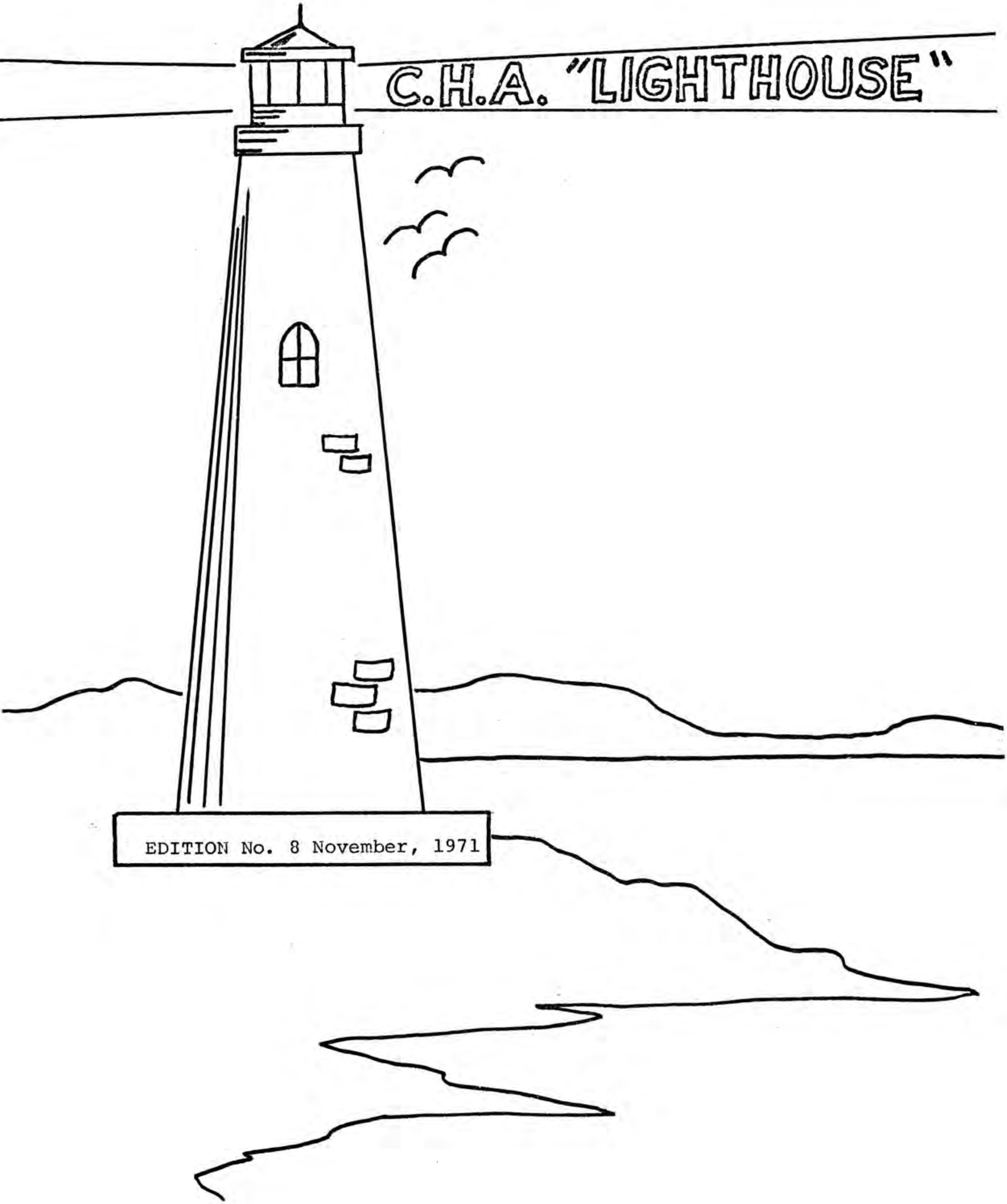
C.H.A. "LIGHTHOUSE"



EDITION No. 8 November, 1971

The editorial staff has been flattered by complimentary remarks regarding Edition Number 7 of the CHA 'Lighthouse'. Congratulations must also be extended to those who contributed the articles. It is hoped that this co-operation will continue.

Edition Number 8 of the 'Lighthouse' has at last taken the form the editors have been trying to achieve from the beginning. We believe we now have the right balance between 'news, technical information, and humorous anecdotes'. Your comments on Edition Number 8 are sincerely invited.

Contributions should be made to:

The Editors, CHA LIGHTHOUSE
c/o Mr. G.D. Macdonald
Marine Sciences Branch
Dept. of the Environment
P.O. Box 5050
BURLINGTON, Ontario

Readers are reminded that a twenty-five dollar award will be given to the author of the best paper published in 'Lighthouse'. This award is restricted to papers not previously published.

Canadian Hydrographers Association

Atlantic Oceanographic Laboratory,
Bedford Institute, Dartmouth,N.S.

2 November 1971

Dear Fellow C.H.A. Members:

The month of December is the time for the election of a new slate of officers for the C.H.A., and nominations will be required for the offices of National President, Vice President, and Treasurer for the three regions.

I sincerely hope that when you are asked to accept one of these nominations that you will do so willingly and without reservation, as the C.H.A. needs your wholehearted effort and support.

Many members, myself included, have said that the C.H.A. is very inactive and leaves a lot to be desired. Here is your chance to prove that you can rectify some of these shortcomings and that your criticism can be substantiated by your willingness to serve.

This time next year you will probably feel a bit remorseful and ask remission for not accomplishing all you set out to do, but remember you will have contributed a heck of a lot more than the fellow who said "let the other guy do it".

Yours truly,

Ken

Ken Williams,
National President.

RKW/hg

Victoria, B.C.
October 29, 1971

Dear Editor,

Replying to Mr. Goldsteen's comments (July 1971 issue of Lighthouse) on my article (April 1971 edition) concerning MRB-2 Hydrodist operations on board the "William J. Stewart".

My article as published in 'Lighthouse' was solicited by our Regional Field Superintendant at the end of the 1970 field season. It was not, and is not, intended to criticize Hydrodist potential or Hydrodist operations in any other region. It is a statement of what was experienced in a typical survey in Pacific Region.

Our 1971 survey operations using Hydrodist have only reinforced my opinion. Despite repeated repairs, checks, adjustments, component replacements, frequency counts, etc. the Hydrodist did not live up to expectations, precisely as I outlined in my original report.

Constructive criticism is of course welcome, we all may learn by it. However some of Mr. Goldsteen's comments remind one of the back seat driver syndrome. With your permission I shall attempt to answer his points as they appear in his letter.

Re:- Sounding Mileage

The reason for the difference in mileage that day and most other days was that the Hydrodist did not work.

Re:- Personnel Requirements

For sextant sounding we use two hydrographers, one coxswain, and one seaman. The second hydrographer is usually a junior hydrographer, a student assistant, or occassionally a seaman.

For Hydrodist sounding we use three hydrographers, one coxswain and one seaman. The third hydrographer in this case is either a junior hydrographer, a student assistant, or a seaman.

Re:- Central Region Mileage

From experience in Pacific Region it has been shown that the average daily mileage with Hydrodist is ten miles.

(cont.)

Re:- Plotting

If it takes Mr. Goldsteen five minutes to plot twenty-five miles at a scale of 1:10,000, then should it take an equally well qualified hydrographer two minutes to plot twenty-five miles at a scale of 1:25,000 (our scale)? It takes longer.

Re:- Multiple Reflections

I am familiar with the existance, causes, results and prevention or minimization of ground swing.

Re:- Range

Messrs. Robichaud and Anderson claim reception of a trackable signal at 18,200 metres, Mr. P. DalBianco claims 12,000 metres and Mr. Goldsteen claims 7,300 metres. On one occasion we achieved 7,500 metres, the remote station elevation was 13 feet, but the height of the station varies inversely with the tide (25 feet). However, our day to day sounding range is much less, again because of equipment failure.

Re:- Lunches

In good weather our shore crew takes lunch with him.

Re:- Accurate Sounding

Mr. Goldsteen wonders about accurate sounding in weather conditions not suitable for landing. With a six foot swell a sounding of 100 fms. will be accurate to ± one half of one percent.

Re:- Amount of Control Required

It is better to establish additional sounding marks at the same time as regular control, rather than ten days before the estimated completion of the survey (1971 Hydrodist experience).

Re:- Curvature of the Earth

I am aware that the distance to the horizon is a function of elevation.

Re:- Radio Communications

The antennae mentioned may solve some of our radio problems, and if we persist with Hydrodist we should obtain some specifications for such a ground plane antennae.
QUESTION: "If the radios are no good, why continue to use them"?
ANSWER: Try shouting "fix" over a couple thousand metres!
Seriously, I agree that radio failure is not a fault of the Hydrodist equipment.

(con't.)

Re:- Batteries

Mr. Goldsteen's analysis of our battery problems is appreciated, however, the charging procedure was checked and rechecked. We did not experience any battery problem in 1971. Touchè.

Re:- Poor Visibility

Fog is a problem in Pacific Region and the use of flashing amber lights would probably increase range in light fog. There would be a kind of poetic justice in mounting a flashing amber light on our Hydrodist launch. This type of light is often seen on breakdown trucks around town.

It would be interesting to hear from Atlantic Region users of Hydrodist.

A.D. O'Connor

"Dear Sir:

I am distressed by the tendency amongst younger scientists towards clarity of thought and expression engendered by an avoidance of convolution of verbal expression. Have they no respect for the pedestrian platitudes of their elders?

Recently, I came across the technical description of the catastrophic failure of an avian generated, byosythesized oblate spheriod structure at the termination of a graviational descent. The verbal description was positively succinct. I present my alternate detailed account of the event in order to demonstrate the elegance of verbosity.

"The object of our prognostication formerly balanced in unstable equilibrium at the top of an array of refractory particles held in a matrix by silaceous cement. One day there was a catastrophic failure of equilibrium which resulted in a conversion of potential into kinetic energy. Eventually a collision (non-elastic) occurred and there was a complete destruction of the original shell structure. The Army Engineers (sided by the Equestrian devision), failed to achieve reassembly of the original structure."

This, sir, I claim is a more obtuse, scientific version of the original version of H.D. as reported by M. Goose <u>et alia</u>.

Yours sincerely,"

TABLE OF CONTENTS

A Note on the Calibration of Decca 6f with Mini-Fix

by

A.D. Mortimer

During the 1970 Arctic Survey season, the hydrographers in CSS PARIZEAU used Decca 6f and mini-fix, both configured hyperbolically, to position sounding lines. A preliminary calibration of the Decca 6f Chain was made by comparison with mini-fix positions converted into Decca lane-counts, with the aid of CSS BAFFIN's computer.

The PCSP Decca 6f Chain covered the southern Beaufort Sea from Atkinson Pt. to Herschel Island; the master station being sited at Hooper Island. This configuration provided a rather limited area of reasonable repeatability and up to 120 metres shift was considered likely to exist in the working area. In addition to the Decca Chain, a hyperbolic Mini-fix Chain was established in Mackenzie Bay to provide positioning coverage of the Red base line extension of the Decca Chain.

The Mini-fix chain was calibrated by comparison of mini-fix position and (1) positions obtained by intersection of launch stations, (2) positions obtained by trilateration with distances from the Motorola R.P.S., (3) base line extension crossings. (During the short period that monitor observations were available; remarkably stable readings were noted). From the comparison positions the mini-fix slave gonios were adjusted to make the propagated hyperbolae fit the prepared lattice. With these adjustments, it was assumed that the likely Mini-fix pattern shift in the area where the Decca 6f was calibrated would not exceed ± 35 meters (± 0.4 LW). Although the ratio of estimated repeatability between the two positions systems did not meet the arbitrary criterion of a ratio 10:1 for calibration purposes, it was thought that this could be overcome by increasing the number of comparison positions.

In all 40 comparison positions were observed between the Mini-fix and Decca 6f systems. They were made by simultaneous observations of both positions whilst the ship was underway between bottom sample stations and with the ship on various headings. Approximately 30% of the comparisons were observed between 2200 and 0200 local time, and these comparisons showed no appreciable deviation that might indicate night effect in either system. Night effect was not expected and had not been observed at this time of year at the Decca monitor in Tuktoyaktuk.

The mean errors obtained from the Mini-fix/ Decca 6f comparisons were applied to the receiver readings and these corrections were retained throughout the survey period, including the period after calibration by intersection. The meaned corrections obtained from the mini-fix method differed from those obtained from intersection by:
(1) On the Red Pattern, -0.009 lanewidth and;
(2) On the Green Pattern, -0.012 lanewidth.
The standard deviation of the observation obtained from comparison with Mini-fix was $\pm$ 0.027 lanewidths; whereas the standard deviation of observation obtained by intersection was $\pm$ 0.018 lanewidths.

The advantages of calibration of Decca by Mini-fix may on occasion outweigh it's disadvantages. Although this method suffers from the lack of accuracy that is normally accepted as the criterion for calibration; the poor ratio of accuracy may be partly overcome by observing many more calibration positions and rejecting those observations falling outside the standard deviation from the mean. Rejecting the 33% of the comparisons found outside the limits of the standard deviation from the mean corrections; the recomputed mean correction was found to be -0.0033 and + 0.0070 LW different from the correction obtained by intersection. This difference may be attributed not only to the lower accuracy of the mini-fix method when compared to the intersection method, but more probably to the fact that the calibrations were made in different areas where the effects of phase lag and propagation velocity error become appreciable.

The use of an accurate electronic positioning system to calibrate one of a lower order of accuracy had advantages over methods with visual limitations. The calibration may take place in the area of the survey. The calibration may be made over a wider area and under restricted visibility conditions. Many more calibration positions may be obtained in the same period of time. Provided the usual amount of care is taken in the calibration of the higher order accuracy system, this method of calibration will produce reliable results.

SYSTEM PARAMETERS

P.C.S.P. Decca 6f

BEAUFORT SEA

MASTER	7,731,381.78 (N)	502,649.21 (E)	Propagation Speed 299,650 km/sec.
SLAVE 1	7,762,342.31 (N)	636,554.46 (E)	Red Freq. 355.92 khz
SLAVE 11	7,722,501.81 (N)	347,563.08 (E)	Green Freq. 266.94 khz

Baseline length, Red	137,482.21 m.	Lanecount	326.599
Baseline length, Green	155,387.83 m.	Lanecount	276.851
Lanewidth, Red	420.95 m.	Green	561.27 m.

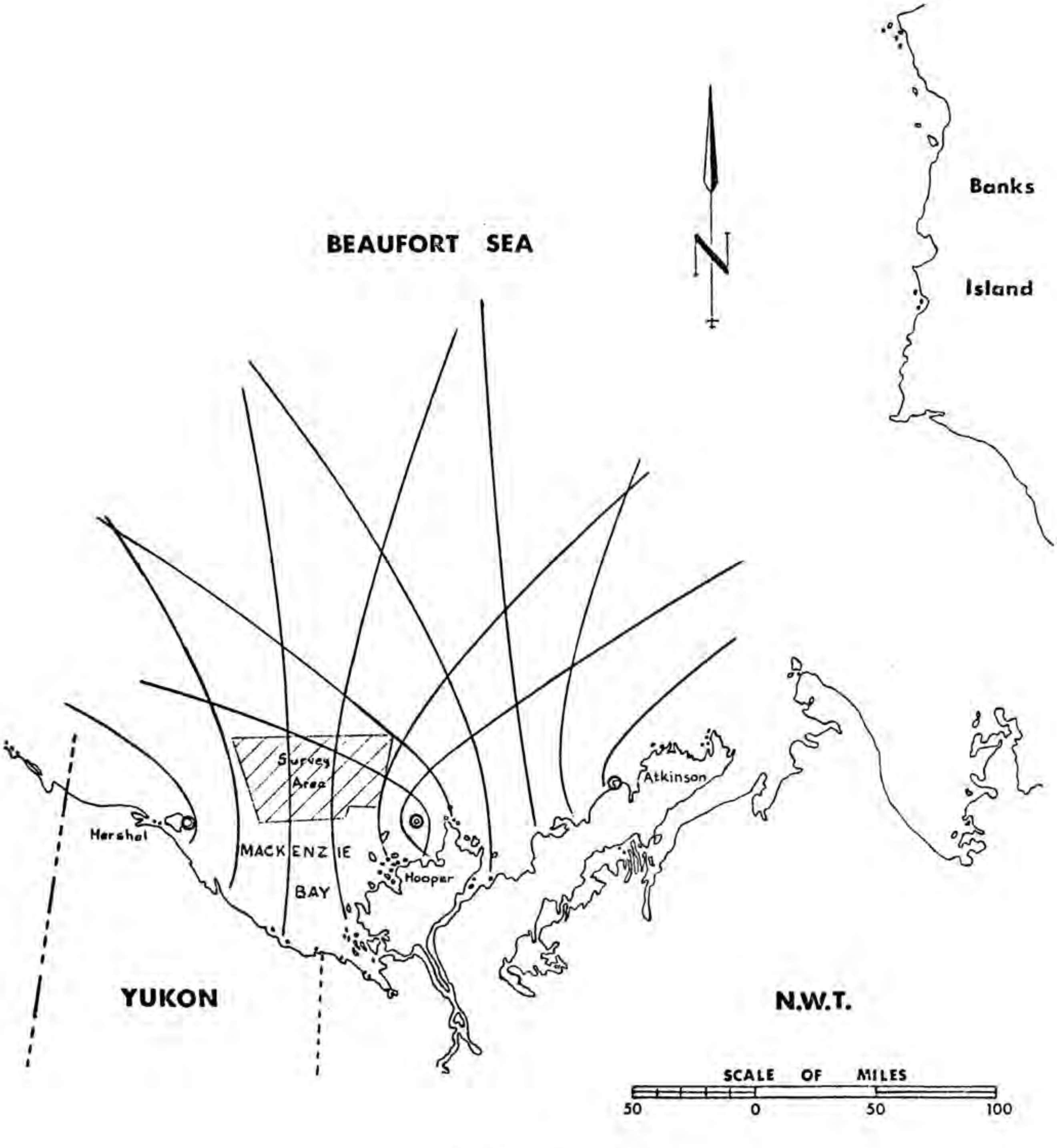
Mini-fix Chain 2

MACKENZIE BAY

MASTER	N. 7,656,234.74	E. 400,818.42	Zone 8
SLAVE I	N. 7,664,007.32	E. 455,153.98	
SLAVE II	N. 7,687,375.22	E. 368,354.65	

Propagation Speed	299,650 km/sec.
Frequency	1702 khz
Lane Width	88.029 m.

Base line length Pattern 1.54,907.01 Lanecount 623.74
Base line length Pattern 2.44,995.30 Lanecount 511.14



DECCA LAMBDA CHAIN

REFERENCES

International Hydrographic Bureau.
Radio Aids to Maritime Navigation and Hydrography. Special Publication No. 39. Monaco, 1965.

R.M. Eaton.
The Use of Hi-Fix Hyperbolic. Canadian Hydrographic Service, Bedford Institute, 1966.

Darrell Huff.
How to Lie with Statistics. London, 1969.

Ever since Professor Edsel Murphy first articulated his famous law, "If anything can go wrong, it will," researchers from all fields have been studying applications of this law to their field.

These corollaries have been tentatively offered the electronic engineering field, although it is understood that all require more definitive research and experimentation before becoming universally accepted.

1. Dimensions will always be expressed in the least usable terms. Velocity, for example, will be expressed in furlongs per fortnight.

2. Any wire cut to length will be too short.

3. If a project required n components, there will be n-1 units in stock.

4. A dropped tool will land where it can do the most damage. (also known as the law of selective gravitation.)

5. A device selected at random from a group having 99 percent reliability will be a member of the 1 percent group.

It has been suggested that there might even be some relationships between these principles and those found in educational research and evaluation.

------ Chemical and Engineering News, May 27, 1968. Published by the American Chemical Society. Used with permission.

EXCHANGE PROGRAMME COMMENTS

L.R. LASNIER

The writer was involved in a staff exchange program which brought him to the country of fog and sea foods: the East Coast; from a country of sun, wine and of slight impregnation of pollution: Southern Ontario.

Most of the time spent in the East Coast was aboard the C.S.S. 'BAFFIN' which was working on Flemish Cap. Flemish Cap is approximately 350 nautical miles east of the eastern Newfoundland coast and consists of the most eastern limits of the Newfoundland shelf. The C.S.S. 'Kapuskasing' and Yarmouth Shore Party No. 1 were also part of the assignment.

Upon receiving news of the 1971 field assignment in the fall of 1970, the writer was quite astonished to learn that the coming season would have to be spent in the East Coast Region. After much thought, the decision was made to accept and see the proceedings of a different type of survey. So, curiosity aroused the author to join the staff of A.O.L.

This narrative will deal with the author's summer activities.

C.S.S. 'BAFFIN' ASSIGNMENT

The author was asked to report at A.O.L. on April 28th and to report immediately to the C.S.S. 'Baffin', sailing on May 3rd. The Hydrographer-in-Charge was Mr. T.B. Smith and still faithful Master was Captain P.M. Brick.

While en route to the survey grounds, the hydrographers had a briefing by the geophysicist on board (M.R. McNab) explaining the reasons for collecting gravity and magnetic data in conjuntion with hydrography. The geophysicist also showed the principles behind the geophysical recording machines. When all systems became operational, the hydrographer had the responsibility of calibrating the gravimeter and maintaining all strip chart recorders in working condition.

General Duties of the Hydrographer on Watch

When the hydrographer has been properly trained by the more senior personnel, he was left alone to plot position fixes, con the ship and oversee the geophysical and hydrographic equipment. On watch, he is assisted by a technician, a geophysical watchkeeper, (who is usually a casual employee or a seaman) and a sounder watchkeeper. Only the technician keeps an eight-hour shift compared to the four-hour shift of his co-workers.

The hydrographer is required only to collect the raw data and nothing more. There is no time for involvement in other duties since there is a cut-back in overtime which restricts him from being active in data processing. That step is done mainly durihg the day's normal working hours.

Computer Facilities

Baffin works mostly offshore. Hence, the computer is only needed for processing the geophysical data. The author did not learn a great deal on the use of the PDP-8 but did acquire some useful background. There is no real purpose for having a computer aboard the Baffin for the hydrography aspect, but it is available whenever it is required for calibration of positioning systems, for survey control and for data conversion.

General Comments

The writer did enjoy working on the Baffin. Living accommodations are fantastic and the food is very palatable. Entertainment is provided quite regularly. Bi-weekly movies are shown and many social games are played weekly such as bingo, cribbage and dart contests. Also, bar facilities are available. Since everything is well organized including the survey work it makes the stay on the Baffin a very pleasant experience.

C.S.S. 'KAPUSKASING' ASSIGNMENT

Upon returning from mid-season break, the author transferred to the Kapuskasing on August 16th. The next day, the ship sailed for Notre-Dame Bay, on the northeast of Newfoundland. The survey was conducted by Mr. G.R. Douglas and later replaced by D. LeLievre. The ship was commanded by Captain Taylor.

Unfortunately, the time spent aboard this ship was very short: merely five weeks. During that time, limited survey production was accomplished due to miserable weather and rough seas. Over a three-week period, only five days were occupied sounding. Automatic current meters and one tide gauge were installed. The last week (September 12-17) spent on the Kapuskasing was very rewarding. Daily, the launches carried out sounding operation.

Launches

Kapuskasing is equipped with four launches. Three of them are the new type of Bertram. These were called the HYDRO Series. The after deck platform has been elevated which gives more deck space. The coxswain can also steer the boat from inside the cabin because of dual engine controls. Disadvantages are very minimal: 1st, because of their size and their canoe hull, they are very unstable and uncomfortable in a choppy sea; 2nd, since all survey instrumentation is inside the cockpit beside the helmsman, sufficient air ventilation is not provided even with the present fan.

The diesel engine and the V-drive shaft on the Bertrams are an improvement over the older models. Speeds of 17 knots are easily achieved.

Problems can occur with these launches. An engine on the HYDRO II overheated, causing the engine block to crack because the cooling system was not working properly. Presumably, the original problem was not solved after the first breakdown. Another incident happened on the Shore Party No. 1 at Yarmouth. The HYDRO IV hit a rock and the stainless steel shaft sheered losing the brass propeller. To prevent any re-occurrence, a protective device should be built around the propeller similar to those the fishermen are using. It is a screened steel guard that envelops the bottom part of the propeller.

General Comments

Hydrographic duties on the Kapuskasing do not differ from those of Central Region major surveys except that everybody lives on a ship. The author would like to visualize in the near futre all hydrographic survey vessels carrving on more than one type of survey simultaneously. Why send a ship gathering one kind of information on long survey lines? Where is the challenge in this type of survey for the future. But, if it is a multi-disciplinary survey, the work is more demanding and more interesting because of the equipment involved and the variety of activities.

Living accommodations on the Kapuskasing are inadequate but the food is acceptable. The working spirit is good because: 1st, non-existence of a 24-hour shift; 2nd, restriction of living quarters (all cabin doors emerge into one combined lounge-dining room); 3rd, less strain on staff because of no ambiguity in the daily survey routine (exclusively hydrography); 4th, launch work requires co-ordination and teamwork.

HYDROGRAPHIC DEVELOPMENT

The author does not want to discredit any other Regional Development Group by appraising the East Coast Region. During the assignment, the author was able to observe the accomplishments of that Development Group.

The automatic scaling machine for echograms permits a cut-down on manpower and time. Once the scaler is adjusted and set, a sounding roll can be scaled in twenty minutes which normally, with a 2-man operation, would take one hour and a half, or more. It has two outputs; a print-out format showing the soundings and the fix number and/or a punched paper tape containing the same information. It also handles any type of unit (feet, fathoms or metres) and converts these to the units required. The parametres that can be managed are unit conversion, propagation of sound velocities in water, tide reductions, and shifting of the sounder's transmission mark. The only drawback of the machine is its volume which makes it difficult to move. The writer had the opportunity to spend a considerable amount of time on this machine and appreciated its qualities.

During the mid-season break, the launches and their supporting vessel Kapuskasing were fitted with a data logging system named the HAAPS. The author did familiarize himself with the system but not entirely to his satisfaction. The part which consists of data collecting was undertaken by all hydrographers, but the processing was deferred. Some scanning checks were run on the recording tapes and proved that the equipment was working well. It is a very versatile system. On the breakdown of one unit, the remaining units are still recorded and the missing data can be collected manually. The system is equipped with an alarm buzzer for depth digitizer failure. It is a very worthwhile system if it is handled with know-how to forestall any damage to the units and in particular the Kennedy tape transport which is a very sensitive and delicate instrument.

On the Kapuskasing, the author had occasion to become more competent with the PDP-8 with the help of the more experienced programmer and had the opportunity to operate the computer and write small programs. The author was amazed to realize that a variety of programs has been written by hydrographic field staff. Most staff have been associated with the Development Group in their rotation years. They are given programming courses and operating instructions. They are required to spend a certain number of hours before they can touch the computer. Those personnel are assigned later on a party which has the facility of a computer. Each individual maintains his own program library of listings and tapes. Previous to the field season, he gathers a set of all new programs available so that his computer software is always updated.

East Coast Region seems more inclined not to concentrate on one project but on a wide range of new research ideas.

Mr. G.R. Douglas is helped by a larger supporting staff than any other Region.

IMPRESSIONS & PERSONAL COMMENTS

Upon arrival to A.O.L., my first intentions were to get the clothing issue as soon as possible. I had been advised that everything would have been already picked out. It was not. After many delays, I was finally equipped. I would suggest in the future, that the clothing should be issued in Central Region because of many restricted items and of the poor state of the clothing. In the East Coast, the issues are made on an individual basis instead of a survey party. The condition of the clothes remaining in the stores is bad because they are mostly rejects.

Another complaint that has been mentioned in previous years is the mailing channels. An incident happened that exemplifies the poor communications. An overtime cheque and pay stubs dated early June were not delivered until August 6th for the simple reason that the name was unknown in the A.O.L. Personnel Office. To avoid this type of occurrence, all mail (directives, pay stubs and overtime cheques) should be addressed to the hydrographer's residence which can be directed easily to his field location. It worked tremendously well after the author notified Central Region Personnel Office to proceed that way.

Unfortunately, whoever is assigned on an exchange program is obliged to pay his own transportation to his home office on the mid-season break. When everybody is on holiday, or going home every evening, why should the exchange be left living alone aboard the ship for ten days. Certain concessions will have to be made for Central Region exchange because of the unaccustomed assignment which takes them away for an extended period at sea.

The exchange program was appreciated and showed the variation between a shore party and a ship's operations. If the exchange program is to be continued, the selected candidate should be allowed to spend a minimum of one year at A.O.L. (field season and office duties). This would enable him not only to understand the part he played in the field but also to see and discuss the complete content of the field sheets, for gravity, magnetic and hydrography done by the Baffin surveys.

Before concluding this paper, I would like to point out that if exchange personnel could be more in the bracket levels ESS 5-7, a better lateral exchange of ideas would result between the Regions.

SUMMARY

The author would like to acknowledge that the exchange program is feasible and profitable among field staff of the Canadian Hydrographic Service and possibly among the staff of the Hydrographic Development Groups. The past field season was a traumatic experience which makes me extremely enthusiastic about Computer Science, enough to encourage me to endeavour further studies in that Science.

Thank you, East Coast Region for showing me the light.

As every publication needs some "Bull...." between the covers, perhaps it is time I made a contribution.

The Tale of Mac

A man entered a hotel and registered at the desk. Upon receiving the register back, the desk clerk was astounded to find that in the 'NAME/NOM' column the man had simply written 'Mac'. The clerk rebuked the man for not putting in his full name and after a lengthy discussion Mac proceeded to relate the following story:

> "When I was born my parents were very proud to have a son and named me John MacNut Jr. after my father. I had a normal childhood and when I reached manhood, I felt I wanted to do something that would be beneficial to my fellow man. Therefore I joined the priesthood and became a missionary. My title was now Rev. John MacNut Jr. However, after several years, I was still not satisfied and became a doctor. I was now Rev. Dr. John MacNut Jr, M.D. I started practicing in a small town and was doing quite well for a time. However I became infatuated with this young woman and we had an affair. Anyways, she became pregnant and I performed an abortion.
>
> Then the bad luck struck. The Medical Association found out and I was barred from ever practicing medicine again. I was back to Rev. John MacNut Jr. Then, the church found out and I was excommunicated. Now I was John MacNut Jr. About this time, my father passed away. Now -- MacNut. Lo and behold, to top it all off, she wasn't any lady."

So goes the sad tale of Mac.

Think about it.

Bill Silvey

WHO MEASURES DEPTH?

Over a period of years I have discussed with hydrographers, oceanographers and others the meaning of the depth figures we quote freely. The Assistant Regional Hydrographer, Atlantic Region, suggested that an oceanographer's presentation of this could be instructive.

The following topics are proposed for discussion:

1.) How we infer depth from echo sounding or from pressure measurements.
2.) Echo sounding in non-uniform water.
3.) Echo sounding over sloping or rough bottoms.
4.) Use of side scan sonar to increase coverage from a single sounding track.

Only the first topic is covered at present.

Hydrographic charts carry many printed numbers which are generally taken to represent the depth of water at the corresponding position in the ocean. It is interesting to note that Canadian Hydrographic navigational charts have borne the legend "Soundings in Fathoms" (or for harbour charts in feet, although future charts will use metres). Presumably this might be used as an alibi when a previously unsuspected shoal is discovered. Oceanographic data records list depths at which sample bottles were tripped and temperatures recorded by reversing thermometers. An examination of the methods by which the information was actually gathered shows in both cases that the depth was inferred from some other measurement.

A dictionary definition of "depth" is "measurement downward from the surface". Actual determination of this quantity is only obtained when a vertical scale is attached to a fixed object such as a wharf. The old method of depth determination was by use of a lead line. Strictly speaking this measures the length of line required to be paid out before the lead touches bottom. Only if the line is vertical everywhere will this length be the same as the depth. It is possible to observe that the line is vertical where it pierces the surface, but it is hard to be sure that the influence of currents varying with depth does not distort the line.

Once echo sounders were developed they supplanted the lead line for the routine determination of water depth. They operate on the principle that sound travels well through water. A transducer on the bottom of a ship emits a pulse of sound which reflects off the ocean floor and a portion of the reflected energy is detected back at the ship. The recorder displays the time interval between transmission of the emitted pulse and reception of the reflected pulse. In order to interpret the record as depth it is necessary to know the velocity of sound in the water. At any given point in sea water the velocity of sound depends on the local temperature, salinity and pressure. For the moment I will neglect the variation in velocity along the echo path and will assume that an effective mean sound velocity constant with depth can be assigned.

Most users of echo sounders are satisfied to know the depth within a few percent and accept the scale supplied by the manufacturer. Usually sounders with scales quoted in fathoms or feet assume a velocity of 4800 feet per second (1463 metres per second) while those with metric scales assume 1500 metres per second. This is a difference of 2½%. As a result uncorrected soundings in fathoms and those in metres should not be intercompared using the legal equivalent 1. fathom equals 1.83 metres.

When depth measurement is required to an accuracy of one or less percent it is necessary to convert the echo time interval to depth using the actual velocity. This velocity can be:

1.) determined by direct measurement using a velocimeter,

2.) calculated from the temperature and salinity,

3.) estimated from oceanographic stations taken in the same area at a similar time of year, or

4.) measured by making a "bar check" in which the echo from a bar lowered to known depth is recorded.

Two types of echo sounder recorder are commonly used. In the Marine Sciences Branch the research groups often use recorders with linear scales. They may have a belt bearing a stylus to move the echo mark uniformly (for example the Edo UQN series) or have a helix wrapped around a drum (for example the Alden and Alpine precision recorders). Records made with these recorders may be read off in true depth by the use of an adjustable rule (for example the Gerber scale) set for the correct sound velocity. In the Canadian Hydrographic Service many of the survey parties use Kelvin-Hughes sounders in which the stylus is mounted on a rotating disc. The disc rotation is uniform but the distance of the stylus from the edge of the paper does not change linearly. This prevents the use of an adjustable rule to compensate for the actual sound velocity. A non-linear scale has to be used to convert the distance from the edge of the paper to depth. A scale prepared for a standard velocity can be used to read uncorrected depth and the corrected depth can be calculated by multiplying the uncorrected depth by the ratio of the actual velocity to the standard velocity. Alternatively a number of scales can be prepared for different sound velocities and the one for the velocity closest to the actual velocity can be used to read depth directly.

Before discussing the complications introduced in echo sounding when the sound velocity is not uniform I want to discuss briefly the problem of determining the depth of oceanographic equipment used at some depth less than the total depth of water. As with the lead line it is not sufficient to assume that equipment lowered from a ship reaches a depth equal to the length of wire supporting it. It is therefore necessary to obtain additional data from which depth can be calculated. The classical oceanographer measures the temperature at depth in the ocean by using reversing thermometers protected against pressure by being enclosed in a heavy sealed glass tube. It was early found that unprotected thermometers read higher temperatures than protected ones. By reversing protected and unprotected thermometers together the difference in temperatures registered can be used to measure the pressure when they were reversed. Increasing depth and increasing pressure are related by the hydrostatic equation which involves the density of the water. For accurate work it is not sufficient to assume that the density is independent of position in the water column.

Other types of pressure measuring devices are used with more modern equipment for measuring temperature and other parameters in the ocean. The same principles are used to convert pressure to depth as with reversing thermometers.

Acoustic methods can also be used to determine the depth of equipment. Inverted echo sounders may be used (that is echo sounders mounted on the equipment to receive echoes from the sea surface). As with echo sounders used in bathymetric surveying it is necessary to calculate the depth from the sound velocity and the transit time between pulse transmission and the arrival time of the echo.

C. D. Maunsell
Atlantic Oceanographic Laboratory

Talk Presented to the

Pembroke Outdoor Sportsman's Club

by

A.R. Rogers

H.I.C., Upper Ottawa River Survey

On the evening of June 21 Peter DalBianco and I presented talks to the Sportsman's Club at the request of Mr. Beck, Chairman of the Entertainment Committee of that club.

Our presentation was divided into four parts:

1. Organization and objectives of the Hydrographic Survey.
2. Methods of surveying.
3. Slides.
4. Question Period.

I presented the first part, outlining our organization, purpose of the survey unit, regional areas of responsibility, priorities of surveys, reasons for the Ottawa River Survey, backgrounds of survey personnel, and a few words on training and other items related to the general operation of the service.

Peter outlined various systems of surveying, at the same time showing boat sheets, field sheets, sounding rolls as related to his talk, plus showing a sextant, Edo sounder and tellurometer and explaining how these were used in the operation.

Several slides of northern activities were shown. These were the only ones we had available. An invitation was given to all to visit our trailers at any time for further discussion and to inspect our boats.

Questions were answered after the slides and then the group inspected our charts, field sheets and other items which we had taken with us.

About thirty were in attendance and considerable interest was shown over a three hour period. Enclosed is the notice of the meeting.

A raffle was held at the meeting, and a ticket was bought, drawn and won by A. Rogers. (26 oz. Hiram Walker.)

TECHNIQUE FOR MOORING UNDERWATER INSTRUMENTS ON THE CONTINENTAL SHELF

by

W.S. HUGGETT

INTRODUCTION

A paper SURVEYS ON THE CONTINENTAL SHELF - TECHNIQUES FOR MOORING SELF-RECORDING CURRENT METERS by S. Huggett and D. Dobson was written in 1965, and described the methods then used on the ships at our disposal. Since that time the Department of Energy, Mines and Resources has built two ships specially designed for the laying of submerged instruments either on the continental shelf or in the deep ocean. With the addition of these two new ships to the Department's fleet there have been of necessity certain changes in the methods used, as well as those brought about by the passage of time.

THE SHIP

The PARIZEAU was built at Burrard Drydock Company Limited in North Vancouver and commissioned in August, 1967. She was specially designed for the laying of buoys and submerged instrument packages. She is also well equipped to carry out many other phases of oceanographic work. Her principal dimensions are:

Length O.A.	211'9"
Length B.P.	185'9"
Breadth, moulded	40'0"
Depth, moulded	21'0"
Draft	16'0"
Propulsion	diesel, reduction gear drive
Power	3400 B.H.P.
Propellers	two, controllable pitch
Speed, cruising	12 knots
Speed, trials	16 knots
Range, maximum	12,000 miles
Complement	45 (Scientific 13)
Laboratories	four

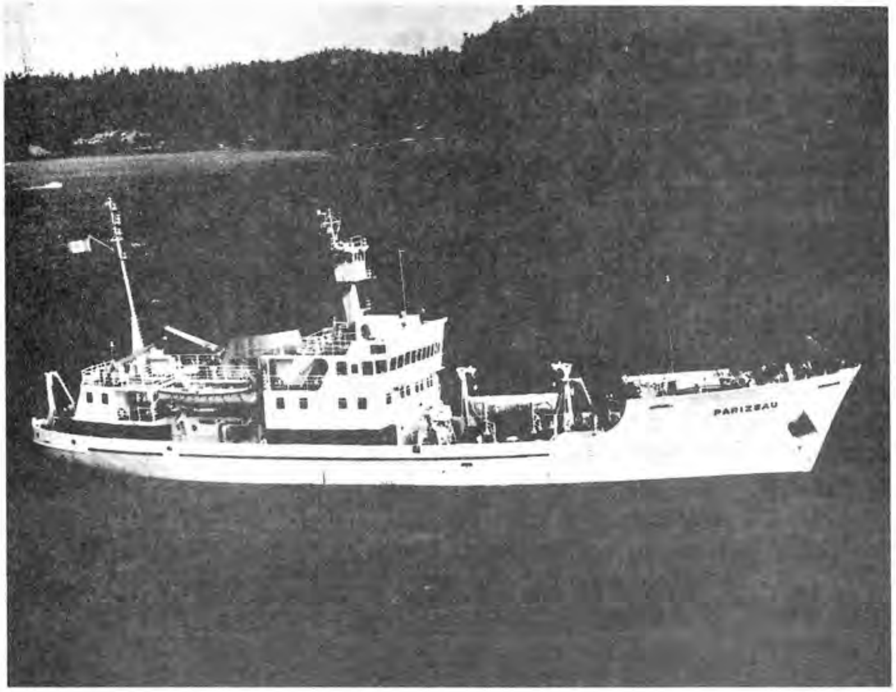


Figure 1
CSS PARIZEAU

HANDLING EQUIPMENT ON THE SHIP

The laying of moorings is done from the foredeck, and all the equipment on the deck with the exception of the one and one-half ton crane on the port side are used at one time or another. Working from the foredeck achieves two purposes: wires and ropes are kept away from the propellors, which are continuously turning, and the Captain or Officer-of-the-Watch can follow the work on deck and thus anticipate required ship movements.

The position of the ship's eight winches, two capstans, two "A" frames, four cranes and three spooling winches are shown in Figure 2. A brief description of the deck machinery follows:

Deep Sea Winches
Single Drum
line speed - 1 ton at 400'/min.
4 ton at low speed
continuous spooling - ¼" to 1"
capacity - 10,000 ft. 3/8" wire
40 h.p. motor

Hydrographic Winches
line speed - 1100 lbs. tension 600'/min.
continuous spooling - .1 to .5 inches
20 h.p. motor

Plankton Winch
line speed - 600'/min.
capacity - 20,000 ft. 5/32" wire
continuous spooling - 1/8" to 5/8"
40 h.p. motor

General Purpose Slip Ring Winch
line pull 1000 lbs.
10 slip rings
15 h.p. 220 DC motor

Servo Controlled Winch
line tension - 1500 lbs.
line speed - 600'/min.
capacity - 30,000 ft. 3/16"wire
continuous spooling .15 to .75 inches
10 slip rings
25 h.p. 220 DC motor

Capstans
line tension - 2 tons
40 h.p. motor

Power Cable Reels
capacity - 10,000 ft. 1/2" rope
continuous spooling 1/4" to 1"
5 h.p. motor

Austin-Western Crane
lift - 3 ton at 26 ft. radius
5 ton at 12 ft. radius

Hiab Crane
lift - 4 ton at 20 ft. radius

Articulated Crane
lift - 1½ tons

"A" Frames
hydraulically operated
lift - 7 tons

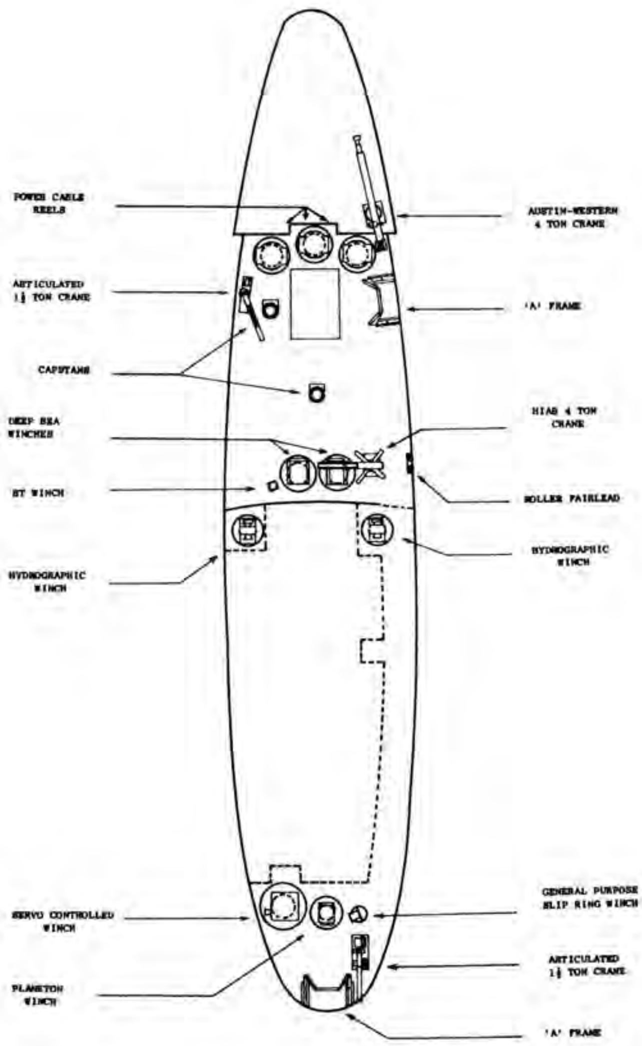


Figure 2
DECK PLAN

One other piece of equipment that is essential when running ropes and wires over the side is the vertical roller fairlead (Figure 3). This fairlead is set in the bulwarks with a horizontal roller on the outboard side and protrudes about five inches past the hull line. This arrangement keeps the rope or wire from chafing along the hull when it is going over the side. The top of the fairlead is hinged so that ropes and wires may be taken out of the fairlead without having to pass the end through.

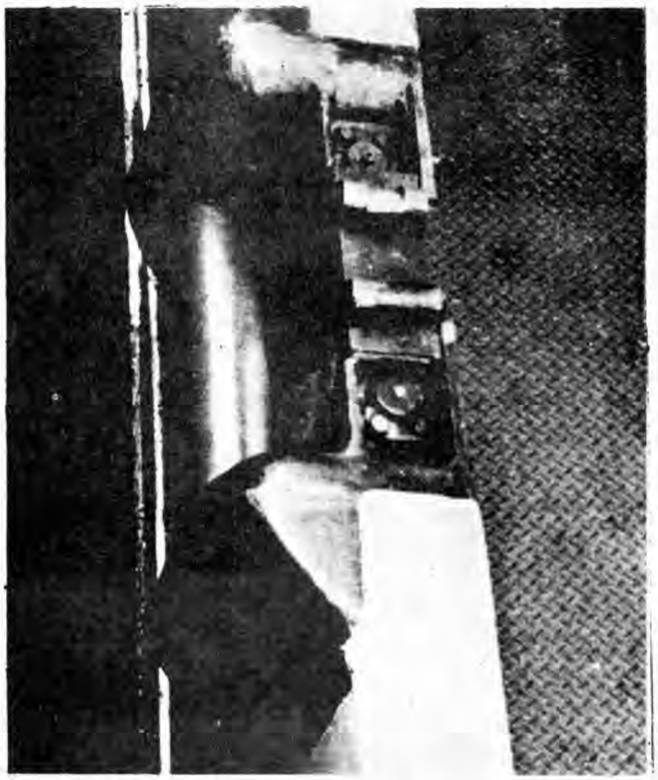


Figure 3
VERTICAL ROLLER FAIRLEAD

Other pieces of equipment that have proved very useful are an Atlas release hook (Figure 4) for putting the buoys into the water. This is a spring actuated hook that, once cocked, releases the load as soon as the weight comes off the hook. It is extremely useful for launching buoys in any kind of a sea. Another handy instrument is a wire measurer. There are two aboard, one reads in metres and is an accessory on the winch, attached to the spooling device, and the other one is a portable one held on the line and reads in feet. For picking up the buoys out of the water we have found the hook devised by the navy minesweeping units most efficient (Figure 5). These are sturdy hooks with a spring clip, so that once hooked onto something they will stay hooked. Also, the hook has a short square shank, about six inches long, and is of such dimensions that it fits snugly into the end of a hollow aluminum pike pole. A stout wire, about six feet long, fixed to the hook is shackled on to the crane hook. The pike pole is used to grapple the hook onto the buoy, then the pike pole is pulled free, and the buoys can be brought aboard by the crane without the pole getting in the way.

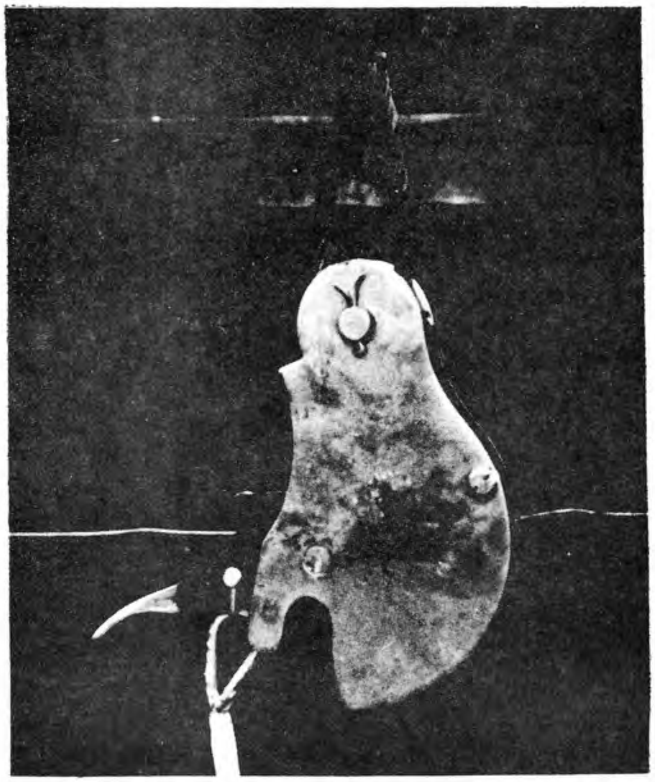


Figure 4
ATLAS RELEASE HOOK

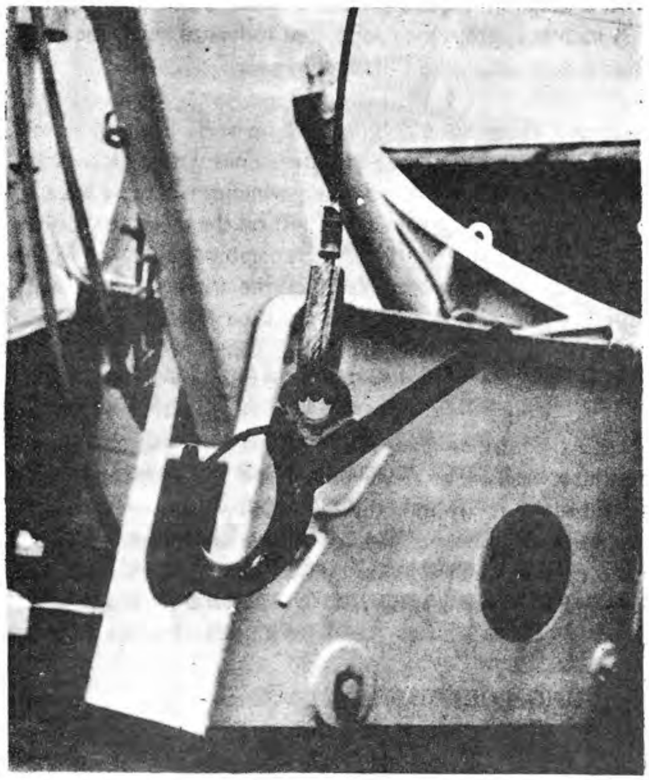


Figure 5
NAVY MINESWEEPING HOOK

A cable grapnel (Figure 6) is needed when dragging has to be resorted to. This grapnel consists of two separate sets of hooks, each set having four hooks set at right angles to each other. The hooks are flat and rounded off, and when dragged over an irregular bottom have a twisting action that prevents them from snagging. A dynamometer with a range of 10,000 pounds is attached to the drag line, a 3/4 inch polypropylene rope, and indicates when there is a steady drag increase on the line.

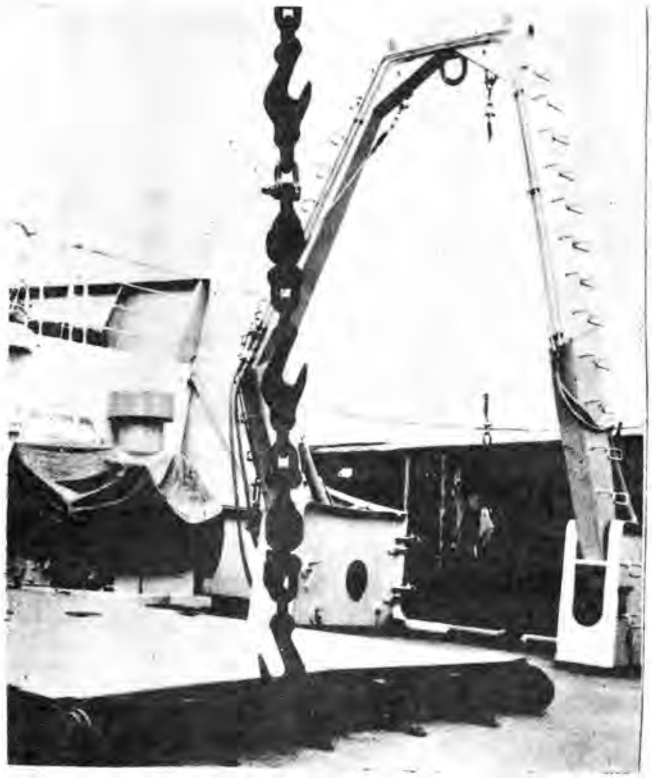


Figure 6
CABLE GRAPNEL

All ropes should be stored on reels both to ensure easy access and to ensure kink-free lines. Extra drums have been obtained for the spooling winches on the PARIZEAU, allowing ropes and wires to be left on the drums once they have been reeled up. However, portable stands to hold a pipe, which is treaded through the reels the ropes are supplied on, can be just as easily used for reeling and unreeling the ropes, but if manpower is at a premium, then it is better to have extra drums for the spooling winches.

At all times great care should be exercised in the matter of leads. The fewer blocks and rollers a rope has to go through or around, the less friction on the rope; nor should a lead have an angle of less than 90 degrees, for the same reason. Such details should be carefully planned before embarking on a survey.

MOORING EQUIPMENT

The moorings consist of one-quarter inch 6 by 19 galvanized wire, one-inch briaded polypropylene rope and three-quarter inch polypropylene twisted rope. The wire is used for the suspension line to give accurate distances between the meters and anchor, and hence their true depth. The Braided rope is used for the ground line for two reasons: it is stronger than ordinary twisted rope and it does not twist when being payed out.

Figure 7
SUPPORT BUOY AND METER
ON AUSTIN-WESTERN CRANE

The support buoys are 10-feet tubular-shaped steel buoys (Figure 7) with a lifting capacity of about 200 pounds, and are in two sizes. The 17-inch diameter buoys are made of one-quarter inch mild steel and will withstand pressures down to 600 feet (183 m); the 22-inch diameter buoys are made of 3/8 inch mild steel and will withstand pressures down to 1200 feet (366 m). These buoys are placed 12 feet above the top instrument, and three-quarter inch polpropylene rope is used here as a safety measure. If, for any reason, the instrument is not recovered, then in time the wire will corrode through and the support buoy and instrument will surface. The marker buoys are spar type (Figure 8) and made of one-quarter inch mild steel. A standard four-inch pipe is welded to the top of the buoy and houses the six-volt flashing white light with an automatic daylight cut-off switch.

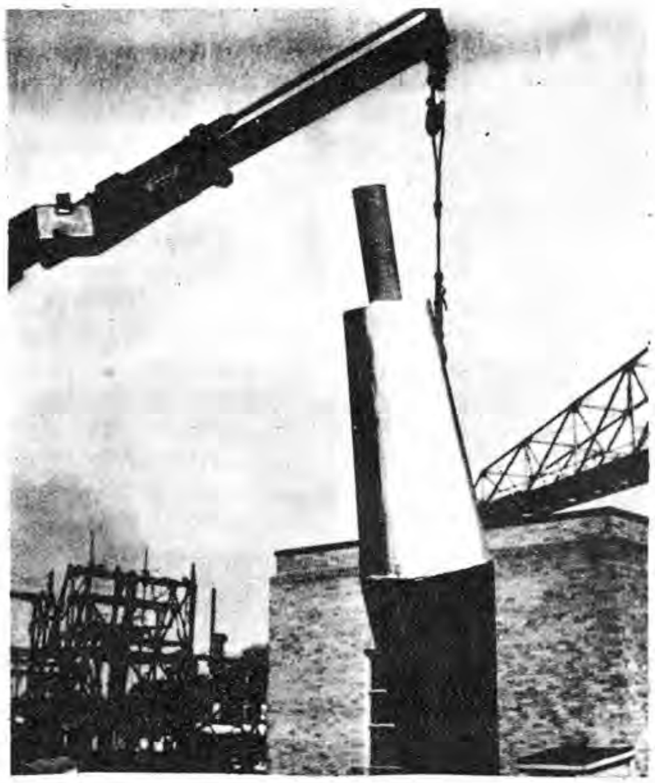


Figure 8
MARKER BUOY

The anchors used are railway wheels. Double wheels bolted together by an eybolt and welded in place are used on the instrument line; single wheels are used on the marker buoy line and at the other end of the ground line. Where the rope is to be attached to the anchors six feet of 5/8 inch chain is used to prevent the rope from chafing on the wheels. If current velocities in excess of two knots are anticipated a 40 pound Danforth anchor and 20 feet of 5/8 inch chain are attached to the anchor on the instrument line. This is particularly advisable where there is a flat mud bottom.

Swivels are used at the ends of every length of wire or rope except on the non-twisting ground line, and above and below every instrument. This not only allows the meters to rotate freely in order to record direction, but also prevents the wire or rope from kinking when lowering or hauling up the meters and anchors.

All shackles used above and below the instruments together with the swivels are either stainless steel or bronze. All shackles are seized with plastic tie-straps to prevent them from becoming unscrewed, and sinker weights are attached to the polypropylene rope below the marker buoy to prevent the rope from surfacing at slack water.

On the continental shelf off the west coast of British Columbia, one-half-inch wire is used on the marker buoy instead of polypropylene rope, and all shackles are spot welded closed. Wire is used because of the swell action and frequency of storms that pass through the area.

MOORING

Sites for moorings should be selected where the seabed is reasonably smooth to facilitate dragging that may have to be used to recover the instruments.

Before setting out on a survey the one-quarter inch wire is loaded on one of the deep-sea winches (it is obtained in 5000 foot lengths), and the other deepsea winch is loaded with 5000 feet of one-half inch wire that is used for dragging.

Prior to mooring, the braided polypropylene ground line, which is in 2000-foot lengths, is flaked out across the ship in front of the deep-sea winches, and the twisted polypropylene rope for the marker buoy is flaked fore and aft on top of the hatch cover. A two-wheel anchor is set on deck under the "A" frame, and a one-wheel anchor is suspended over the side just aft of the vertical roller fairlead. One end of the ground line is led over the side through the vertical roller and forward to the anchor under the "A" frame where it is shackled. The other end of the ground line is shackled to the anchor suspended over the side. The one-quarter inch wire is led through a heel block at the head of the "A" frame, and shackled, with swivel, to the anchor (Figure 9). The support buoy to be used is placed aft of the "A" frame, on the starboard side along with the marker buoy to be used. One end of the marker buoy line is shackled to the buoy, and the other end is led aft (care being taken to dip it under the ground line), and is shackled, with swivel, to the anchor suspended over the side. The sinker weights are now attached to the line, the number depending on the depth of the water. These lines are 1200 feet and 500 feet in length, and are shackled together if the depth is over 1000 feet. All shackles are then checked to see that they are seized with the plastic tie-ons. A portable wire measurer is put on the one-quarter inch wire, and the instrument to be moored is brought out and the top of the instrument is shackled, with swivel, to the support buoy by a 12-foot length of polypropylene rope, which is led around the outboard side of the "A" frame before shackling on.

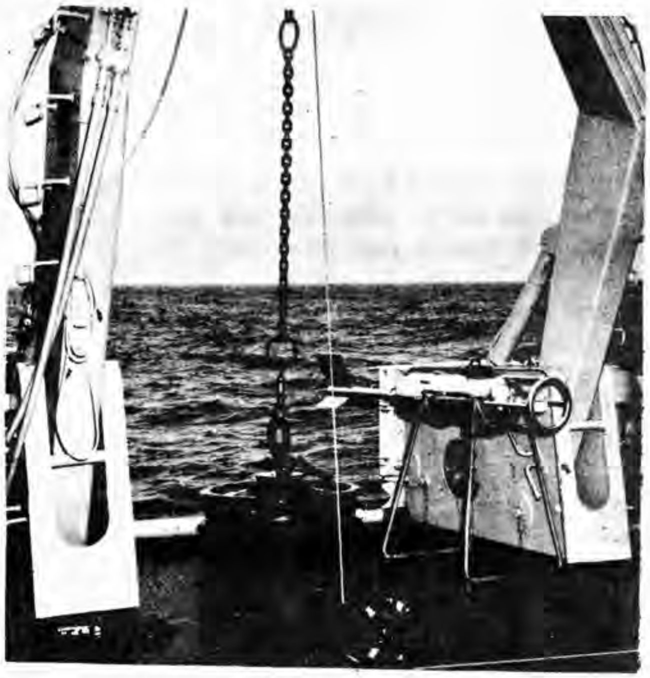


Figure 9
ANCHOR AND WHEELS UNDER "A" FRAME

All moorings are now ready for laying. The ship is then maneuvered into position, an accurate depth is obtained, and the tide correction is applied. Knowing the depth at which the meter is to be placed, the length of wire to be used can be easily calculated. This figure is then given to the man watching the wire measurer.

Now that all is ready the procedure for laying is as follows. The weight of the anchor is taken up on the wire, the "A" frame is hoisted out, and the anchor lowered on the wire. The ground line is led around the centre capstan - three turns - and is slacked away as the anchor is lowered, but care must be taken to see that there is equal strain on the wire and ground line at all times to prevent the wire and rope from twisting together (Figure 10). When the required length of wire is reached, lowering is stopped, and the depth is checked again. If it is unchanged the wire is marked with chalk. The wire and rope are then lowered away again until the chalk mark is about six feet above the deck after passing through the "A" frame. The "A" frame is hoisted inboard until the wire is a few inches off the side of the ship. If the depth has changed, the wire is either lengthened by paying out more wire and rope to the new length, or both wire and rope are hauled in to the new length of wire where it is chalk marked, then proceed as above.

Figure 10
DECK SCENE DURING LOWERING OF INSTRUMENT

The wire below the chalk mark is held by Klein wire grips. The wire is then cut at the chalk mark, and a thimble is put on the end of the wire with Nicopress sleeves. The end of the wire is then shackled, with swivel, to the bottom of the meter. The "A" frame is hoisted inboard, and the support buoy is lifted up on the Austin-Western crane, which in turn lifts up the meter (Figure 7). When the weight of the instrument line is taken up by the crane, the Klein wire grip is taken off, and the lowering procedure continues. At this stage the ship should have slight sternway, for as soon as the support buoy hits the water the release hook will let go, and the weight is then on the ground line. The slight stern-way insures that the instrument wire and ground line will not become entangled. The anchor is then lowered as quickly as possible, and as soon as the anchor is on the bottom, the stern-way is increased, the ground line is taken off the capstan and out of the fairlead, and held hand tight as it is payed out over the side. The end of the marker buoy line shackled to the anchor is then led through the vertical roller fairlead to the capstan and the slack is taken up. The anchor is now released so that it is suspended by the marker buoy line.

Just before all the ground line has been payed out, the weigh is taken off the ship so that the strain of the ground line is gently taken up by the marker buoy line through the anchor. Once the strain has been taken, the ground line is stretched tight, and then the second anchor is lowered to the bottom, all the while the ship having stern-way upon her. The marker buoy is now hoisted over the side by the Austin-Western crane, but kept clear of the water. Once the anchor is on the bottom, the line is taken off the capstan and out of the fairlead, and allowed to run over the bulwark. When the line has nearly been payed out, the buoy is put in the water.

If no marker buoy is to be used, the 3/4 inch polypropylene line is still flaked out on the hatch, but instead of the end being shackled to the anchor, the automatic release hook is used, and the anchor lowered down on it. Lowering the anchor down rather than have it free fall insures the ground line will be stretched out.

If more than one instrument is to be put on the line, the same procedure is followed. If the wire is cut to insert the instrument, then both ends are attached by shackles and swivels to the top and bottom end of the instrument, following which the weight of the instrument line is taken up on the winch, the Klein wire grip released, the "A" frame hoisted out, and the lowering process continued. Where the instruments are attached to the wire by clamps, or hung from a frame clamped to the wire, care should be taken to see that the instrument will be at the required depth. It has been found more expedient to calculate the depth at which one of the clamps should be attached and mark that place on the wire.

Where wire is being used for the marker buoy line instead of rope, the same procedure is followed as for rope except that when the buoy is swung over the side the wire should be led out through the vertical roller fairlead along with the other part of the wire going to the anchor. When the anchor is on the bottom the turns on the capstan are thrown off, and the wire allowed to run free through the fairlead.

Accurate fixes are taken each time an anchor is on the bottom to ensure knowing the direction of the ground line, and, of course, its location.

Automatic release devices may also be inserted in the line. The most advantageous place to put the release gear is just above the instrument anchor, with the ground line made fast to the top of the release gear so that the instrument package will remain anchored to the bottom after it has been released.

In places where log booms are towed it has now become standard practice not to put down a marker buoy. It was found that after storms anywhere from two to six log booms may be towed in company with one another, at times quite close together. With not much room for the tugs to maneuver, the buoys would likely be run down. It thus became a case of either staying clear of the towing tracks, or keeping everything underwater, and we have opted for the latter.

It is now general practice to put only one instrument on the line in current surveys to minimize losses due to the excessive cost of the instruments. However, when less expensive instruments are used, two or more are put on the line depending on the weight of the instruments in water.

RECOVERY OF METERS

Under normal conditions recovery of the meters is the reverse of the procedure for laying them. The ship is maneuvered alongside the marker buoy which is then hoisted aboard. The mooring rope is unshackled from the buoy and led through the "A" frame to the capstan, and the anchor is hauled up. A watch should be kept for the sinker weights attached to the line. The rope is flaked out on top of the hatch cover ready for lowering again if it is to be used, or stowed on a reel if it is not going to be used again. The anchor is close hauled on the "A" frame, the "A" frame hoisted in and the anchor is lowered on deck.

The ground line is then unshackled from the anchor and led through the "A" frame to the capstan, and the second anchor is then hauled up. When the ground line becomes nearly vertical, slight stern-way should be put on the ship to ensure that the support buoy does not surface under the ship. The anchor is brought right up and landed on deck in the same manner as the first anchor, and the instrument wire is unshackled from the anchor. A heavy shackle is attached to the wire, and then the wire is thrown over. The ship is then maneuvered alongside the float buoy, and the buoy and instrument are hoisted aboard. The wire is unshackled from the instrument, led through the fairlead and reeled back on the winch, ready for use again if the wire shows no signs of corrosion, otherwise it is discarded.

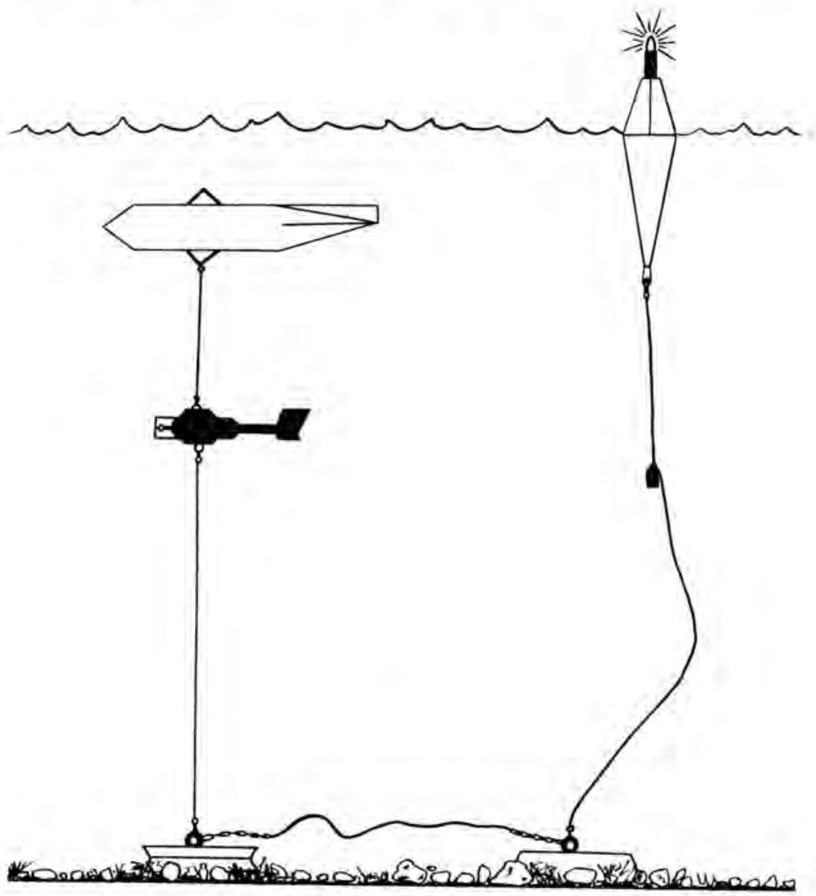


DIAGRAM SHOWING TYPICAL ARRAY

If more than one instrument is on the line, the one-quarter inch wire on the winch is led through the "A" frame and shackled to the instrument wire under the first instrument. The "A" frame is then hoisted out and the wire hauled in until the other instruments are reached. If attached to the line, they are just taken off, and the wire is again reeled in on the winch. If the instruments are in the line, then Klein wire grips must be used to hold the wire while each instrument is taken off.

Where wire has been used to moor the marker buoy, the buoy is hoisted on deck and taken as far forward and over to the port side as possible. The wire is led through the vertical fairlead and held with Klein wire grips. The wire is then unshackled from the buoy, led around the capstan and the anchor hauled in. The anchor is hauled up to the surface, then the ship is maneuvered to get some slack in the ground line. As soon as the line becomes slack it is unshackled from the anchor, led forward through the "A" frame on to the capstan, and the recovery proceeds as previously described.

Where no marker buoy is used the instruments are recovered by dragging. The grapnel is shackled, with swivel, to the one-half inch steel wire, which is led out through the "A" frame, and a dynamometer is inserted between the heel block at the base of the "A" frame and the deck. When an increase in the drag is noted, the ship is stopped and the grapnel hauled in. A snatch block is hung off the end of the "A" frame, and this is put on the ground line and the grapnel is lowered down until the weight is on the block. The grapnel is then brought aboard by the crane, the wire unshackled and reeled back on the winch. The ship is then steamed slowly in the direction of the anchor that is not at the bottom of the instrument line. The crane hook is held ready just over the "A" frame. As soon as the anchor comes up to the "A" frame the crane hook is put on the anchor, and the ship steamed in the opposite direction to get slack on the ground line so that the anchor can be brought aboard. The ground line is unshackled from the anchor, led through the "A" frame, and the procedure from this stage is the same as that for recovery with marker buoy. Great care must be taken when approaching the end of the ground line. When the line is hanging perpendicular the speed of the ship should be adjusted so that the ground line is barely running through the block, and as soon as the anchor breaks the surface, the crane hook should be put on it.

A more difficult problem arises when the ground line has been severed, and in this case the usual dragging procedure is modified. The ship steams around the assumed position of the instruments (in some cases this can be double checked by observing the support buoy on the echo sounder), paying out the drag line as fast as possible. When the position has been completely encircled, the drag line is hauled in at full speed with the expectation of either cutting the suspension wire below the bottom instrument or fouling it in the grapnel of drag line. In the first case the support buoy will surface with the other meters suspended below it. In the second, the suspension wire with the attached meters will be hauled in by the drag line. The major problem is to ensure that the line is cut below the lowest meter, otherwise the instrument will probably be lost on the seabed.

CONCLUSION

In a year and a half of operations on the PARIZEAU seventeen current meters were laid and recovered some four to six times, but no losses were sustained by this laying and picking up technique. This record has been possible because of the co-operation of the survey staff, Captain, officers and crew of the PARIZEAU and because of the layout of the ship, especially a bow propeller, that makes the laying and recovery of buoys and submerged instruments easier.

EDITOR'S NOTE:

The preceding article by W.S. Hugget is reprinted in most part from the Marine Technology Society Journal, Nov./Dec., 1969. Prior to the 1970 Field Survey in the Western Arctic, Parizeau underwent a conversion process by which she became adapted for a full-scale hydrographic survey versus her original design as an oceanographic vessel.

This involved the mounting of three sets of launch davits complete with the necessary hydraulics and the fitting of mounting facilities for the seating of four survey launches. Inside the vessel, accommodations were made for staff and crew along with a large hydrographic chartroom.

THE YUASA 12 VOLT BATTERY

The Yuasa 12 Volt Battery is a 14 amp hour wet cell battery designed for use on a Honda motor cycle. With dimensions of $5\frac{1}{2}$ inches by $3\frac{1}{2}$ inches by $6\frac{1}{2}$ inches, it weighs less than 10 lbs. wet. The battery costs $19.95.

The William J. Stewart has had the use of four of these batteries this season and they are proving to be reliable and readily adaptable to the needs of the Hydrographic Service. One Yuasa battery will meet the demands of a MRA 3 tellurometer measuring up to 10 distances per day, while two connected in series will power a RPS transponder for a day. When running a tellurometer traverse along an exposed shore, the use of these extremely portable batteries makes the whole operation safer and more efficient.

However, these batteries have a low charging rate and consequently require a longer charging time. Therefore, after a day in the field the batteries cannot be fully recharged overnight. It is recommended that if four batteries per day are required in the field, then 12 be obtained so that a constant supply of fully charged batteries is on hand.

A.D. O'Connor,
Pacific Region

CSS VEDETTE

Type: Welded steel hull

Complement: 4 crew, 3 staff

Statistics:	Year built	1970
	Length	50 ft. O.A.
	Beam	16 ft.
	Draft	4 ft. 6 inches
	Gross Tonnage	32.
	Net Tonnage	8

Performance:	Cruising speed	10.5 knots
	Maximum speed	12 knots
	Range (cruising)	340 k.m.
	Endurance	30 hours

Propulsion: Twin screw Cummins, 370 horse, diesel

Electrical Power: 24 volt DC
12 volt DC
110 volt AC (generator or shore power)

Navigation: Sperry gyro-compass w/two repeaters
Magnetic compass
Sun-log
Kelvin Hughes type 17 radar

Communications: one CH25 Marconi AM SSB
one Clipper III VHF
two portable VHF Motorola PT300 (ship to ship)

Echo Sounders: two Edo 9040 (0-720 ft. or fms.)
one Raytheon type DE719 (0-200 or 0-400 ft).

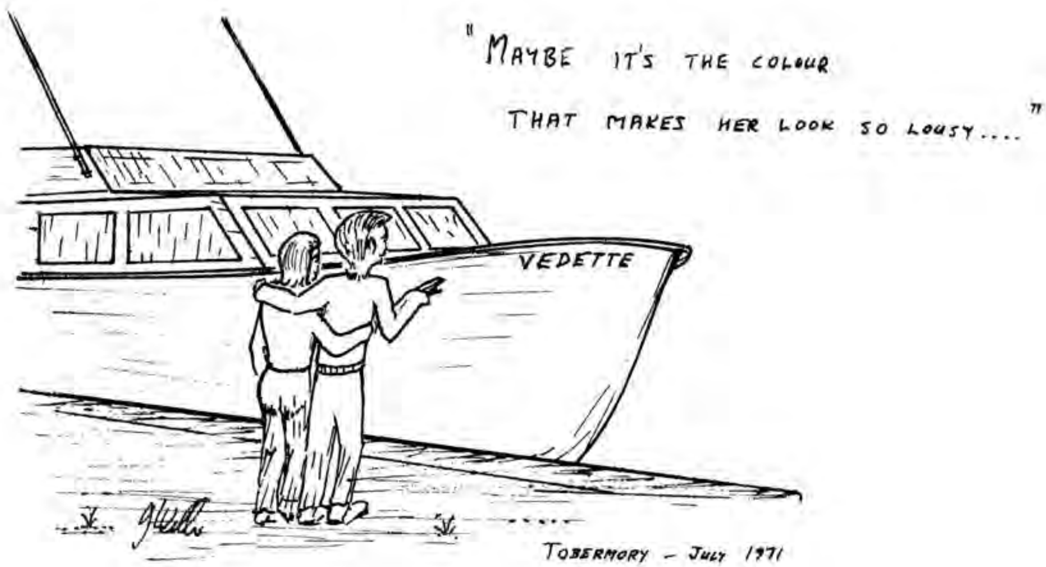
Equipment: one 17 foot boston whaler for inshore work.

Habitability: Living accommodation cramped but adequate for six month duration.
Air conditioned.
Washrooms and showers for crew and staff.
Galley equipped with 110 volt electric stove and refrigerator.

History: Built in Holland and outfitted in Kingston (Ontario). First season 1971 - employed as revisory survey, launch on Lake Huron-Georgian Bay.

Survey Vessel "Vedette" at CCIW

Survey Vessel "Vedette" at Kingsville



OUR REVISORY SUMMERY

"I've spent the last twenty years trying to figure out a way to earn a living up here, and you seem to have found it." So said the resident of one of our Georgian Bay's Thirty Thousand Islands when I was asking him the whereabouts of his charted submarine cables. He was spending all summer in a house there with his wife and family, perched on an island barely a hundred yards in diameter, and Reg (our coxswain) and I were visiting him in our little open boat during the course of our Revisory Survey of the charts of the area.

I know what he meant of course, for that particular day was one of those days that our migratory American cousins tell the Folks Back Home all about when comparing holiday expectations, experiences and expenses: blue skies, warm September sun, calm clear blue waters with just enough breeze ruffling the outer leaves of the trees to remind them about changing into a colourful new outfit of fine fall foliage instead of the cool green costumes they had been sporting all summer.

The gods were not always so benign towards us when handing out the daily ration of weather this last field season. Such lovely days, alas, seemed to be somewhat less frequent than that other kind when the wind from the northwest at about ten to fifteen knots teases the waters into that tantalizing dance of theirs that is not quite boisterous enough to keep us home scaling sounding rolls, the grey clouds playfully hiding behind the sun's skirts of blue sky until we are well away from our base then come scurrying out from hiding, having tempted us into forgetting our rain gear, and happily spend the rest of the day sitting damply on top of us in our little open boat.

This other kind of day we limp home wet, battered and weary, wistfully wondering whatever possessed us to clamour for a post with the Canadian Hydrographic Service when there must be an utterly peaceful desk job going begging in some office.

Then there was that forget-me-not day when John (our seaman-cook) and I set out in the 13 ft. dory, leaving the Vedette at Tobermory, to do revisory work along the shore towards Cabot Head, some fifteen miles east. Quite a pleasant morning, it was, with a ten knot northwesterly breeze and a few fleecy clouds basking in the sunshine.

We had a quite uneventful run down the coast as the limestone cliffs didn't seem to have changed too much since the original survey, then a more detailed look at Wingfield Basin with its wreck, its leading light beacons and its ruined mill. Our work there completed we headed out of the sheltered Basin blithely intending to do a few more miles of the coast before heading back for home but found that while we were in our little haven looking at the relics of its past glories the breeze had increased somewhat and the water looked like it might be building up to something, so we headed for home. An unforgettable experience.

That fifteen mile jaunt along the craggy cliff-lined coast took us over three hours, pounding into the waves the whole way with each wave throwing its handful of spray over us. Never did the Vedette look so beautiful as she did that afternoon when we finally reached home.

And that was the day that a horrible little boy sitting on the dock fishing said in disbelief, "You really get PAID to go out in the boat??" Battered and bruised, wet and weary as I was, I could cheerfully have strangled him.

One interesting point came to our notice on the Vedette this season regarding the warning light customarily displayed by survey launches. At the beginning of the season our departure for the field was delayed a few days while the electricians searched to discover the answer to the intriguing question: Why does the radar switch itself on when our Flashing Amber Light is on?? and Why do the lights in the stern cabin blow a fuse when the Flashing Amber Light and the radar are both on at the same time??

The electricians eventually solved the problem which turned out to be a series of short circuits in the wiring, but then some weeks later another built-in hazard persuaded us to do without the services of our Flashing Amber Light.

We were running a check sounding line one morning en route from Port Elgin to Tobermory with visibility about two miles when we received a message by radio. A cottager had reported seeing "a quite large vessel" about eight miles offshore apparently in distress and trying to attract attention by flashing a mirror or a bright light, and Would we please investigate?

We had passed about a mile offshore in that area only an hour or so before and had noticed nothing untoward, but willingly turned back to investigate. Already we could see ourselves figuring prominently in a Search and Rescue mission to help fill out George's monthly report. In fact maybe we could even take one or two interesting photographs for him.

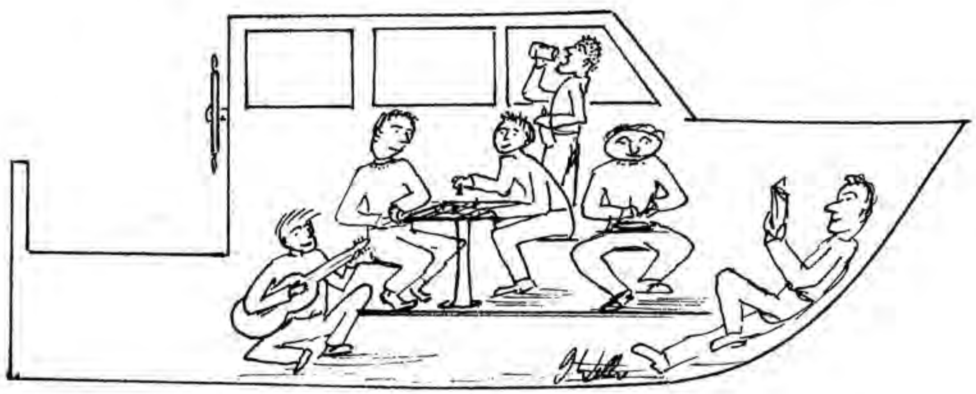
Then doubt set in. How on earth could a cottager see a vessel flashing a mirror or bright light eight miles offshore when we had passed only a mile off through just that area at just that time on a sounding line and could barely make out the houses on the shore? The horrible truth gradually dawned on us. It was us on one of our sounding lines that the cottager had seen. The light he had noticed was our Flashing Amber warning light, and here we were cruising around in ever decreasing circles vainly searching for our own shadow! Our dreams of being immortalised in George's monthly report burst like a soap bubble, and a somewhat crestfallen Vedette resumed her sounding line.

We did help one or two vessels in distress this summer, though. There was that cabin cruiser with engine trouble that we towed ten miles into Midland with our whaler one afternoon, but when we went back about half an hour later to get the name and address (for George's monthly report) found that the boat had vanished leaving no trace....

And there was that fibreglass sailing boat that we found drifting upside down a half mile offshore one day. We righted the boat, towed it to a likely looking house that had a little dock and handed it over to the resident for him to contact the appropriate authorities. Maybe - just maybe - he'll send us half the finder's fee one day.

All in all we had a good season. Despite the five or six of us living together in such confined quarters we managed to survive for the full five months without any of us coming to blows or even having any real arguments. Quite a remarkable achievement considering that we were often at little out-of-the-way places with nowhere to retreat to when we felt in need of a change of company.

More remarkable still, the three crew are all quite keen to be with the Vedette again next year....



.... DESPITE THE CONFINED QUARTERS ....

SEANITIONS 71

Friden Punch	An animal that eats paper tape
Master Clock	Slave driver
Gifft-Alpine	Enthusiastic ping pong player
Gravimeter	A device used to measure the roll and pitch of a ship
Magnetometer	A machine used to measure the amount of noise radiated by a ship
Funnel	A place where technicians read dirty books
Lambda	A system designed by an engineer to frustrate hydrographers and keep technicians affluent
Computer	An electronic idiot with a mind of its own
Extended Memory	The subconscious of a computer (it only works when it wants to)
Computer Program	A group of fudge factors designed to give the right answer
Loran	Short range navigation (sometimes)
Plotting Room	A kindergarten for grown-ups
Spares	The things that you don't have when you need them
High Speed Reader	An iron for paper tape
Radiotelephone	A device which is used to disturb you when you are trying to listen to the news
SSB	A one way radiotelephone
High Speed Punch	A device to manufacture confetti
Data Processing	The process of ironing tape while making confetti
Punch Programmer	A device that mixes the food and feeds the animals
Decca Digitizer	A machine that has eyes only for a hydrographer
Repeater Clock	Assistant slave driver
Radar	A device which attracts rain and fog
26B	A device used to see how accurately a man can read a stopwatch

Cone Check	A complex procedure of weights and pulleys used to see if the sounder is turned on
Sal Log	A spanish invention to measure salty logs
Decometer	A device composed of meters and wheels and cogs which usually manages to get lost
Scaler	Daily scorekeeper for the ping pong match
Air Conditioner	A device designed to condition people to vast changes in air temperature and wind conditions
Plotting Table	The place where plots are devised to confuse the bridge
Intercom	A system designed to make all instructions unintelligible
Audio Warning System	A dope fiend's alarm clock
Buoy	A small object moored in the ocean which is programmed to self destruct if any ship approaches within ten miles (occasionally the program does not work)
Oceanography	A game of chance and skill similar to monopoly and sometimes called oceanopoly. The players move from point to point taking cores, dredges, etc. The winner writes a report or paper
Hydrographic Survey	A game similar to oceanography but using variations of the rules. (may be called hydrogopoly)
Chart	A sheet of paper containing hydroglyphics
Hydroglyphics	Specialized symbols used in the game of hydrogopoly (see manual of hydrogopoly for definitions)
Electronics	A science in which one finds that a piece of equipment does not work and replaces it with another piece of equipment
Electronic Maintenance	The job of finding which piece of equipment does not work
Electronic Repair	The paperwork involved in writing off defective equipment
Technician	A man who waits for equipment to break down

Technician Manual	A book that tells you how to connect and disconnect various pieces of equipment
Lambda Slave Station	A place technicians go for a summer vacation
Repeater	That which does not agree with the master unit (gyro repeater, Decca repeater, etc.)

Some Current Methods of the Canadian Hydrographic Service for Processing, Storage and Retrieval of Bathymetric Data for the Great Lakes.

A talk given during a panel discussion on "Optional Processing and Archiving of Bathymetric Data for the Great Lakes" at the 14th Conference on Great Lakes Research.

E. Brown
Canadian Hydrographic Service
Canada Centre for Inland Waters

The present series of navigation charts covering the Great Lakes is considered generally satisfactory for general Marine navigation purposes, however with the increased emphasis on the broad field of scientific studies, there is a somewhat urgent requirement for a chart, or perhaps more correctly, the depth data of the Lakes being presented in a different format or with a change of emphasis.

One of the first steps in meeting this and the ever increasing demands of the scientific community, was the production of the bathymetric charts of the continental shelf of the East Coast of Canada. Because this series of charts was well received and considered extremely useful by those conducting scientific studies, a similar series of bathymetric charts was planned and has been partially completed for the Great Lakes. A bathymetric chart of Lake Ontario, Chart 881, has been completed, and is now available for general distribution. A similar chart covering Lake Erie should be available in about six (6) weeks, (the end of June), and charts for other Lakes are now in the planning stages.

As can be seen the bathymetric chart is much more colourful than the standard navigation chart. The colour of course is the most obvious differnence, however, there are other more important differences.

The colours are used to emphasis the various contours which are shown in the areas of bathymetry at 10 meter intervals and in the land areas every 30 meters. One of the principal differneces of the bathymetric chart is that the same emphasis in placed on the deep areas as is on the shoaler areas. As most of you are no doubt aware, the navigation chart is provided to the mariner to facilitate safe navigation, it therefore places much emphasis on portraying shoal areas and hazardous features. As a result, in many areas a deep sounding will be sacrificed for a shoal one, simply because at the scale of the chart both cannot be shown. Generally then the navigation chart shows a somewhat pessimistic view of the depth while on the bathymetric charts the shoals and the deeps receive equal weight. When comparing the two charts you will find much more deep data on the bathymetric chart. There are only a very few individual depth soundings shown on the bathymetric chart and these are added only to show extreme deeps or shoals.

In some cases on navigation charts, hazardous features such as pinnacle shoals, are by necessity of chart scale, distorted to show a much larger area on the chart than they physically cover on the ground. There is no way this can be overcome when showing depths in numerical form at a small scale, and of course, the objective is to make the mariner aware of these hazards. At the scale of the chart, 1:400,000,0.1 inch on the chart represents approximately 3300 feet on the ground.

As mentioned previously, on the bathymetric chart are also shown the contours on land. This no doubt gives the scientific community a much clearer and much needed picture of the drainage basin relative to the bathymetry.

On most charts, including the bathymetric series, a certain amount of generalization has been made. The amount is dependant on the scale of the field survey and the scale of the published chart.

The raw data collected and corrected by the field survey are presented to chart compilation on a field sheet. This field sheet simply shows, among other things, all of the soundings which have been collected in an area. On an average field sheet are shown approximately some 20,000 depth soundings. It is obvious then that it is impossible, or at any rate inadvisable, because of overcrowdedness, to incorporate into the chart all of the soundings shown upon the field sheet. For this reason a sounding selection is made, and only those soundings are chosen that are needed to make a clear and intelligible assessment of the field sheet information at the chart scale. The policy in sounding selection is to seek out the shallowest places first, and to radiate the soundings outward from them, gradually increasing the distance, one from another, as deeper water is reached. Generally shallow water is dangerous water, and a greater profusion of soundings in such areas is used to advertise the fact.

On an average chart, there are shown some 3,500 soundings or roughly 15-20 per cent of the field sheet data.

It is quite obvious then that for any study requiring detailed bottom topography the data should be extracted from the field sheet and not the published chart.

At the present time we have no bathymetric data available in a digital form. We are, however, actively pursuing this goal both on field surveys and in the compilation stage. Magnetic tape data logging and processing systems are now with us and it is only a matter of time before field sheets as they are known today, will no longer exist. Our cartographic development group in Ottawa is presently conducting studies into various alternatives for a data base and some form of data bank will be set up. I would suggest that this is the time for the scientific community to provide their input and perhaps the system can be set up to accommodate specialized requirements. Our chart compilation people are also seeking advise and constructive criticism on the bathymetric charts -- can they be improved. It is, I believe, the general opinion that they are better than anything previously available, however, with your comments they can no doubt be further improved.