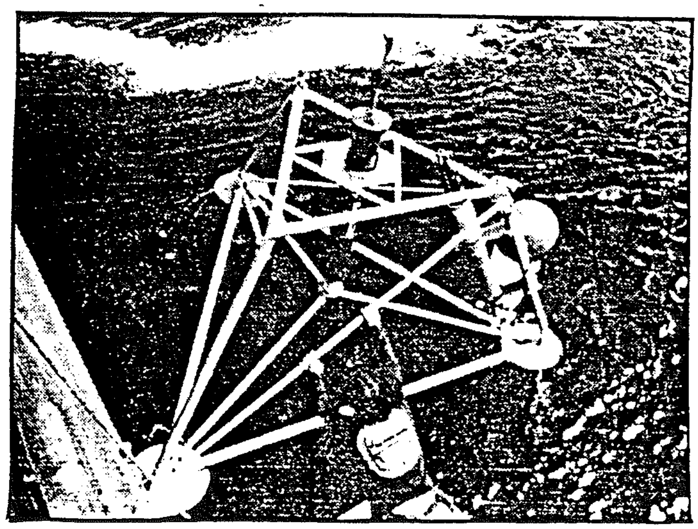
DIRECTIONAL WAVE AND TIDE RECORDER

P.F. 635-12 9-82



FEATURES:

- Directional Wave Measurements
- Uses the Paroscientific Quartz Sensor, YSI Thermistor Temperature Sensor, Marsh Mcbirney Electromagnetic Flow Sensor
- 400,000 Scans of Wave Height and X, Y Orbital Velocity Vectors on a 450' Tape
- 0.05 cm Depth Resolution (20 m Range), 0.002°C Temperature Resolution
- 0.2 cm/sec Mean Current Resolution, 0.4 cm/sec Orbital Velocity Resolution
- Uses the Sea Data Model 610 Recorder with 15-Megabit Tape Capacity

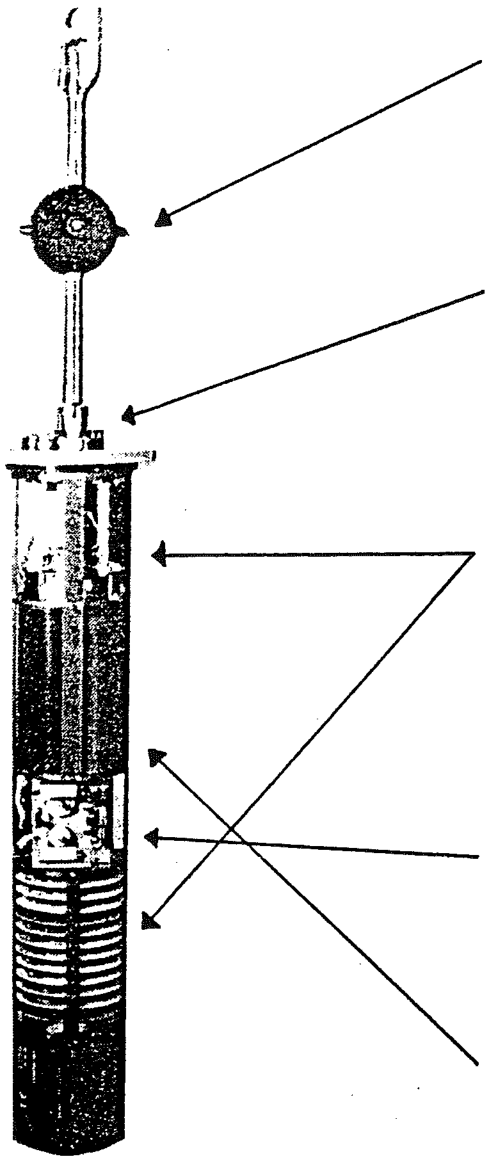


THE 635-12 DIRECTIONAL WAVE AND TIDE RECORDER

The Sea Data 635-12 Wave, Tide and Current Recorder is our top-of-the-line undersea data acquisition instrument. In one convenient-to-use package the 635-12 combines the proven electronics and data recording capability of its 635 series predecessors with the unsurpassed accuracy of the Paroscientific quartz pressure sensor and the excellent cosine response of the Marsh Mcbirney electromagnetic flow sensor. A version of the 635-12 with the Neil Brown accoustic sensor is also available, but this data sheet refers exclusively to the MMI version. Measuring wave direction and height, temperature, tides and mean current velocity, the 635-12 gives you a comprehensive picture of conditions at the deployment site. The Sea Data 635-12 is the instrument of choice for offshore site surveys and shore erosion analysis. A variety of special versions are available for bottom boundary experiments and other oceanographic research.

APPLICATIONS:

- Shore Erosion and Sand Movement Surveys
- Tide, Wave and Storm Surge Measurements
- Water Resource Management
- Current Flow Surveys
- Offshore Platform Site Surveys
- Hot Water Outfall Mixing Surveys
- Wave and Current Climatology, Hindcasting



THE CURRENT SENSOR

The Marsh Mcbirney (MMI)electromagnetic flow sensor is claimed to be "THE ONLY COMMERCIALLY AVAILABLE SENSOR THAT CAN ACCURATELY MEASURE NEAR SURFACE OCEAN CURRENTS" due to an excellent vertical cosine reponse. Combining fractional centimeter resolution with a durable design, the Marsh Mcbirney sensor can stand up to conditions at your deployment site. The zero-drift of the MMI sensor is less than 0.07 ft/sec, but occasional recalibration or zero adjustment is useful.

THE PRESSURE SENSOR

The 635-12 uses the Paroscientific "Digiquartz" Sensor, by far the most accurate commercially available pressure sensor. The Paros sensor registers pressure changes as frequency changes of an oscillating quartz crystal. The 635-12 records the number of oscillations over a precisely determined time interval, a technique which allows depth determination to 0.05 cm! The 635-12 is also equipped with a YSI precision thermistor temperature sensor mounted within the pressure sensor housing, to allow you to apply temperature corrections to pressure data for even greater accuracy.

THE ELECTRONICS

The 635-12 employs all C-MOS circuitry to minimize power drain, contributing to the typical 635-12 standby drain of less than 1.0 mA. An ultra-accurate quartz clock allows measurement of the sensor's frequency to the degree of precision necessary to take full advantage of the Paros sensor's unbeatable specs. All electronics are unpotted, making most repairs simply a matter of pulling the offending board and inserting a replacement. Except for the EM sensor,no recalibration is necessary.

THE RECORDER

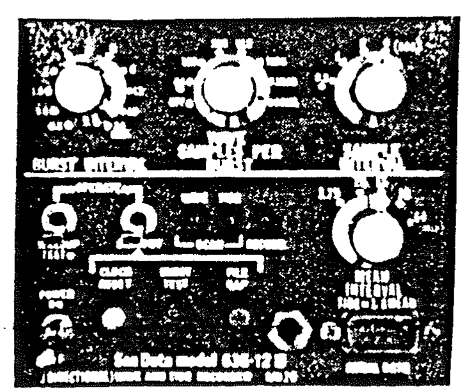
The Model 610 recorder used in the 635-12 is famous for its precision and reliability, with almost 2000 units in the field today. The recorder utilizes a tough industrial 200 step-per revolution stepping motor with unique 8-phase current-source drive and writes on four tracks at an 800 bpi density, allowing 15 megabit data capacity on a 450' data tape.

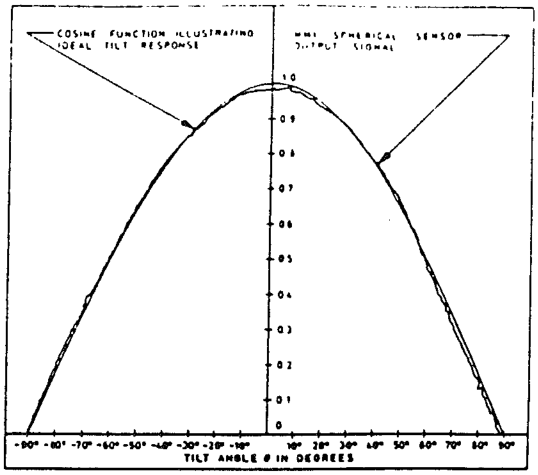
THE BATTERY

The 635-12 uses the Sea Data SDB-9 (alkaline) or 6L (lithium) batteries, manufactured from stacks of fresh alkaline or lithium D-cells cast in polyurethane inside a molded fiberglass shell and provided with a 25-pin D-subminiature type connector. While battery life is dependent on the type and frequency of measurements made, deployments of over four months in duration are possible with the SDB-9 battery, and the SBD-6L is capable of powering the 635-12 for well over a year.

THE FRONT PANEL

The six wave and tide programming switches on the 635-12's front panel offer you a wide choice of measurement patterns so that you can optimize data acquisition to suit your experimental needs. Time between wave bursts is switch-selectable from 0.5 to 24 hours in 11 steps. The number of samples per wave burst is selectable from 64 to 2048 in six steps, with additional settings disabling wave recording entirely or programming for continuous wave measurements. Time between individual scans is switch-selectable from 0.5 to 4 sec in six steps. The MEAN INTERVAL rotary switch allows prescise selection of the mean current and tide intervals. The MEAN CURRENT interval ranges from 3.75 min to 60 min and the TIDE is measured 8 times faster. The BURST TEST, STANDBY AND SPEEDUP switches allow you to test the 635-12 before deployment. The clocks, sensor electronics and sensors can be checked using a Sea Data Model 18 VDM connected to the serial data port on the 635-12's front panel. In short, the front panel of the 635-12 gives you tremendous programming power and access to the instrument's electronics.





THE MARSH MCBIRNEY ELECTROMAGNETIC FLOW SENSOR

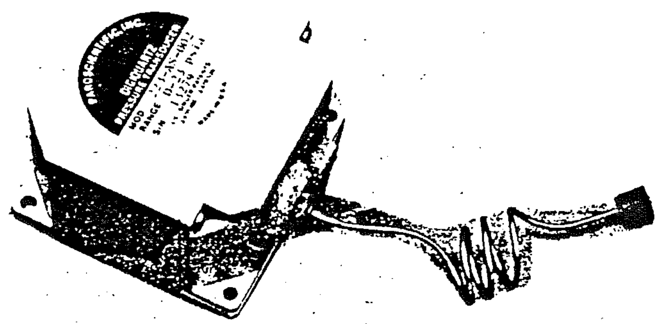
The Marsh Mcbirney electromagnetic flow sensor used in the 635-12 is claimed to be the best for measuring near surface ocean currents. According to Technical Note 5 available from Marsh Mcbirney, accoustic sensors, Savonius rotors and Electromagnetic disk sensors all show poor response to sensor tilt and flow reversal compared to the nearly ideal response of the Marsh Mcbirney sensor. Housed in a four-inch sphere on a steel extension from the 635-12 housing, the sensor is rugged enough to withstand storm damage and is more linear at intermediate currents than smaller versions. The accompanying figure shows the exceptionally fine tilt response of the Marsh Mcbirney Sensor.

MARSH MCBIRNEY SENSOR SPECIFICATIONS

Mean Velocity	
Range	+/- 300 cm/sec
Noise	less than 0.3 cm/sec
Resolution	0.2 cm/sec (12 bits)
Accuracy	2% of signal + 2 cm/sec +/- 15 degrees
Duty-Cycle	1/8
Orbital Velocity	
Range	100 cm/sec
Resolution	0.4 cm/sec (8 bits)
Accuracy	+/- 20 degrees
Duty Cycle	duration of wave burst

THE PAROSCIENTIFIC QUARTZ SENSOR

An idea of the unusual quality of the Paros sensor can be seen from its .005% maximum worst-case hysteresis error, over a full range pressure excursion. Corrected measurements approaching 5 ppm can be obtained with the Paroscientific sensor. This remarkable performance is achieved through the use of a special quartz crystal resonator whose frequency of oscillation varies with pressure-induced stress. The result is much better than other quartz sensors which measure the stress by sensing capacitance. In the 635-12, this sensor provides a wide dynamic range and good linearity to allow the measurement of small waves at greater than usual water depths. And it provides nearly ideal absolute pressure data for the tide measurements.



PAROSCIENTIFIC "DIGI-QUARTZ" SENSOR SPECS

	100 psia		45 psia	
	feet	meters	feet	meters
Standard Ranges:	190	60	65	20
Abs. Maximum Depth:	235	70	90	25
Resolution - waves:	0.0035	0.1 cm	0.0015	0.045 cm
tides:	0.004	0.12 cm	0.0017	0.05 cm
Accuracy-				
less than 80 ft:	0.03		0.014	0.4 cm
more than 80 ft:	0.05 ft	(these aren't typos!)		
vs temp @30 ft	0.004 ft/°C (max)		0.003 ft/°C (max)	

Other ranges available: 10 and 120 meters. The 100 psi sensor is the preferred sensor, due to the limited overanging (120% of full scale) of these sensors. The resolution will meet your needs and the instrument can be used in more locations.

THE PRESSURE CASE

The standard pressure case for the 635-12 is constructed of 6061-T6 aluminum with a welded bottom endcap. All surfaces of the case and top endcap are given a corrosion resistant Sanford hardcoat and all external surfaces also receive a electrostatically-applied fused epoxy coating for further abrasion and corrosion resistance. Zinc anodes complete the corrosion protection measures. All cases and endcaps, including connectors, are pressure tested to 2000 psi. A PVC base allows setting the 635-12 on a rough deck.

OTHER SENSORS

In addition to the remote and surface pressure sensors mentioned previously, you can order your 635-12 with additional temperature sensors, a conductivity sensor, a turbidity sensor, the new Wotan surface wind speed accoustic sensor, a remote MMI sensor, or with two MMI sensors.
The 635-12 has three spare card slots, and is available with 2 transports, 0.25 sec measurement rate, and event detection change in burst rate.

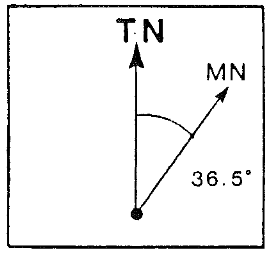
Instrument Deployment Sheets

APPENDIX 8

DOBROCKY SEATECH LTD.

AANDERRA DL-1 DEPLOYMENT SHEET

PROJECT NUMBER: 1-965



indicate mag. north and orientation

LOCATION:

Site Name or #: King Point, Beaufort Sea

Latitude: 69° 06' N

Longitude: 137° 58' W

Height above ground: 10 m, 12 m Above Sea Level

Oriented to: Magnetic North

Magnetic Variation: 36.5° E (1985)

INSTRUMENT:

Instrument #: DL-1, 399   Tape #: 399 (1)

Number of channels in use: Reference, Three Sensors

Serviced by: Aanderaa Inst.   Date: July, 1985

Mobilized by: Gar Fisher   Date: August, 1985

Test tape: Date:

Test Tape verified by: Date:

BATTERY VOLTAGES:

	#1	#2	#3	clock
Deployment:	10.0	10.2÷	10.1	
Recovery:				

SENSOR CONFIGURATION:

Channel #	Sensor Type & Model:		Serial #:
1	reference #:	52	399
2	Wind Speed	(2593)	540
3	Wind Direction	(2053)	689
4	Air Pressure	(2056)	169
5	Unused	-----	---
6	Unused	-----	---
7			
8			
9			
10			
11			
12			

TIMING:

Time Zone: Mountain Daylight Time   or GMT + 8 hrs.

Sampling Interval: 15 minutes

Batteries connected: August 26, 1985

Sensors connected: August 26, 1985

Clock reset: August 26, 1985

First sample: 15:00, MDT, August 26, 1985

First pertinent data: 15:45, MDT, August 26, 1985

Deployed by: Gar Fisher

Notes: Ignore first two records (which are "tests"). "First sample" is third record (see Digiprint tape).

* use back of form for site plan

RECOVERY:

Time Zone: M.D.T.   or GMT + hrs.

Last pertinent data: 11:03 14 September, 1985

Last sample: 12:18 14 September, 1985

Recovered by: Gar Fisher

DOBROCKY SEATECH LIMITED OCEANOGRAPHIC SERVICES

INSTRUMENT DEPLOYMENT

Project Number: King Point Coastal Zone Sediment Transport Study (1-965)

GEOREF: Lat: 69° 06' N Long: 137° 57' W

Magnetic Variation: 36.5° E Depth of Site: 2.6 m

Time Zone: Mountain Daylight = GMT + 8 Hrs.

INSTRUMENT Type: Sea Data 621 SN: 01 DEPTH 1.8 (Pressure Sensor)

Instrument Ref No: Tape No. 1

Instrument Prep'd + Checked — Date: 27 Aug. 1985 By: Gar Fisher

ATTACHMENTS: Conductivity — SN: Range

Pressure — SN: Y-469 Range 0-50/100 A

Temperature SN: Range

Compass — SN: 218/01 P36-837 Range

Other: Current Meter MMB 40280/B782 ± 3m/s

BATTERIES: Main-Type: Checked Voltage

Other-Type: Checked Voltage

COMMENTS:

RELEASE [1] Type: No release SN:

Command or General Codes:

Release Code: Rearm Code:

RELEASE [2] Type: SN:

Command or General Codes:

Release Code: Rearm Code:

Release(s) Prep'd—Checked—Date By:

DEPLOYMENT Power-Up Time: ( ) = (GMT), Date

Time Interval (s): See attached

First Cycle Time: 18:00 (MDT) = (GMT), Date: 27 August, 1985

Deployment Time: 19:30 ( ) = (GMT), Date: 28 August, 1985

First Pertinent Data: 21:00 ( ) = (GMT), Date: 28 August, 1985

Deployed By: Gar Fisher, Rick Gillie Vessel: From Beach

COMMENTS: See attached

RECOVERY Last Pertinent Data Time: 18:00 ( ) = (GMT) Date: 14 September, 1985

Release Time: 19:00 ( ) = (GMT) Date: 14 September, 1985

Last Cycle Time: 11:58 ( ) = (GMT) Date: 15 September, 1985

Shut Off Time: 12:20 ( ) = (GMT) Date: 15 September, 1985

Recovered By: Fisher, Gillie Vessel: From Beach

COMMENTS: See Attached

INSTRUMENT DEPLOYMENT SUMMARY

SEA DATA 621 DIRECTIONAL WAVE/CURRENT METER

DATE	TIME	DESCRIPTION
27 Aug/85		- Conducted final electronic and recording checks on instrument. - Select deployment sampling settings, burst interval: 3 hours scans per burst: 2048 scans scan interval: 0.5 seconds burst duration: 1024 seconds
	18:00	- Instrument power switched-on, first cycle time.
	21:00	- Instrument checked for status during recording cycle.
28 Aug	18:00	- Zero current speed calibration check conducted and recorded on tape.
	19:30	- Instrument deployed approximately 20 m from the beach.
	21:00	- First pertinent data.
29 Aug to 13 Sept		- Instrument in continuous operation with frequent inspection dives. Suspended sediment sampler intake hose attached to tripod leg. - Current meter sensor measured at 0.47 m above the seabed. - Numerous measurements made of surface longshore currents using floats and water-filled balloons (see LEO log sheets). - Wave conditions (height, period and angle of approach to shore) also observed on LEO log sheets.

DATE	TIME	DESCRIPTION
14 Sept	18:00	- Last pertinent data.
	19:00	- Instrument recovered. All six sand bags (two per leg) still attached and tripod feet buried 0.2 to 0.3 m under seabed.
	21:00	- Zero current speed calibration check conducted and recorded on tape.
		- Instrument left to run for night.
15 Sept		- Removed electronic chassis from pressure case. All sampling settings as deployed.
	11:58	- Last cycle time observed and recording status checked.
	12:20	- Instrument power switched-off.

Notes

Water Depth:	2.7 metres
Pressure Sensor Depth:	1.9 metres
Current Meter Sensor Elevation:	0.47 metres above seabed

INSTRUMENT DEPLOYMENT

Project Number: King Point Coastal Zone Sediment Transport Study (1-965)

GEOREF: Lat: 69° 06' N Long: 137° 57' W

Magnetic Variation: 36.5 ° E Depth of Site: 5.6 m

Time Zone: Mountain Daylight = GMT + 8 Hrs.

INSTRUMENT Type: Sea Data 635-12 SN: 03 DEPTH 4.0 m (Pressure Sensor)

Instrument Ref No: ______ Tape No. 2

Instrument Prep'd + Checked — Date: 28 Aug. 1985 By: Gar Fisher

ATTACHMENTS: Conductivity — SN: ----- Range ______

Pressure — SN: 11301 Range 0-100 PSA

Temperature SN: ______ Range ______

Compass — SN: 225/3 U06210 Range ______

Other: Current Meter MMB 10129/BXXX

BATTERIES: Main-Type: Alkaline Checked Voltage V1 = 14.99, Vm = 17.8, Vm+ = 8.76

Other-Type: ______ Checked Voltage ______

COMMENTS: ______

RELEASE [1] Type: No release SN: ______

Command or General Codes: ______

Release Code: ______ Rearm Code: ______

RELEASE [2] Type: ______ SN: ______

Command or General Codes: ______

Release Code: ______ Rearm Code: ______

Release(s) Prep'd—Checked—Date ______ By: ______

DEPLOYMENT Power-Up Time: ______ ( ) = ______ (GMT), Date ______

Time Interval (s): See attached

First Cycle Time: 12:00 ( ) = ______ (GMT), Date: 29 August, 1985

Deployment Time: 18:00 ( ) = ______ (GMT), Date: 29 August, 1985

First Pertinent Data: 21:00 ( ) = ______ (GMT), Date: 29 August, 1985

Deployed By: Fisher, Gillie Vessel: Zodiac

COMMENTS: ______

RECOVERY Last Pertinent Data Time: 09:00 ( ) = ______ (GMT) Date: 11 September, 1985

Release Time: 11:30 ( ) = ______ (GMT) Date: 11 September, 1985

Last Cycle Time: 21:00 ( ) = ______ (GMT) Date: 11 September, 1985

Shut Off Time: 21:20 ( ) = ______ (GMT) Date: 11 September, 1985

Recovered By: Gillie, Fisher Vessel: Zodiac

COMMENTS: ______

INSTRUMENT DEPLOYMENT SUMMARY

SEA DATA 635-12 DIRECTIONAL WAVE/CURRENT METER

DATE	TIME	DESCRIPTION
28 Aug/85		- Conduct initial check-out of instrument.
29 Aug		- Conduct final electronic and recording checks on instrument.
		- Select deployment sampling settings, burst interval: 3 hours scans per burst: 2048 scans scan interval: 0.5 seconds burst duration: 1024 seconds tide interval: 15 minutes
	12:00	- First cycle time.
	15:00	- Zero current speed calibration check conducted and recorded on tape.
	18:00	- Approximate deployment time.
	21:00	- First pertinent data.
30 Aug		- Located postion of instrument at approx. 399 m from shoreline.
31 Aug		- Diving inspection on instrument.
11 Sept		- Noticed that surface marker buoy missing. Ground line marker float still visible.
	11:30	- Locate instrument and conduct inspection dive. Tripod frame has fallen over on it's side with the current meter sensor near the seabed. No sandbags were found near the tripod, suggesting instrument moved from original site. Recover instrument.

DATE	TIME	DESCRIPTION
11 Sept (con't)		- When instrument pressure case is removed it is noted that the setting for "scans per burst" has changed from 2048 to 512. This reduces the "burst duration" from 1024 to 256 seconds. All other settings are unchanged.
		- Changed setting probably happened as electronic chassis was inserted into pressure case prior to deployment. Only about 1/4 of the expected tape usage has occurred.
	21:00	- Instrument checked for recording status during last cycle time.
	22:00	- Instrument power switched-off.
	09:00	- "Last pertinent data" prior to recovery. However, time of tripod falling over is not known.

Notes:

Water Depth:	5.6 metres
Pressure Sensor Depth:	4 metres
Current Meter Sensor Elevation:	1.47 metres above seabed