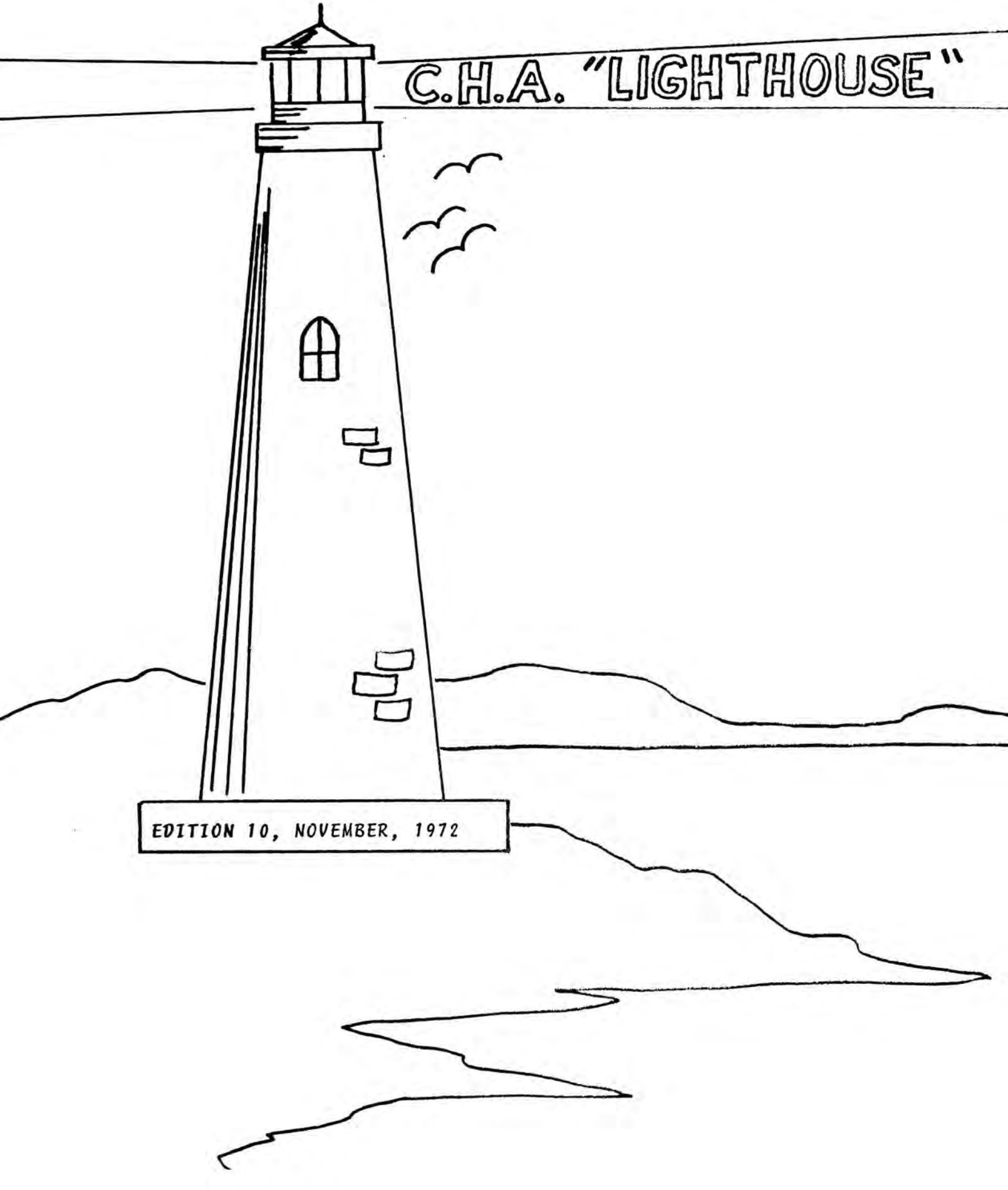
C.H.A. "LIGHTHOUSE"
EDITION 10, NOVEMBER, 1972

While basking in the sun on the fore-deck of the VEDETTE, the words of a co-editor spoken a few weeks before, came back to haunt me:

"WHATEVER HAPPENED TO EDITION 10 OF THE LIGHTHOUSE?"

Well, here it is; somewhat smaller than usual, somewhat later than expected.

Material is urgently required for the next edition and can be sent to:

The Editors
CHA LIGHTHOUSE
c/o G.D. Macdonald
Marine Sciences Directorate
Department of the Environment
867 Lakeshore Road
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.

Your comments on Edition Number 10 are sincerely invited.

Environment Canada | Environnement Canada

Our File No / Notre dossier WC 1605

Your File No / Votre dossier

The Library,
Dept. of the Environment,
Marine Sciences Branch
Pacific Region,
512 - 1230 Government Street
Victoria, B.C.

May 29, 1972

Editors, CHA Lighthouse
Marine Sciences Branch
867 Lakeshore Road
P.O. Box 5050
Burlington, Ontario

Dear Editors:

Your handsome publication C.H.A. Lighthouse has been brought to my attention, and I see I ought to have a complete set in this library for reference purposes.

I wonder if you have any old ones there? I have only nos. 8 and 9 at present, and I believe I ought to have from no. 5 on in order to cover the more erudite editions. If you can send 1 copy each of nos. 5, 6 and 7 I would be most grateful; earlier numbers [with a different title yet!] would also be welcome.

Thank you for any help you can give me on this.

Yours truly,

D. Stastny, (Mrs.)
Librarian

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WATER CROSSING

STRAITS OF MACKINAC, MICHIGAN

During one phase of this summer's four month exchange between the Canadian Hydrographic Service, Central Region, and the Lake Survey Center, Detroit, I was assigned to the Vertical Control Section. The Vertical Control Section is responsible for carrying out precise level work as required by the Lake Survey Center. One of the projects this year was to continue a precise level line from Cedarville, Michigan to Mackinaw City, Mighican. This involved a four mile water crossing at the Mackinac Bridge (*figure 1*) spanning the Strait of Mackinac. A special technique was required since the bridge was not stable enough for normal precise levelling procedures.

A water (or valley) crossing can be made using a spirit level and targets. The level line is somewhere between the two vertical targets. Observations are taken to the top target, the 'level' point on the rod, and the bottom target. Readings are indicated by a micrometer attached to the spirit level. The level line reading on the rod can then be determined. Simultaneous readings are taken in all cases to cancel out the effects of refraction and curvature.

Since the Zeiss Ni2 level has no bubble, no special rotary wedge with a micrometer is used to 'tilt' the line of sight. The two instruments are used in a reciprocal collimation method of sighting into each other (*figure 2*) to adjust for imperfection in the line of sight. This makes the lines of sight parallel to each other but not level. After collimation the instruments are sighted to the targets (*figure 3*) and simultaneous readings are taken at each sight with both nets (i.e. four) instruments according to a certain procedure. The differences in elevation are calculated after reduction of data.

Essentially the idea is to find the height from the index on the target rod to the level line of sight of the instruments. Elevations are then determined to the index by regular precise levelling and the line can continue from that point.

The two levels with rotary wedge attachments, and targets were set up at bench marks at each site. The level line was continued in the standard way to the approaches at A and D. The three crossings were made using these points and bench marks established on the anchor piers at B and C.

The final results of the longer crossing are being re-examined as the results were unacceptable. The crossing is relatively long considering the limitations of the equipment and several attempts were made before visibility was adequate.

A detailed account of the theory and recording procedures for this technique may be found in LSC Report 69-6, "Zeiss Apparatus for Crossing Water Spans in Precise Levelling" by R.M. Berry.

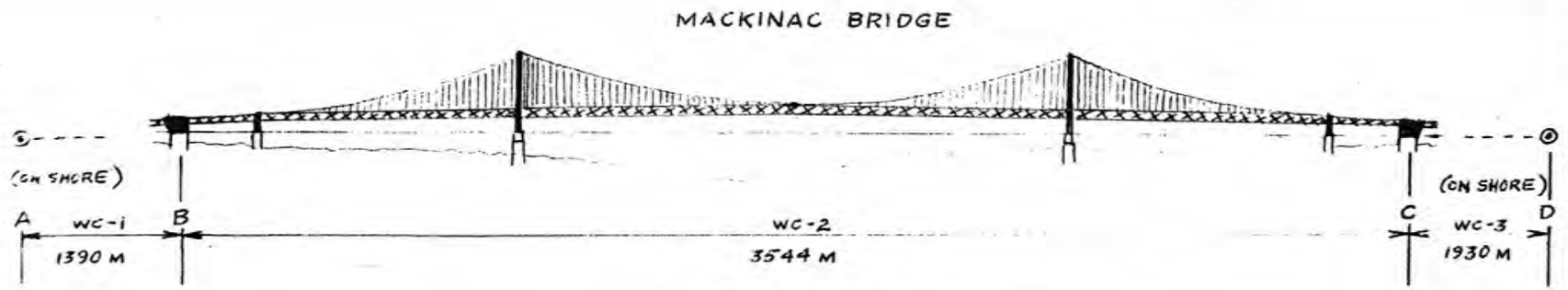


FIGURE - 1

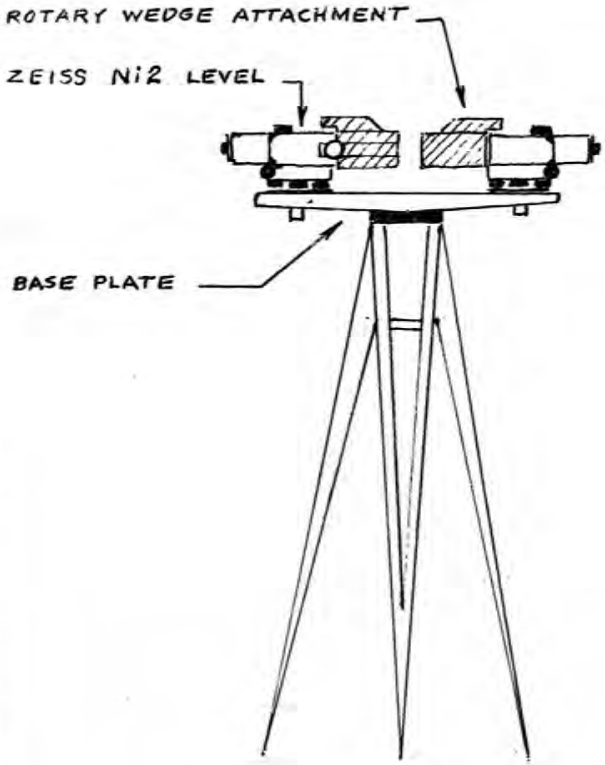


FIGURE - 2

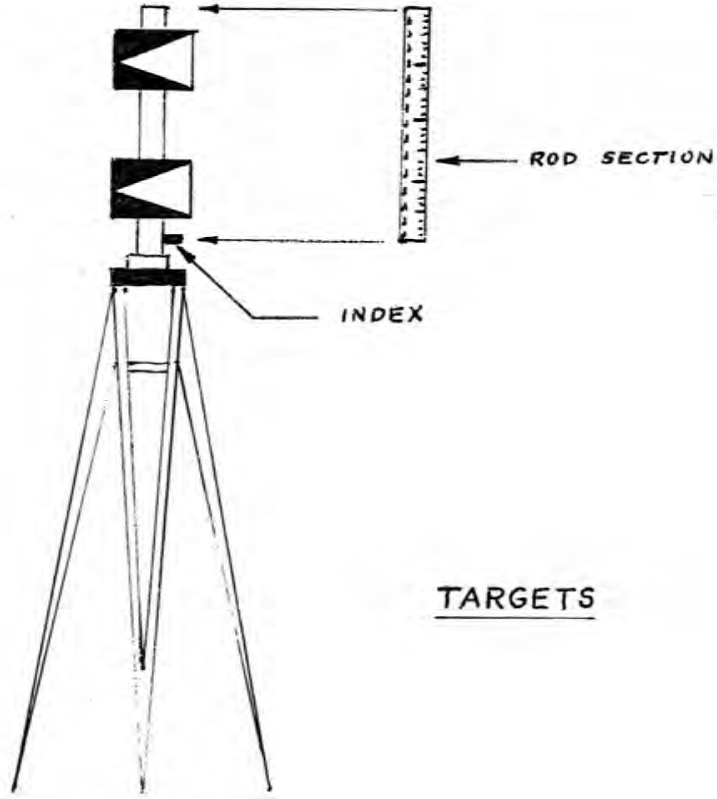


FIGURE - 3

TARGETS

LAWS OF COMPUTER PROGRAMMING

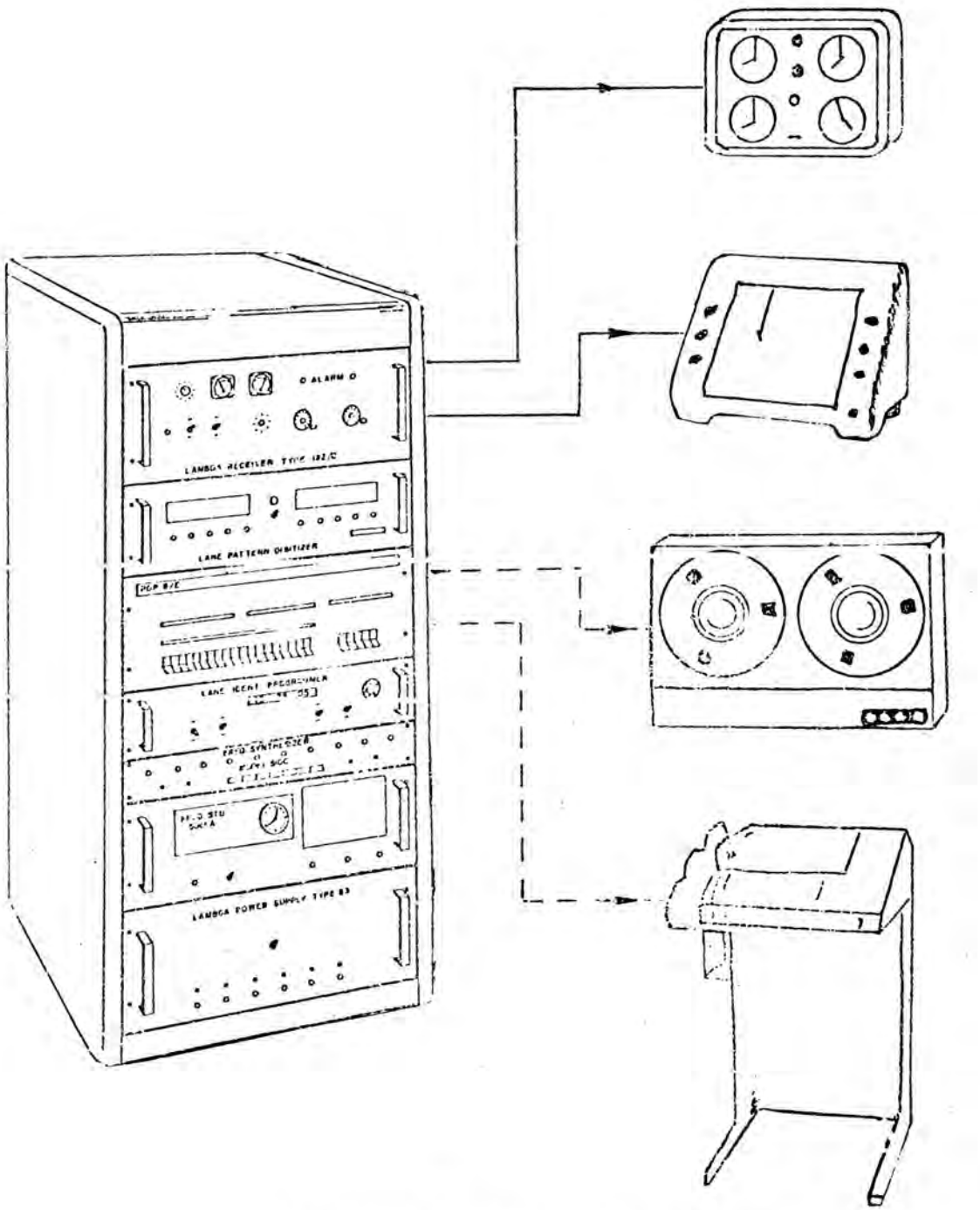
1. Any given program, when running, is obsolete.
2. Any given program costs more and takes longer.*
3. If a program is useful, it will have to be changed.
4. If a program is useless, it will have to be documented.
5. Any given program will expand to fill the available memory.**
6. The value of any program is proportional to the weight of its output.

* This law is derived directly from Sturgeon's Revelation.

** This law is a special case of Parkinson's Law.


"IT'S O.K. JACK —
I GOT YOU THAT BENCHMARK..."

CESIUM CONTROLLED DECCA LAMBDA SYSTEM



COMPLETE MASTER INSTALLATION

A CESIUM CONTROLLED DECCA LAMBDA SYSTEM

The survey positioning system described below emerged from the need to eliminate the cumbersome transmitting antenna normally installed on a survey vessel using the Decca Lambda system and to provide a noise-free signal source for reception at the shore based station, independent of the ship to shore distance. No practical tests have been carried out to date to determine the operational parameters of this method of operation.

Passive Ranging Systems (Rho Rho)

During recent years a number of navigation systems have been offered for use in the passive ranging mode, either in the form of complete chains which could be set up on a temporary basis to cover a particular survey area, for example TORAN, or in the form of a receiver package which enables the user to determine ranges from fixed permanent navigation stations of a hyperbolic net, such as LORAN C. During early experiments in 1966 and 1967, rubidium frequency standards were used, which required long warmup times and recalibration at frequent intervals to determine drift rate. Nowadays most passive ranging systems use cesium beam frequency standards.

Since its inception in 1959 a total of 18 Lambda chains have been manufactured by Decca for use throughout the world, 9 of which have been supplied to Canada, including two systems designed for hyperbolic operation for the Dept. of Energy, Mines and Resources. In that time it has proved its value as a reliable, medium range positioning system.

Its main disadvantage in the ranging mode is the vessel size required for the transmitting antenna and coil box installation and the need for attendant technicians.

Frequently, an existing helicopter platform is utilized for the transmitting ground plane, obviating the use of a helicopter, or conversely a cleared area of valuable 'aft' deck space. In an Arctic type of operation this may necessitate a separate vessel for the helicopter if the survey ship is too small to accommodate both antenna and helicopter deck. Any steps taken to reduce the size of the transmitting antenna generally result in reducing the effective operating range of the system, and general experience has shown that the 60 ft. umbrella provides the best compromise between radiating efficiency and space occupied.

Relative Merits of Systems

If we incorporate atomic clocks in the Lambda system, the Master transmitting equipment can be dispensed with, thereby maintaining relative vessel security since the 2 Slave stations no longer need the transmitted 12f signal. In this mode of operation, each Slave is locked into its own clock while the receivers on the ship phase compare the received Slave signals with the shipborne cesium clock. A further advantage is that additional vessels need only be fitted with a Lambda receiver and atomic clock package to operate from the same 2 Slave stations, once the initial calibration has been carried out.

Ranges predicted for this method of operation are somewhat greater than for the conventional 2 Range system, due to the one-way only transmission path. Pattern fluctuations caused by propagation anomalies, skywave, etc. are expected to be considerably less. Other systems operating in this manner claim up to 100% increase in useable range over conventional ranging methods. Interruptions caused by precipitation static and locally generated noise at the Slaves will be correspondingly reduced.

Against this must be weighed the disadvantages anticipated, one of the main ones being the reduced accuracy obtained. As the transmissions occur only from shore to ship, the lane width is doubled.

Normal expression of 2 Range Lambda

Lane width = $\lambda = \frac{v}{2xf}$

Lane width for Rho Rho Lambda is expressed by:-

l.w. = λ = v/f metres

where λ is the wavelength at comparison frequency

v is the propagation speed over water in mtrs/sec.

f is the comparison frequency in Hz.

In a typical instance using a chain with a Master frequency of 170 kHz, the instrumental resolution of .01 lane of the Red pattern represents 8.8 metres, instead of 4.4 metres as obtained with the normal and short term fluctuations in the cesium beam standard which will degrade the accuracy by some unknown factor. Generally the short term fluctuations are so small compared with systematic errors arising out of propagation speed variations that they can be ignored.

Referring to data published by Hewlett Packard for their Model 5061A Frequency Standard, the short term stability averaged over a 1 second period is of the order of $\pm 3 \times 10^{-11}$, which represents .00001 Red lane.

Long term variations are more predictable and would be compensated for by periodic calibration. Of greater interest in this application is the relative drift between the Master clock and each of the Slaves. Again referring to manufacturer's data, the "settability" is given as $\pm 7 \times 10^{-13}$ when one unit is compared to another. Taking the worst case, two clocks may therefore differ by 1.4×10^{-12} which represents an accumulation of 0.04 Red lane over a 24 hour period. In practice, the

relative drift will be somewhat less than this amount, however, some means must be found to correct for this source of error before the system can become a practical survey tool.

The method proposed is described under the Calibration heading and uses a Calibration Calendar. It assumes that the drift is progressive in a linear manner and ignores the smaller deviations either side of the mean difference.

Interface Methods

The next problem to be solved is the interconnection of the atomic clock and the Lambda control units. Each Lambda chain is manufactured to its own particular frequency specification which may not be harmonically related to any of the clock output frequencies. Whatever method is used to convert the clock signal to a frequency compatible with the Lambda equipment, the phase stability of the device must be of the same order as that of the clock itself.

The method adopted uses a commercially manufactured Frequency Synthesizer which provides any required frequency between 1 Hz and 1 MHz. The Rockland Model 5100 accepts the 1 MHz output of the atomic clock and has an output range of 0.001 Hz to 2.0 MHz in steps of .001 Hz. Short term phase stability for this instrument is less than 5×10^{-9} over a 1 second averaging period which is well within desired limits.

Master Station

The fundamental "lf" oscillator in the Lambda Master control units operates at approximately 14 kHz. Disabling the oscillator and substituting the clock derived signal at the input to the lf channel may best be done by disconnecting the oscillator crystal and injecting the synthesizer output

at the stage immediately following the oscillator. Normal signal level at this point is 0.2V p. to p. so that the synthesizer output of 1V will require some attenuation. Any harmonics remaining at this level will be suppressed in the plate circuit of this stage. The synthesizer output is fed simultaneously to both Master control units via identical interconnection methods, enabling the units to have equal functions, instead of the Duty/Standby arrangement of the existing configuration.

Redundant circuitry in the Master Control Unit would be the 11f and 12f receiving channels, the 11f and 12f drive channels, and the 1f oscillator. The block diagram of Fig. 1 shows the essential units which make up the shipboard Master installation.

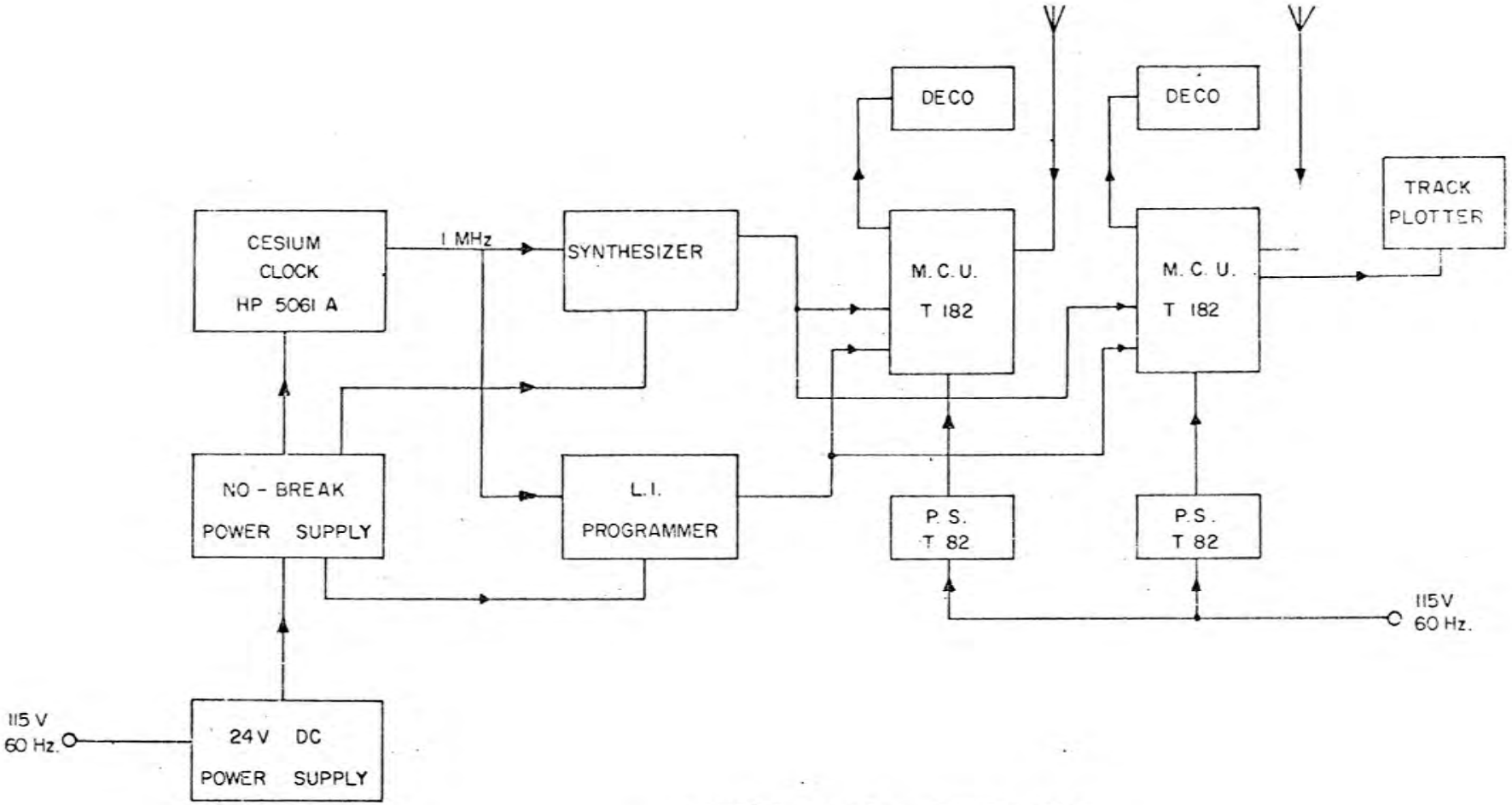
Slave Station

In the Slave control unit, it is proposed to retain the 1f oscillator and synchronise the unit with the cesium derived signal as is done conventionally with the Master signal. The signal from the synthesizer will be routed through a pulse forming network and applied to the antenna socket of each Slave Control Unit. This will retain the normal referencing function of the unit and permit pattern phase adjustments to be inserted on the 12f gonio.

The 11f receiving channel will be activated in normal pattern operation to provide a notch indication at all times on the NOTCH meter. Fig. 2 shows the equipment layout.

Lane Identification

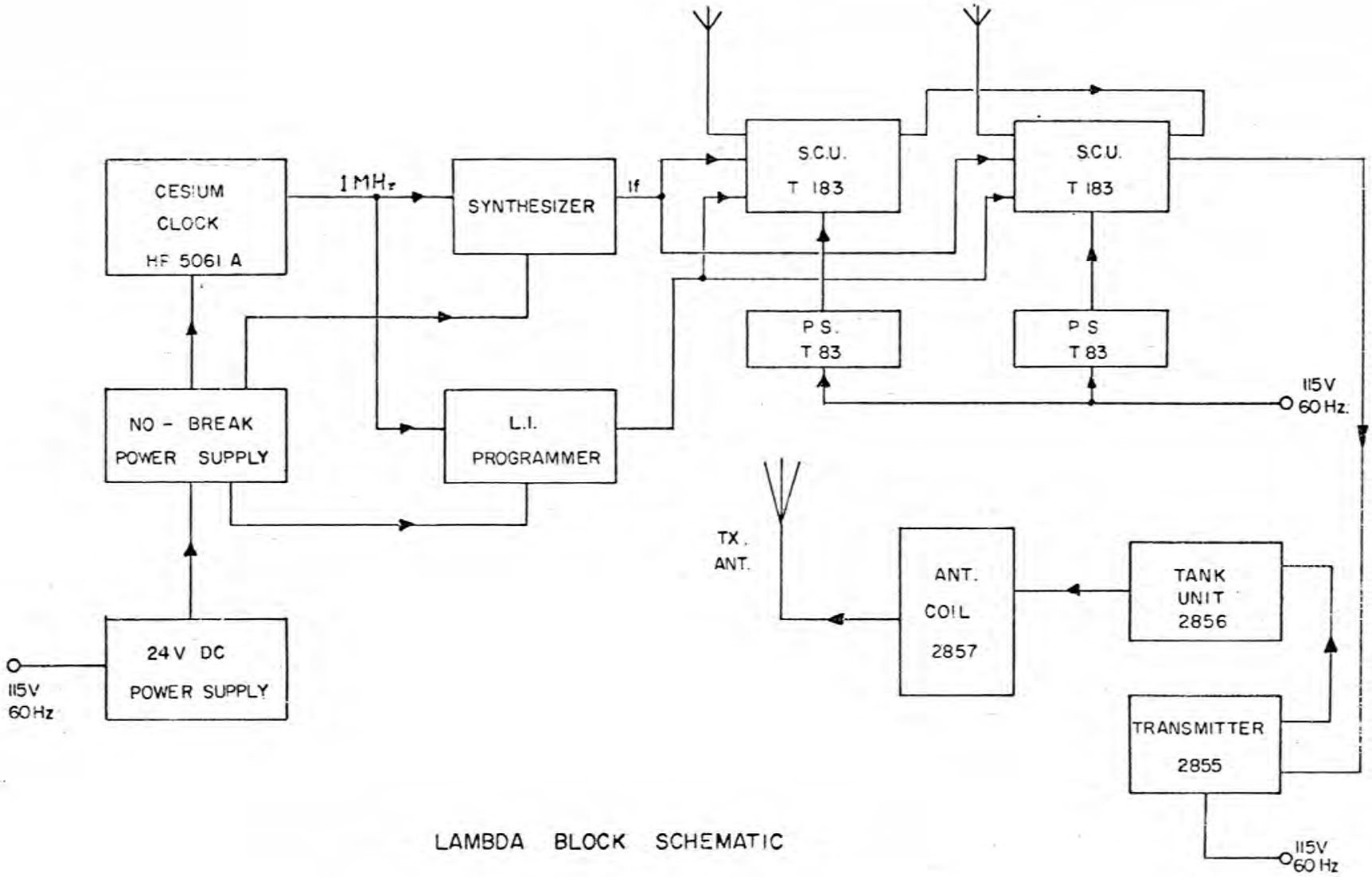
The transmission of a Lake Identification signal is normally initiated at the Master by switching the 12f transmission to 11f for 1.3 seconds. This switchover is



LAMBDA BLOCK SCHEMATIC

CESIUM CONTROLLED MASTER STATION

FIG 1



LAMBDA BLOCK SCHEMATIC

CESIUM CONTROLLED SLAVE STATION

FIG. 2.

recognized by the Slave C.U. which changes its transmitted signal to that of the opposite Slave simultaneously with the reception of Master 11f.

In the absence of a Master radiated signal, the simplest method of generating L.I. readings is with a programmed real time clock controlled by the cesium beam unit. The L.I. Programmer supplies the necessary contact closure at predetermined times to each of the Master and Slave control units. The long term stability (1 part in 10^{11}) of the cesium clock is more than sufficient to maintain simultaneous switching at all stations for a 12 month period, once initial synchronism has been achieved.

Installation and Calibration

The atomic clock, synthesizer and L.I. programmer should be installed in a space where mechanical vibration, temperature variations and stray magnetic fields are a minimum. Interconnecting cables to the Lambda equipment should be as short as possible. The optional "No-Break" power supply will maintain the clock in operation for a period of only 30 minutes when the power service fails, hence additional batteries will be required for continuity when the diesel generators are shut down. The 24V D.C. supply shown in Figs. 1 & 2 will have a reserve for at least 6 hours operation of the cesium clock, synthesizer and L.I. programmer.

At the Master Station, referencing of the receiver channels will take place normally, but the 11f and 12f channels, being unused, need not be adjusted. At the Slave, the referencing procedure will be carried out in the normal way.

The locking constants produced by resolving the Tellurometer readings will not conform to a typical value as in the existing system, since the phase relationship between the Master and Slave clocks will be unknown and may represent

any part of a Decca zone. The sector constant will therefore no longer be a typical 1.5 lane in relation to the -0.5 lane, or thereabout, of the lane pointer but will change gradually according to the drift of the clocks. This holds true as long as the clocks and synthesizers are maintained in operation.

Any interruption to either of these units will require recalibration of the system, either by Tellurometer, or by stationing the vessel at some fixed location where the Decca coordinates are accurately known.

The drift between the respective clocks will have already been established from the long term bench tests prior to installation. Hence, on completion of the initial calibration when the sector and fractional corrections are known, a Calibration Calendar may be drawn up, which will indicate the appropriate constants for each day. Since they are no longer constant in value, it is perhaps more appropriate to re-name them "corrections". A portion of a typical calibration calendar is shown below.

Some 2 to 4 weeks later, a repeat calibration should be carried out to confirm that results of workshop conditions are being duplicated in a field environment. This period is seen as the minimum time in which a trend can be verified with any certainty.

In the example it is assumed that the bench tests provided drift figures corresponding to an increment of .0124 Red lane per 24 hour day and a decrement of 0.0031 Green lane per day. The readings listed are those to which the Decometers should be set when referencing. The lane pointer readings are expressed relative to any major line on the scale.

Calibration Calendar

Location_____ Date _____

Ship _____ Equipment_____ Chain Freq._____

Clock S/No Master_____ Synthesizer S/No Master_____
Red _____ Red _____
Green _____ Green _____

DATE	RED			GREEN			REMARKS
	L.F.	LANE	SECT	L.F.	LANE	SECT.	
	+.0124			-.0031			Drift/day
Aug 18				0.19	1.2	28.3	Green cal.
19	0.33	0.3	9.8	.19	1.2	28.3	Red cal.
20	.34	0.3	9.8	.185	1.2	28.3	
21	.355	0.3	9.8	.18	1.2	28.3	
22	.37	0.4	9.8	.18	1.2	28.3	
23	.38	0.4	9.8	.175	1.2	28.3	
24	.39	0.4	9.8	.17	1.2	28.3	

Lane Ident Programming

The choice of most suitable interval between each series of L.I. transmissions and the number of L.I.'s in each sequence will generally depend on the type of survey operation and the area being worked since the routine seems to differ from one project to another. Too few idents means an unnecessary wait for lane confirmation, while too many causes excessive disturbance of the fractional Decometer readings.

One suggested compromise would be a series of 3 L.I. transmissions separated by 15 secs. every hour on the hour; and between the hours of 0500 and 0700 when the day's operation normally commences, additional L.I.'s at 15 minute intervals. The lack of voice communication between Master and slave which is sometimes the cause of delays in the present

method of operating would not seriously hinder the ident procedure as the slave should never be incorrectly notched.

A feature of the L.I. Programmer which would assist in lane identification when radio communication is available is the provision of a NORMAL/CONTINUOUS switch. When set to CONTINUOUS, L.I. switching would take place at 15 sec. intervals until the switch was restored to NORMAL.

So far, we have described the method of initiating L.I. transmissions and the choice of sequences, but we have not looked at synchronising the real time clock on the ship with those at the Slaves. For correct lane ident operation, the synchronising should be achieved to within 0.1 sec., bearing in mind that a margin of only 0.15 sec. overlap exists at the leading and trailing edges of the Slave L.I. period.

Since voice communication invariably exists between ship and shore, a tone operated keying circuit has been devised which ensures synchronization to within 0.001 second. The 1 kHz tone is transmitted by the single sideband radio aboard the ship and received by the Slave L.I. Programmer via the station radio. After setting the Slave Programmer clock to the next even minute and arming the tone circuits, the cessation of the 1 kHz tone from the master which occurs on the even minute, starts the Slave clock. The Programmer would then be checked for correct synchronization by setting the L.I. sequence switch to "CONTINUOUS" on both ship and shore installations.

Conclusions

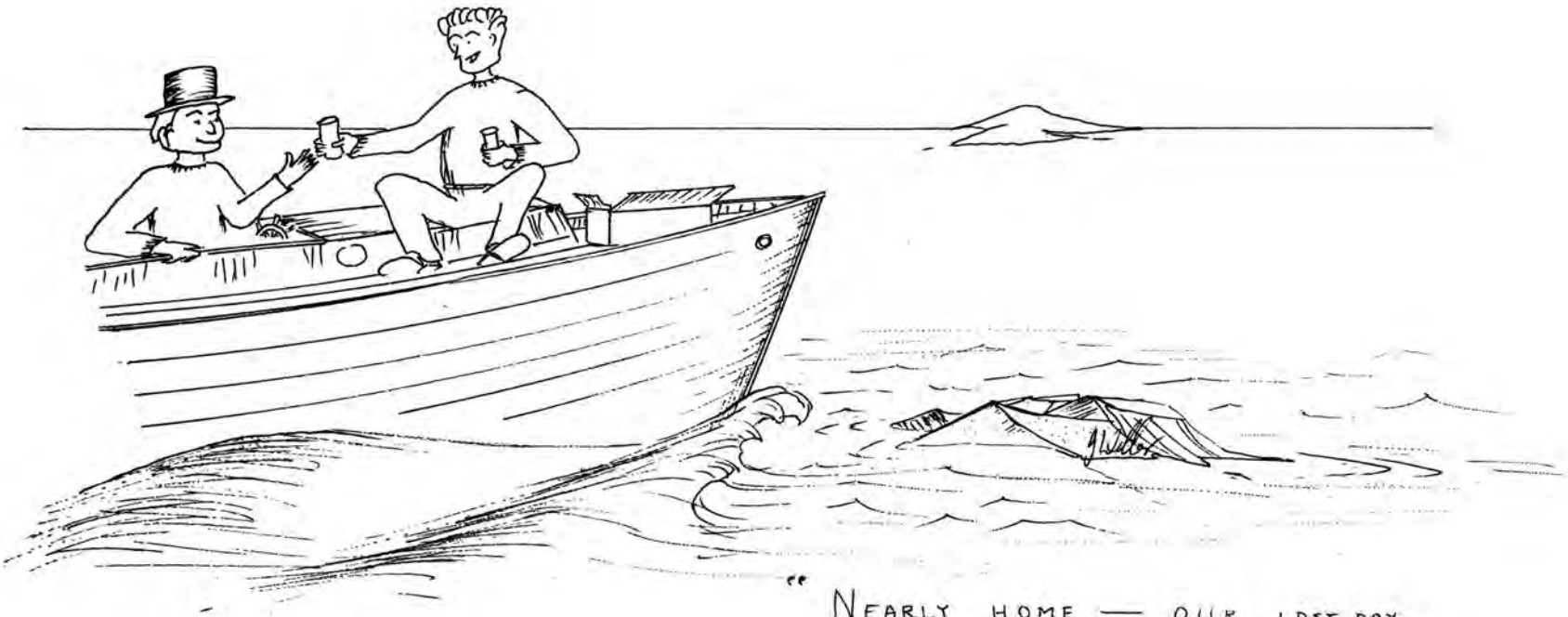
Having examined the advantages and disadvantages of cesium controlled Lambda system, with due allowance for some factors which may have been overlooked, one must logically ask the inevitable question of whether it is worth the high initial cost of the additional equipment.

To many users, the lower accuracy brought about by the increased lane width will seem a further high price to pay for the advantages of a multi-user, increased range system. However, there may also be a solution to this problem, if one is prepared to develop the system further. Nowadays most data acquisition methods use automation to some degree, which generally requires A to D converters using electronic digitizers. The relatively simple modification of doubling the digitizer clock frequency will restore the lane width to its normal dimensions. A conversion chart would then be required for the Decometer display.

Perhaps the aspect which would appeal to most prospective users of this system is that it is a logical step towards attaining unmanned stations, for undoubtedly this is the area where most cost saving could be achieved.

Obviously many problems remain to be solved, such as automated antenna tuning, extended diesel operation and possibly a data telemetry link to report back the status of certain vital functions, however the expenditure on additional equipment could well be justified if for example the operation is located in the Arctic or similarly isolated area.

submitted by: A.R. Falconer
Survey Division
ComDev Marine



"NEARLY HOME — OUR LAST DAY,
AND WE'VE HAD NO ACCIDENTS"

So What Is New In Compilation?

Can you date this within five years?

> "The use of photo-reduction techniques was discussed with the Ordnance Survey who were asked to reduce two plans of Victoria and Esquimalt in _____ with a statement of costs."

Answer - see page 30.

PRESS
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INAUGURATION OF BRITAIN'S FIRST HYDROGRAPHIC SOCIETY

Britain's first Hydrographic Society was inaugurated at a meeting on Friday, March 24 at the headquarters of the British Petroleum Company.

The Society's object is to further the science of surveying at sea and related activities. Measurement and investigation at sea is the province of the hydrographer, oceanographer, geophysicist, geologist, engineer and mariner. It is their work which precedes and complements the many activities of offshore industry such as port conservancy, pollution control and mineral (including gas and petroleum) exploitation.

Under the Society's first President, Rear Admiral G.S. Ritchie, CB, DSC, FRICS, the Society will represent this marine community on an international basis, its membership embracing all branches and levels of experience.

Rear Admiral Ritchie, who last week was presented with the Founders Medal of the Royal Geographical Society, said in his Presidential Address: "The Society is breaking new ground in uniting in its membership all interests associated with surveying at sea, including the manufacturers of the surveyors' instruments and those who use the surveyors' services as well as the surveyors themselves. This should lead to refreshingly frank exchanges of views."

Honorary Secretary of the Society is Alan Ingham, Senior Lecturer in Hydrographic Surveying at the North East London Polytechnic and the Society's secretariat will be based at NELP's Waltham Forest precinct. It was the Department of Surveying

....(con't.)

there which in 1969 initiated short courses in all aspects of surveying at sea. These are still the only courses available to the offshore industry in the world today.

The formation of the Hydrographic Society is seen as a timely move by all concerned in this era of rapidly evolving technology and increasing investment offshore.

For further information, contact

A.E. Ingham
Hon. Secretary
North East London
Polytechnic
Dept. of Surveying
London E17 4JB

28 March 1972

A TALK GIVEN TO THE CENTRAL BRANCH OF THE CANADIAN HYDROGRAPHERS ASSOCIATION, BURLINGTON, ONTARIO MARCH, 1972

Canadian Sailing Directions - Some Recent and Planned Changes

The Sailing Directions have been in existence for considerably longer than the charts themselves. Canadian Sailing Directions, or Pilots as they have been called, have been modelled along the lines of those produced by the British Admiralty, which have been published since 1828. The style and format of these publications, although revised from time to time to include the latest information, has changed very little in the past century. Fortunately, I am pleased to be able to tell you, the British and Canadian issues are undergoing a major overhaul. Likewise the Americans, both the U.S. Navy Oceanographic Office and the National Ocean Survey are now making major changes to these books.

During 1968 the British Admiralty undertook a major survey of the mariners' opinions of the Pilots. In total they received answers to questionnaires from a total of 780 sources. Included in their survey were 149 naval vessels, 420 merchant vessels, 27 pilotage authorities and 33 yachts. Some of the more interesting questions asked were:

	YES	NO
Are views useful	64	34
Would oblique photographs be of value	77	16
Are radar PPI photographs useful	52	39
Are diagrammatic directions more acceptable	84	12

.....con't.

Among the more special requirements: A noticeable number of requests for pictures of lighthouses. The opinions of the need for radar PP1 photographs were, as can be seen, quite mixed. The weakness of the system is, of course, the difficulty of viewing from different antenna heights and differently tuned sets. It may be seen that there is a high number in favour of diagrammatic directions, presumably to cut down the text, and make the meaning more understandable. The Supplements came in for some criticism with various methods suggested for their improvement of updating the Pilots. I have only touched here on the key features of this very detailed study but it did in reality form a basis for the new Canadian approach. Before going on to describe the present Canadian system it may be interesting to discuss the direction the Americans have taken.

The National Ocean Survey has taken a rather intermediate road and I shall therefore describe the more radical U.S. Navy Oceanographic format. This is well described on the back of their Pilot Chart for the North Atlantic Ocean for April, 1971. The NAVOCEANO System was much quoted by Lt. Cmdr. Forrest in his recent talk at the Hydrographers' Conference. The Americans also carried out a Customer Requirement Study and were told that the Sailing Directions were unusually voluminous, lacked sufficient graphics and were too detailed. In their study they also noted some disconcerting facts, such as the fact that the only references to electronic navigation were some recently added items on conspicuous radar targets.

The new concept for the NAVOCEANO Sailing Directions involved a quite new approach. They have succeeded in reducing the 70 existing volumes into 35 En route Sailing Directions and 8 Planning Guides. Information on ports that was previously scattered throughout the 70 volumes has been included in an expanded edition of The World Port Index. In all their volumes

they will now make extensive use of diagrams. Diagrams will be used to describe winds, weather, tides and currents. There will be panoramic photographs annotated to identify prominent land marks. Directions for entering ports will be shown diagrammatically with side references being made to sketches and photographs of prominent land marks.

Let me return now to the way the Canadian Hydrographic Service is going at present. Our direction has followed to a certain extent, that of the British Admiralty but hopefully including some Canadian input. The main differences to be found in the new editions, the first of which will be published later this year, as follows:

1. Chapter 1, a general information chapter, will appear in a standard format with three parts.
   Part A - General Information
   Part B - Geographic Information and Broad Description of Port Facilities Available in the Area
   Part C - Natural Conditions
2. The use of oblique aerial photographs to aid in describing certain harbours, bays, etc.
3. The term 'Pilot' replaced by 'Sailing Directions'.
4. A soft cover of new design will be used.
5. A computerized photocomposition and text editing method will be used.
6. Supplements will not be issued for the new editions and in future new editions will be published more frequently.
7. The 'Index to Charts' will face page 1 when folded out.
8. The following subject matter will be deleted:
   a) Notes on fixing position.
   b) Use of oil for modifying the effect on breaking waves.
   c) Rules for revolving storms.
   d) Rules concerning mine-sweeping operations.
9. Description of lights is confined to non-charted information.

10. Description of buoys confined to major buoys only; light characteristics of buoys not given.
11. Mention of fog signals will only be made if useful, non-charted information is available.
12. Chart references have been reduced to only the largest scale chart of the area being described, except when area described overlaps two charts.
13. The indented references in the index of existing editions will be deleted.
14. All numbers and fractions will be expressed in figures.
15. Diagrams of buoyage systems and ice limits (if applicable) to be included.
16. Details of traffic separation schemes and off-shore oil, gas and mineral exploration to be included.
17. Page size increased to 8" x 10" with two columns on each page.

I do not believe that the above list identifies a more fundamental principle and this is an objective of cutting down the considerable duplication that exists at present between the Sailing Directions and the charts. I see no point whatsoever in describing in text what is clearly shown on the chart, other than particularly dangerous features, such as off-lying rocks. In this case the text serves as a warning.

In our efforts to streamline the text the question of Special User editions has arisen and it is planned to produce some small boat sailing directions. You are perhaps aware that one for the Trent Severn Waterway will be written in Central Region and one for the Gulf Islands will be written in the Pacific Region. The Small Craft volumes will use a different style of language and format in order to make them more digestible for the yachtsman. Some attention will be paid to aspects of tourism and tourists needs, although I do not believe that we have agreed to get down to such fundamental needs as the locality of the local liquor store.

I should like to devote some of your time to describing in greater detail the plans for automating the production. In the first place, for automation to be economically efficient a fairly large production volume is needed and Canada, unlike the U.S.A. and U.K., has a small production volume. The fourteen volumes and the 1971 sales as reported by Information Canada are as follows:

Arctic Canada Vol. I	683
Arctic Canada Vol. II	67
Arctic Canada Vol. III	94
Labrador and Hudson Bay	82
Newfoundland	149
Gulf of St. Lawrence	192
Nova Scotia and Bay of Fundy	221
St. Lawrence River	316
Great Lakes Vol. I	555
Great Lakes Vol. II	660
Great Slave Lake and Mackenzie River	83
British Columbia Vol. I	986
British Columbia Vol. II	273
Total	4441

These figures must be read with the understanding that sales peak after the issue of a new edition with the weight being taken up by the free issue of Supplements in between. The low sales volume made the initial economic studies of automated methods rather poor but it was decided that the key issue was to provide the mariner with a better product. Since automating meant doing away with the Supplement System, which I think all mariners will agree is very unsatisfactory, it was decided to go ahead. It might be remarked that although the U.S. agencies are now moving into an automated era the British, are, as far as I know, still holding back.

Three Systems were studied, IBM, Alphatext and McClean Computer Graphics. Basically, you get what you pay for. IBM appeared to be a rather laborious process for the operator but was cheap, Alphatext was easier but required a trained operator and your own terminal, was medium priced and McClean was a 'hands off' System where we simply sent them the typewritten text and they did all the work and we paid accordingly. Since it was found that the Inland Waters Branch already had an Alphatext terminal and trained operators it was decided to go that way.

Now, how hoes Alphatext work? The typed copy, prepared by the Sailing Directions' writers, is marked up and a specially trained operator re-types the manuscript putting in code to indicate to the computer where italics, capitals, new paragraphs, etc., are needed. The output from this machine is a rough sheet that gets sent back to the writers for editing and a magnetic tape. Later any corrections can be readily typed and the tape edited. This is now the text bank. To produce the final copy, the tape is input to an automatic photo-typesetting device that is on line to an IBM 360 computer. The device produces the characters on a Cathode Ray Tube and with a lens system exposes the type onto photographic film. The photoset pages can now be used through standard modern printing processes to produce the black and white pages.

Instead of producing supplements, the text bank on magnetic tape files is re-edited and a total new text prepared. In order to cut costs and since the books are now only required to last for one or two years instead of the five to seven years previously, soft covers will be used instead of the costly hard covers. These covers will, hopefully, be quite attractive and a more pictorial presentation is proposed and will be made of some plasticized material. Since under the old system a mariner only had to buy a Pilot once every five years or so and had free Supplements in between, it may be necessary to lower the

price from the present $5.00 on these new yearly editions, although it is my opinion that the convenience of the new System will greatly outweigh the added cost.

Although a move is now being made I feel that we still have a long way to go to improve the format. The British and Canadians appear to have taken a rather conservative step forward and I believe that the NAVOCEANO System has some very interesting characteristics that we should study. The diagrams illustrating courses to steer seem to be a particularly good idea.

Finally, let us get back to the data that must be collected to make the Sailing Directions a valuable aid to the mariner. I am sure that many of you will agree that the field sheet is inclined to take precedence over the gathering of information for the Sailing Directions. This is rather natural but looking back to the earlier days of hydrography you will find that the early hydrographers were 'marine observors'. True they had more time when the winds were foul than their modern counterpart with his Bertram Launch but if the Hydrographic Service is to fulfill its total mission we cannot specialize on sounding data to the exclusion of everything else. It is absolutely no use whatsoever for the hydrographer to come back from his survey and then glean information for the Sailing Directions from the field sheet - even a first year compiler can do that in Ottawa. No, what is needed, are observations in the field. The hydrographer often has the unique experience of staying for several months in one area. During that time he can talk to the local people, including particularly those whose business takes them to sea, study the natural conditions, note the areas where the tidal currents are unusual and generally fill in all the details that <u>cannot</u> rather than <u>can</u>, be gleaned from the field sheet.

Since I believe that a person who is new or passing through an area obtains a different type of impression from those

who remain there for some time I see it as worthwhile collecting data in two ways. To this end, in spite of the fact that 'BAFFIN', 'KAPUSKASING', 'MAXWELL', and a charter vessel are working around the coast of Labrador and Newfoundland this year, I have arranged to have two of the Sailing Directions' writers and one of the Planning Staff travel on the coastal steamers around those same coasts this summer. It appears to me that hydrographers on Revisory Surveys can make a very useful contribution, since they also are transients and will obtain frequent first vivid impressions.

I hope that this discussion has not bored you. I regret the lack of preparation and without doubts some slides or photographs might have enlivened the presentation. However, I hope that you will look forward as much as I to the first of the new books and when it comes remember that it is just a start and your constructive criticism is needed for future improvement.

Thank you.

A.J. Kerr,
Hydrographic,
Planning and Development,
March 29, 1972

AJK:cm

ANSWER:

1861 Quotation from 'The Admiralty Hydrographic Service' page 75, Vice Admiral Sir Archibald Day, pub. HMSO


"YOU SAY I SHOULD HAVE BEEN
PUSHING THIS BUTTON ALL DAY...?"

FROM THE GLOBE
TUESDAY, AUG. 19, 1845

LOSS OF STEAMER KENT
(From correspondence Detroit Advertiser)

Steamer 'KENT' sunk ----- several lives lost

Dear Sirs:

At half past three A.M. this day below Point au Peller on Lake Erie the 'London' Steamer from Buffalo and the 'Kent' Steamer on her downward passage came in contact with a dreadful crash and the result of the concussion was the loss of the latter boat and I grieve to add, several lives.

I have no heart to dwell upon the scene which we witnessed. For some minutes we supposed that we had broken the machinery of the 'London' and were going to the bottom; and were only relieved from the apprehension of a watery grave by the sight of the 'Kent', rapidly sinking at our bows.

Every effort was made to save her passengers and all who were in sight were saved; several of those from the cabin being transferred to our boat without even their clothes. But sad to say a number were lost, being unable to gain the upper deck in time.

Among these we reckon:

Rev. James E. Quay, Bedford, Mich.
Mr. Chauncey Osborne, Genesee, N.Y.
Mr. Seth Deming, Berlin, Conn.
Master Bruce Deming, Galena, N. Y.
James Lowden, Ypsilanti, Mich.

Two young ladies and a boy from near Ypsilanti, names not known.

All the officers and hands of the boat and seventy-nine passengers, including ten children were saved.

Without any formal proceedings on the subject our passengers have endeavoured to ascertain the cause of this dreadful accident and we have no doubt it occurred in consequence of the error in the 'Pilot' of the 'Kent', attempting to pass on the wrong side of the 'London', which brought her directly across the bow and at this the Engineer of the 'London' as soon as he saw the course of the 'Kent' shut off his steam, yet his boat had so much headway that the 'Kent' was cut down in front of her wheelhouse. We remained five hours with the wreck, gathering floating parcels of baggage and attempting to tow the hull ashore, but she gradually sunk by the head and we were compelled to perfrom the sad office of hoisting her flag half mast and leaving her to her fate.

The 'London' is not at all injured. Our passengers have done something to relieve the necessities of the sufferers -- the ladies dividing their wardrobe and the gentlemen opening their purses.

Yours,

T.

FROM THE CHATHAM GLEANER
AUG. 26, 1845

To The Editor Of Chatham Gleaner

STEAMERS KENT AND LONDON

Dear Sir:

We have been furnished with 12 affidavids of parties on board the Steamers London and Kent, and cognizant of the facts on the occasion of the late disastorous collision on Lake Erie, resulting in the loss of the latter vessel, which contain full and authentic information relative to all the circumstances connected therewith, and we conceive it is a duty we owe the public, and in justification of the officers and crew of the Kent, to lay before them, through the medium of the press, a correct account of the occurance, which will disabuse the minds of many who may be erroneously impressed by the mis-statements which have already found their way into the public prints.

It appears from the depositions on oath of several good seamen, who composed the watch aboard the Steamer Kent at the time she was run down by the London, that she, the Kent, left the wharf at Detroit, in the U.S. at half past six P.M., and after touching at Windsor and Malden in Canada, on the Detroit River, finally sailed from the latter place on her trip to Buffalo, in the State of New York and situated at the outlet of Lake Erie, between 8 and 9 o'clock on the evening of the 11th instant, having on board 97 passengers.

She pursued her usual course down the Lake until about 2 o'clock on the following morning, when Captain Laing retired below, leaving the vessel in charge of the mates watch with instructions to 'be careful and try the water round the reef,

Point au Pele spit, and when clear of it, to steer north-east by north, so as to keep close to land and make smooth water. These orders were accordingly obeyed, and sometime afterwards the watch on deck of the Kent described the light of the London about 5 miles off, some distance on the starboard or right hand side of the Kent, steering up the Lake. The Kent continued on her course down, and the London continued steering up the Lake in a parallel line with her, but as before stated, some distance to the right or seaward. Thus they continued on their respective courses, and the mate of the Kent, seeing the London would shortly pass stepped to his bell rope for the purpose of ringing the customary salute, and while there, the London having come within two cables length or so, nearly abreast of the starboard side of the Kent, she, the London, began to swing towards shore, running directly into the Kent; one of the wheelsmen of the Kent had just previously to this said to the mate "David, are you not going to give her a bell", but suddenly turning towards the London shouted "she's swinging into us". David Paten, first mate of the Kent, who still stood at his bell rope awaiting the salute of the London, she being the larger boat, instantly looked about and discovered that the London was swinging completely round and making in a direct line for the side of the Kent, gradually altering her course in such a manner as could not fail to bring her in contact with the Kent. The make of the Kent at this time heard distinctly an order on board the London "Hard a port", and in the hope of being able in some measure to avert the shock, ordered his vessel "Hard a Starboard" and the Kent had obeyed her wheel insofaras to vary her course one or two points to the Northward, or in shore, when the London's starboard bow struck her forward of the starboard paddle box, and her stem cut forward to the Kent's firehold; at this moment one of the watch on the Kent rushed onboard the London, went to her compass and found she was heading northwest by north. The Kent was found to be heading at the same time northeast by north half north. The London had thus swung from her own course (southwest) 8 or 9 points and when she struck the Kent was running within 6 or 7 points of the Kent's course, which accounts for the incision in the Kent

raking forward and also for the London striking the Kent with her starboard bow, staving in her own bulwark rails, guard stanchians and receiving other injuries, while her starboard bow was uninjured.

Capt. Laing of the Kent, immediately on the collision taking place appeared on deck, where a scene of indescribeable confusion and distress ensured, the vessel was sinking fast, and the attention of the Kent's crew was directed to the safety of the passengers, amongst whom were many ladies and children, and it is believed that all the passengers with the exception of about 8 or 9 who met a watery grave, were hurried aboard the London, some with scarcely any clothing, and all having lost their baggage.

The Capt. of the Kent demanded in a loud voice, 'why the London did not lower her boats and attempt to save those who were still clinging to the wreck, and the baggage which was everywhere floating about. Boats were afterwards lowered and a few articles picked up. The Kent had in this time gone down, excepting the stern, which still remained floating, showing the cabin windows out of the water; she was then towed by the London some short distance towards Point au Pele: a great deal of baggage and valuable property might have been taken off her stern and from her cabins at this time, but she was cast off by order of the Captain of the London and both property and vessel abandoned about 10 mi. from the nearest point of land. The officers and the crew on the Kent with her passengers returned to Detroit in the London. The wreck has since been inspected by the owner and found to lie in 12 fathoms of water.

The statements which have appeared in the Detroit papers, and been copied widely throughout the country, originated on board the London and who it is not probable, would willingly state anything in crimination of themselves.

Had the London kept her usual course S.W. she would have passed the Kent as she has invariably done before, to the seaward; or if the London had kept her course when she had neared the Kent on the starboard bow, there would have been no collision; but by the testimony on oath of men from her own decks, who had looked on from the time the Kent first, have insight on the inside course, she, the London, made a complete half circle towards the Kent when almost abreast. When the two vessels came in contact, the London was steering northwest by north, instead of southwest her proper course.

W. & W. Eberts
Stockholders, for the Proprietors

SUMMARY OF
1971 FIELD SEASON
WITH
TECHNICAL OPERATIONS

J.M. GERVAIS

INTRODUCTION

There will probably be many questions asked at the end of the field season. Questions like: What did you do? Where did you go? How hard was it? Did you like it? These questions are the main reason for this report. Generally speaking, the report will give an idea of what is expected of a hydrographer who decides to transfer for one field season. This paper will review the work involved in each type of cruise and the work done outside them. The report will finally state my opinions and recommendations.

The Technical Operations section is composed of approximately twenty-five (25) people of which fifteen (15) end up working on the two major vessels: the LIMNOS and the M.V. MARTIN KARLSEN. These two vessels are the main two work horses of the section. It is on these vessels that most of the centre's projects are performed. These projects may vary in form but they all have one thing in common: collecting data for the development and the better understanding of the ecology of our lakes. For this reason alone, most of today's sciences are put into practice here at the centre. Both ships are more or less floating laboratories and it is in these that most of the different preliminary analyses are done. What is being analysed may vary from water samples to mud samples or from depth profiles to current directions. There are many parameters being studied and the major ones will be discussed later on.

When is all this being done? The field season starts around March and ends sometime in December. Most of the large projects are run during these nine months. Depending on the size and the location of the projects, they may last from one to three weeks at one time and they involve working either shift work or day work. Because of the preparation between

cruises, there is usually a break of a couple of days between them. These few days are usually used to unload the samples obtained and to load the necessary equipment for the next cruise. Because of the distance and the time involved, the ships do not necessarily dock in Burlington. If work is being done in the upper lakes, the ships will either dock in Port Colborne or in Sarnia. Of course, after a cruise in Lake Ontario or if there is a fairly long period of time between two cruises, the ships will dock in Burlington. If not, there is transportation available to bring the technicians back to Burlington.

SUBJECT MATTER

Now that the working conditions have been laid out, it becomes necessary to discuss the type of work being done and where the technician fits in all this. This next section will try to explain briefly the different kinds of projects and where each one is being performed.

The Monitor cruises are probably the most important and the most frequently performed projects during the field season. Each lake has a number of stations from which water samples are collected at various depths. The water sample is obtained from a Knudsen bottle(see diagram 1) which also records the temperature at that specific depth. That sample of water is then analysed chemically in the laboratory. The other main function involves taking a continous profile of the temperature versus the depth at that station. This is done by lowering a torpedo-like shell to the bottom (see diagram 2). In the shell, a small needle scratches the graph on a gold-dusted plate as the torpedo is lowered. A new pressure type system has replaced this old method. It consists simply of

pressure gauge and a temperature sensitive resistor. As the tube is lowered, the pressure gauge records the depth and the resistor suffers temperature changes. By connecting the instrument to a machine the continuous graph (see diagram 3) can be observed at the surface. A new method of collecting water has also been designed. They have now built a pump which sucks the water up into a fosset at the surface. All there is to do is lower the pump arrangement to the prescribed depth and turn the pump on. At present, all the methods described alone are in full use on the ships and are performed on all three lakes -- Ontario, Erie and Huron. The technicians work shifts during these analyses: 4 hours on, 8 hours off,etc.

The second major type of project is the Mooring cruise. This consists basically in launching and retrieving current meters. Among the different procedures the technician must take a Knudsen bottle cast at the current meter depth before retrieving a meter and one after launching a meter. The correct length of ropes and wire must be measured, fastened(see diagram 4) and laid out on deck before arriving on a station. Because the meters contain a magnetic tape they must be calibrated before lowering them in the water and they must be checked once they are out of the water to ensure that they are functioning. Current meters are placed in Lake Ontario, Lake Erie and Lake Huron and they are usually replaced once a month. Daylight is required for this operation therefore work can only be done during the daylight hours and there is no shift work.

There are usually two or three Geology cruises run throughout the summer. Bottom samples are the main importance in these cruises. These samples are collected from a variety of instruments (see diagram 5) and the only parameter necessary to chose one instrument over another is the bottom characteristics (mud, sand, rock, etc.) The same applies to the type of corers used. Some of these samples are analysed immediately in the laboratory but most of them are preserved in plastic bags or

plastic tubes and returned here to the centre to be further analysed. The second major operation done during these cruises is track sounding. This is probably the only work which closely resembles the hydrographic's. The difference lies in the fact that the geologists are interested in the penetration of the soundings rather than the depth. The deep penetration of the 26-B and 26-A sounders permits the scientists to identify the type of bottom and its hardness. The sounding grids are usually 25 to 30 square miles with sounding lines run every mile in each direction. True bearing and distance by radar is the positioning system in use although Decca navigation has been installed. Both Lake Erie and Lake Huron have been surveyed in part in this fashion this summer.

The Organic particle study is another cruise which is done once every month, but this cruise has only been carried out in Lake Erie. Unlike the other cruises there are a variety of activities going on at every station. That, and the fact that these activities take a fair amount of time to finish, limit the number of stations capable of being completed during one week. Most of the experiments are biological or geological in nature. There are three phases to be done at each of the six stations. The first phase consists of lowering a sediment bottle 10 meters below the surface. Basically this bottle traps the sediments in the bottle and permits the scientist to count the amount of particles in a specific volume of water. The operation is a delicate one and the bottle must sit in the water for one hour. While that is going on the scuba divers go down to the bottom and collect a few hand cores. Once the sediment bottle is retrieved an interface sample is taken. The instrument which resembles a glass box with no bottom is lowered to the bottom and the divers gently sink it in the mud. They then slide a sheet of fibreglass across the bottom and raise the instrument to the surface. You then have one cubic foot of an undisturbed chunk of the bottom. As mentioned before, there is a lot going on at each station. Water samples must be

collected for bacteriological and biological studies. Light penetration is also measured at each station. This cruise is always an interesting one for the technicians because there is never a lack of work and of course the overtime is fair because of the daylight working conditions.

There is, however, one job which has not been mentioned up until now because it must be done during every cruise and that is the meteorological observations. These observations must be done every three hours around the clock. The main parameters to be measured include ship and wind direction, wind speed, visibility, barometric pressure, wet and dry bulb temperatures, types and amount of clouds and naturally the position of the ship from which these observations were made. In addition to providing a synopsis to the Weather Bureau, this information helps in the interpretation of the results obtained in many of the experiments.

There is a fair amount of work being done in the office even though the appearances may say otherwise. Charts have to be prepared, data must be tabulated and equipment must be made ready for future use. Admitted that the office work is not as dense as an administrative position would be, the same amount of quality and exactness must be put into it. Most of the work done this summer has revolved around IFYGL -- International Field Year for the Great Lakes. Next season will be a very busy one for this section. Canada and the United States will concentrate most of their efforts to gather as much information as possible from Lake Ontario. This will be the first joint effort to try and fully analyse the lake. Monitor cruises will run more often and current meters will be installed all over the lake. Meteorological buoys will be installed and the scuba divers will play a greater part in some of the projects. There will be seven ships involved in this project. Schedules had to be made for each of them. Charts had to be done showing the number of stations studied during each particular cruise.

Calendars showing the dates of each cruise were also put together by the technicians. All this proves that next year will be a busy one not only for the Operations Section but for the whole centre.

CONCLUSION

In reading these pages one will realize that this type of survey is quite different from our line of work. Nevertheless, the work is relatively simple and after a couple of cruises one can easily fit in with the rest of the technicians in the section. Incidentally, I would like to say that the people with whom I was associated during the past summer were very sympathetic and friendly and that it was a pleasure working with them.

The exchange was a persoral choice and I think it was a good one. I gained new experience in the sense that I was involved in most of the major projects. I even did some diving in Niagara-on-the-Lake where we installed three meteorological towers. Like any other field season, I was glad when it was over, but at least I ended it with a better understanding of what goes on here at C.C.I.W. As mentioned before, there is not much hydrographic work done, therefore if the exchange is to be continued, I think that it should be kept at the ESS 3 or 4 level.

I have tried to keep this report fairly general but there are probably some points which are not too clear. D.J. Williams, one of the technicians in the Technical Operations, has put together a manual containing all the methods and procedures used in the field. The book is called 'Manual of Methods for Limnological Observations of the Great Lakes'. Any questions will probably be answered by glancing through the manual. Our library should have a copy of this book.

If there is to be a transfer again this summer, I am sure that the candidate will enjoy his summer.

J.M. Gervais

MONUMENTING AND DESCRIPTION OF SURVEY STATIONS

J.H. WELLER
C.S.S. W.J. STEWART
CANADIAN HDYROGRAPHIC SERVICE

MARCH 1971

Monumenting and Description of Survey Stations

This is a particularly important part of our work, yet so often we probably regard the actual monumenting and description of our Control Points as being a rather annoying incidental to be done as simply as possible -- preferably by someone else -- just to show that we were once here. But this has a far more important role.

The reason that monumenting and description are so important is that we will not be the only hydrographers to do a survey here. Civilization being the overwhelming creature that it is, any area where we are sent to do a survey will undoubtedly become more active in the future. Perhaps our seaplane base here will enlarge and develop into a busy Marina, which will then require charting of the area in greater detail. Not the 1:25,000 of our work, but more probably at a scale of 1:2,500.

Hydrographers of the future will be sent out with copies of our field sheets and they will need Control within which to hang their own completed survey, just as we do. And how much quicker and easier their work will be if they have our monumented Control Points to work from, but to be of any use our monuments must be permanent, accurately sited, and -- above all -- well described so that those who have to look for our Control Points don't need to hunt through the bush looking for a vaguely described soil post, only to find that it is no longer there.

In the past few days I have spoken to most of you on these matters, and many of you mentioned poor monuments and poor descriptions -- but we must realize that the men who did the work before us were hydrographers like ourselves and just as conscientious as the best of us, so the probability is that

each of us will one day make some blunders in Monumenting and Description, but the point of this lecture is to try and show us what can go wrong, and how it should be done.

The whole purpose in our monumenting a station is to leave a mark which is as accurate and as permanent as we can make it. To this end we have our choice of markers. The most satisfactory of these is quite obviously the Rock Post which is a bronze plug with a $2\frac{1}{4}$ inch diameter head. Our work is done to an accuracy of the Third Order, so we are in effect guaranteeing that our plug is centered on the actual point being described, but our Rock Post is quite useless as an accurate and permanent mark unless it is embedded in a suitable medium. Ideally -- as we all know -- this should be horizontal bedrock that looks unlikely to be used as building land in the foreseeable future, but often we must build our stations where the terrain is not the ideal. I shall here give some examples of what not to do.

This summer Raj and I went out looking for a station that was monumented in 1959. We found it. A Rock Post set in a block of concrete some six inches long, four inches wide and four inches deep, sitting atop a small hill of earth and gravel. This was quite useless as an accurate and permanent mark as it was easily lifted up by the curious, and one day some acquisitive American Tourist will take it home as a souvenir of Canada. In such a place a Soil Post would have been much better.

Another example was a Control Point monument found by Raj this summer near Parry Sound. This Rock Post was set in a larger block of concrete -- a foot square and about two feet deep -- on a beach. Alas, the ice and water action had undermined the block and it was lying almost on its side. This was quite useless as an accurate and permanent mark, and

here I think the problem was poor choice of site -- a subject which will be covered in depth in a later lecture in this series.

Another remarkable Rock Post I came across this summer was near the tip of a point of land and I had no trouble finding it. The Rock Post hole had been very neatly drilled and cemented .....in a boulder some two feet in diameter sitting at the water's edge. This was quite useless as an accurate and permanent mark for it probably moves a few feet each winter when the ice passes by.

While on the subject of damaged and useless monuments, I would like to point out that in the years to come we shall all be on Revisory Surveys on occasion, and one of the parts of Revisory is to check on these monuments left by our predecessors, which means that we must report the condition in which we find them so that Hydrographers of the future will not waste too much time searching for a useless monument.

As a last word on monumenting, I must stress the point that what we are monumenting is not just the site of our station but the actual point from which and to which we make our observations, thus the centre of our plug must be plumb below the centre of the mast of our station. So before the cement sets hard we must check with a plumb-bob that the Rock Post is indeed dead centre and not just 'close'. If our monument is not quite dead centre, those who have to use our Control in years to come will have a hard time trying to close their traverse with other Control Points.

The Description of our Control Point is almost as important as the original choice of site and method of monumenting as the Control Point is of little help to the Hydrographer unless he can find it with a minimum of time and effort. In this context I would remark on the fact that I have heard that

not one of us had any notes on this subject of Description beyond the cryptic comment 'from the general to the particular'.

Our descriptions must enable the Hydrographers of the future to find our monuments with the least effort and for this reason the description is written in two parts. The first part takes him to the locality of the survey. For example, it might read: "On the Island of Vancouver, in the County of Saanich, there is a bay known as Patricia Bay," and the sketch will perhaps be a tracing of a Topo Map showing the southern part of Vancouver Island with all the appropriate place names written on it.

The second part of the description might read "On the eastern shore of Patricia Bay there is a Government Wharf of timber on timber pilings, some 600 feet long and 20 feet wide for most of its length. Station DOCK is a Canadian Hydrographic Service Rock Post set vertically in the highest point of a rocky out-crop 245 feet north of the western end of the dock causeway, 35 feet east of the water's edge and 47 feet southwest of the southwest corner of the Anglican Church." And the second sketch would show all the places mentioned, perhaps at a scale of about 1:2,000 which will show the dock some four or five inches long, thus giving the distinctive shape of the dock and positively identifying the "western end of the dock causeway" and other details mentioned in the description.

When describing a monument set, for instance, on the top of a mountain, a scale of 1:2,000 is not adequate. Here the problem is not to find the mountain top -- it is either there or not there, and is easy to identify -- but is where; amongst the rocks, lichen, or bush on the mountain top the Rock Post is. A scale of 1:500 might be better, and use anything available for the description. Use large conspicuous rocks, a rock pool, even a bush. Everything will help, as the plug will probably become mossy over the years; and very difficult to find, even in an open area.

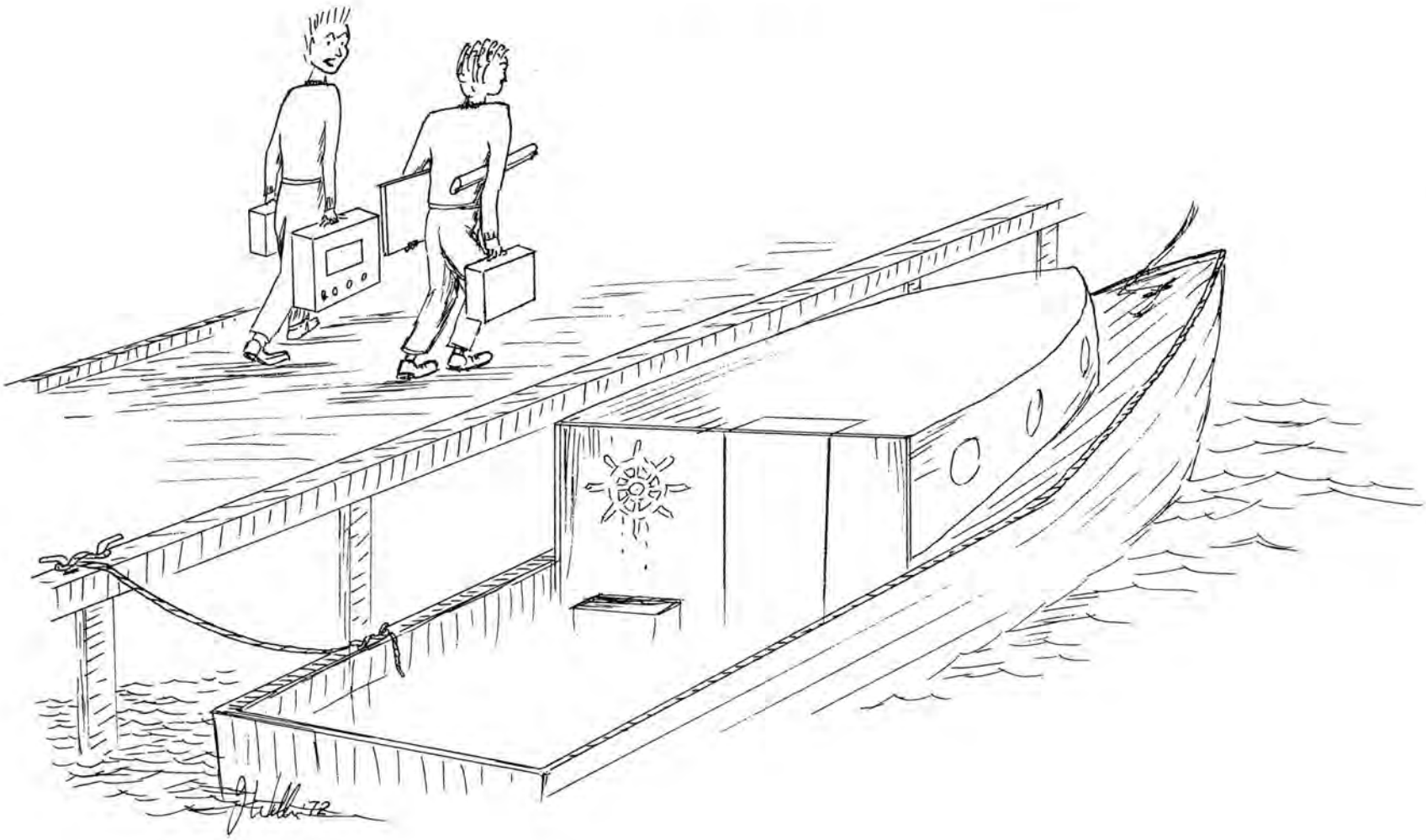
These sketches should be drawn North Up, and must have a North Arrow on each of the two sketches. Show the scale as well, and the number of the Topo sheet or Aerial Photograph used for the tracing on the general sketch.

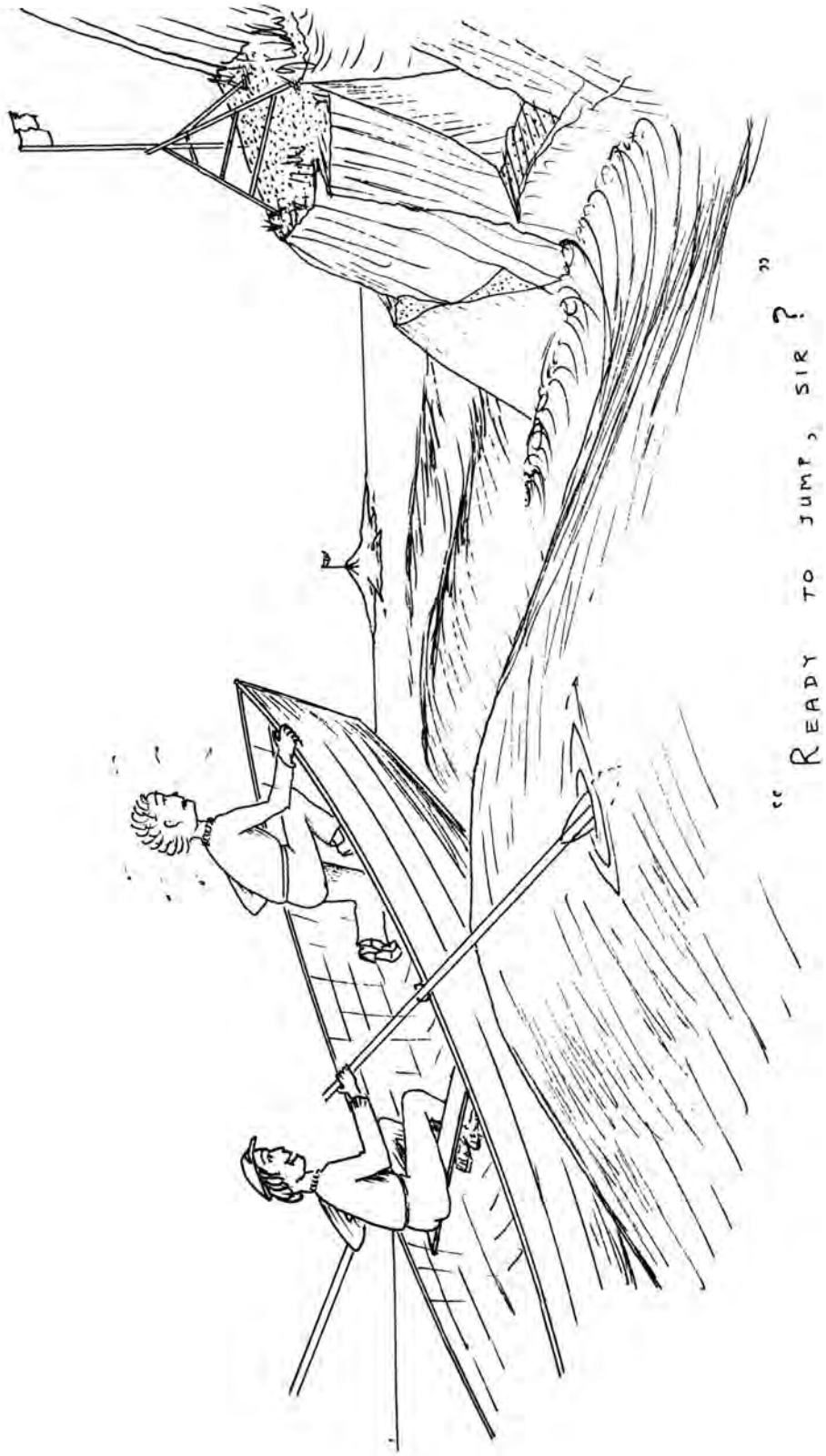
One thing I feel I should mention here about our Descriptions: use reference objects that will probably still be around eighty years from now. Use public buildings or War Memorials or solid natural marks. Use the local flagpole if it is a substantial one and is an official one, but don't use the flagpole someone has in his front garden as the chances are that the next owner will accidentally burn it down one night and build a bigger one ten feet away. Unles a garden wall or gate post is a property boundary, don't use it as a reference point as the owner's wife will be driving his new car one day and will knock the wall down. Or maybe he will landscape his garden and move the wall twenty feet. As I pointed out just now, the exception is when the wall is a definite property boundary marker, for then it is a legal mark and virtually inviolate. If there is a statue of a naked woman standing there, use it by all means. Imagine the delight of a Hydrographer seeking a Rock Post "63 feet south of Naked Woman," but first make sure that it does not belong to the owner of the nearby house as the next owner will undoubtedly be a puritan and will hide her away in the cellar. However, if the statue is maintained by our taxes, you are safe to use it as a reference mark if there is nothing better nearby.

Try not to rely too much on the existing shoreline in your Description as erosion and silting make great changes here, and if the waterlevel rises or falls a foot or two, the water's edge may move twenty feet or more.

In conclusion, I can only repeat the statement that one day someone is going to want to use our Control Points again and we must monument them as accurately and permanently as possible and describe them as best we can. And bear in mind that it may well be one of us that is out there in the 1990's looking for Rock Posts we installed in the 1970's.

"YOU MEAN I SHOULD HAVE KEPT THE USED SOUNDING ROLL..?"




"READY TO JUMP, SIR?"

A SIMPLE METHOD FOR MAKING COPIES OF FIELD SHEETS IN THE FIELD

INTRODUCTION

Once again it became apparent this year that when selecting shoals to be examined from a field sheet a lot of time is being spent inking them in red on an overlay and subsequently surrounding every one of them with a few 'black' soundings. This is supposed to give the hydrographer, whose task it is to find and examine these shoals, a good indication of what can be expected. It takes considerable time to prepare such overlays and it still does not give the hydrographer the overall picture. He does not know whether he works near a channel, generally shallow area or what to really expect. He therefore will have difficulties deciding whether interlining is sufficient or if a "star" is required or a pattern of closely spaced lines perpendicular to each other.

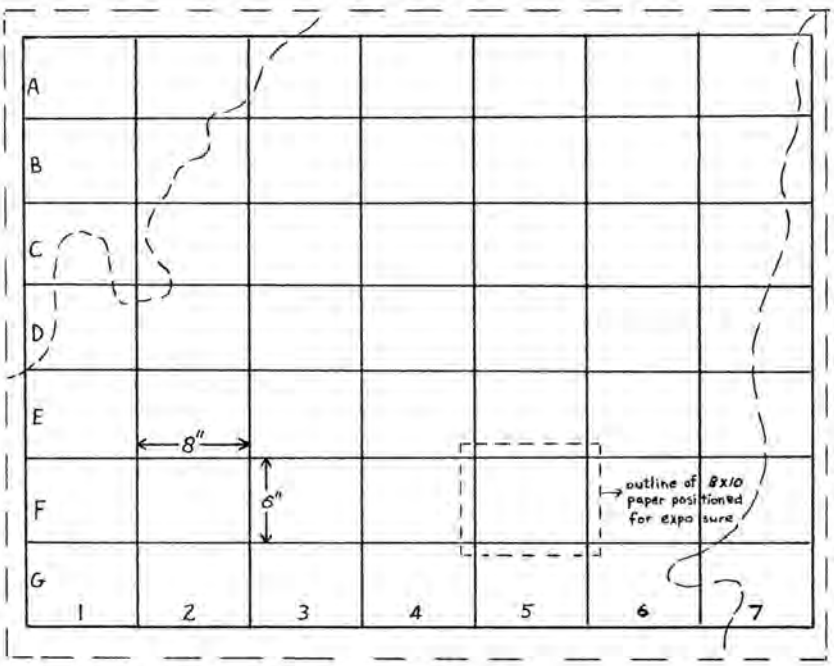
With the large increase in the use of electronic positioning systems in the last few years the hydrographer in charge of a launch becomes less and less aware of what the sounded area is really like. The field sheet portrays the latest available information from previous surveys and the survey being conducted. It would therefore be of great help to the hydrographers running the launches to know whether the shoal sounding to be investigated is either a ridge, a pinnacle, sand dune or other type of shoal. The field sheet gives also a good idea on how far to go off the shoal (once it has been located) with the sounding lines and in which way to tackle the shoal. However, we all know it is impossible to take the field sheet into a boat for a variety of reasons.

We developed a simple method to provide photographs of portions of a field sheet that hydrographers could take out in a launch when doing shoal examinations. The process includes the indexing and processing of light sensitive papers, commonly

known as photographic paper. This process requires such equipment as a makeshift darkroom, photographic chemicals, a few miscellaneous chemical storage bottles, graduated cylinders and a supply of photographic paper. It requires an initial investment of about $25.00. One should count on a seasonal cost of $10.00 to $15.00 for chemicals and other items that are used up on top of the initial investment.

INDEXING

The first step is to prepare a grid overlay (see sketch). This will be an aid in keeping track of the exposures, getting a sufficient overlap and later, orientating the prints in relation to each other and to the survey area. A grid produced with the same co-ordinates on the largest scale chart of the area will also be found useful.



PROCESSING PHOTOGRAPHIC PAPERS

THE EXPOSURE

We will make our prints using the following theory. A negative is placed between the light source and a piece of photographic paper allowing only sections of the paper to become illuminated. The negative can be carried either in an enlarger and be projected down upon the paper or be placed in contact with the paper. The former making 2x, or 3x or any size enlargements and the latter a simple 1x "contact print". We will only concern ourselves with the latter method.

The "negative" in our case will be the field sheet. The paper will be placed in contact with and underneath it. Any transparent glass plate of approximately 10" x 14" x ¼" placed over the two will make the contact uniform. The 8" x 10" paper we have been using was found to be a useful size covering a large enough area. This size is convenient to carry around. The photographs or "contact prints" then will be a series of 8" x 10" sections of the field sheet, each with sufficient overlap.

A darkroom is required for the exposure and development so it must be of sufficient size to hold a table large enough for the field sheet and another table to hold the four trays of chemicals. The amount of darkness one can obtain will have a direct bearing on the quality of the contact prints. Obviously total darkness will be very difficult, if not impossible, to achieve and may not be necessary for the type of work we will be doing. Obviously all main sources of light entry into the room must be blocked. An attempt should be made to reduce the entry of light around door jambs and window sills and joints. A "safelight" is used in the darkroom. This provides all the necessary lighting required while working in the darkroom. Photographic papers are not affected by this light as long as

they are not held closer than 4 feet. The light to be used for exposure of the photographic papers can be, in most cases, the existing lighting in that room. Preferably the light should be positioned over the print area to provide uniform illumination and there should be no shadows cast over it as these will affect the print. Exposure times will vary with the type of illumination used and it is best to experiment. For example, we used a fluorescent light fixture which was mounted onto the ceiling about 10 feet over the table and to the side of the latter. The exposure time was about 2 seconds with the lights fully on using an average contrast paper (Kodabromide, F-3, glossy, single weight). The exposure time will vary widely depending on these two factors: i.e. the type of illumination and the type of paper used, so experiment to find the best time for your conditions.

THE DEVELOPMENT

The chemicals required to process the prints are as follows: developer, stop bath and fixer. All chemicals are mixed with water. Full directions can be found on the cans, bottles and boxes in which they come. The quality of the print will depend on how closely you follow those instructions. The working temperature should be around 68°F for all solutions. However, do not worry too much if it is off by a few degrees. The paper should stay at least 90 seconds in the "developer tray" with frequent agitation. The agitation is important for it replaces the partly exhausted chemical in contact with the paper surface with a fresher part of the solution. It is easiest accomplished by gently lifting one side of the tray and causing a wave flow across the surface. The "stop bath" in the second tray halts the development process. The paper should remain 5-10 seconds in this solution with agitation. The "fixer" is in the third tray and it 'hardens' the print so that it is no longer light sensitive. Once in the fixer for about 1 minute the print is no longer light sensitive and the main light can be

switched on. The permanency of the print depends on the length of time the paper has been in the fixer and for our work we recommend 5 minutes. Finally the print must be washed thoroughly in fresh water of about 68°F and this can be done in a sink, bucket or anything large enough to hold several photos. The water should be circulated and replaced completely every 5 minutes. If this is not possible, agitate the prints and let the water run out and replace with fresh water every 5 minutes. The prints actually 'soak' clean so it is the length of time in the water which is important. Thirty minutes is recommended for the washing time of single weight papers.

The prints can be hung out anywhere to dry. While drying the paper will curl up and this is a normal occurrance especially if they dry too quickly. Once dry, the prints can be placed face to face together in a pile under some books or weights to flatten them again.

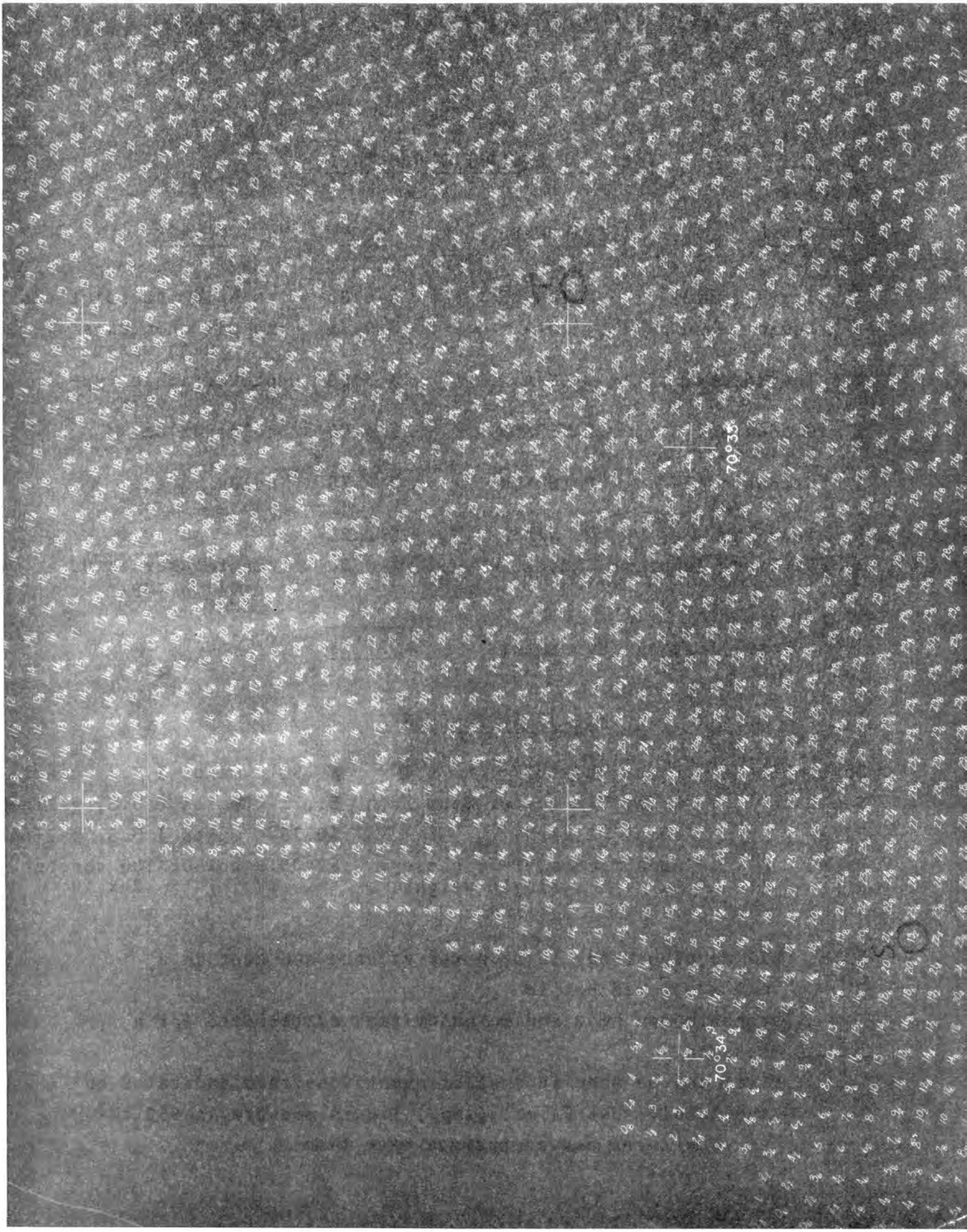
RECOMMENDATIONS

The prints are now ready for use and can be written upon with a felt marker pen. For our shoals we simply circled the suspect sounding in red, gave it an identifying letter and prepared a list with the coordinates of the positioning system to be used opposite the "depth looking for" and above letter. With the photograph with him in the boat, we think the hydrographer can now make a better judgement on how to examine the area he is interested in.

If required, one could add some distance rings or hyperbolas to the photograph by overlaying the lattice on the field sheet. Exposure time will have to be increased and the lattice will come out somewhat fuzzy because it cannot be in direct contact with the photographic paper and will therefore be out of focus. The advantages of this added lattice are obvious.

The chemicals and paper which we have been using were chosen because of our familiarity with them and in the case of the paper, because of a ready supply. They were not designed to do this type of work although the results were acceptable. A little further experimentation with other papers and developers might result in an easier and better quality print. For instance a paper is available designed for contact printing. It is less sensitive than enlarging papers and thus makes for longer exposure times. This enables better control over the correctness of the exposure.

CAUTION: *The instructions in this article apply mainly to the process as described and are not necessarily correct for the processing of papers in ordinary photography.*


70°35'
70°34'

APPENDIX 1

TABLE OF EQUIPMENT REQUIRED

	NAME	BRANDNAME	COST	REMARK
3	Trays (8x10)	PATERSON	$ 6.00	to hold the solutions
1	Ladle	N/A	$ 0.75	to mix chemicals with water
1	Thermometer	N/A	$ 3.00	photographic type only
1	Graduated Cylinder	PATERSON	$ 4.00	holds 42 oz.
1	Graduated Cylinder	PATERSON	$ 2.75	holds 11 oz.
3	Tweezers	N/A	$ 2.25	
1	Darkroom lamp	KODAK	$ 4.50	Wratten series 0, yellow cup.
	Total Initial Investment		$23.25	

SEASONAL PURCHASES

Developer	Kodak "Dektol"	$0.90	makes 1 U.S. quart
Stopbath	Kodak "Indicator Stop Bath"	$1.75	makes 8 U.S. gallons
Fixer	Kodak "Fixer"	$0.70	makes ½ U.S. gallon
Paper	Kodabromide, F-3, glossy, single weight	$9.00	box of 100 sheets 8 x 10

NOTE: all developer has to be mixed at once and kept in a well stoppered bottle

stopbath can be mixed in quantities as required for a session

Fixer can be made in smaller quantities than indicated on the label. Use 5¼ oz. (imp.) liquid measure in 950 cm^3 of water, and reseal package each

APPENDIX 2

TROUBLE SHOOTING

PROBLEM	CAUSE	SOLUTION
Developed sheet completely black	Far too much light	cut exposure to ¼ of previous and try again
Too light, no detail	Not enough light	double exposure and try again
Overall grayness with little detail	1) outside light entering darkroom and striking unexposed paper	1) check for light leaks and block
	2) paper too close to darkroom lamp (safelight)	2) move at least 4ft. from lamp
Soundings appear fuzzy as if not in focus	paper not in contact with field sheet	place glass sheet over the print area to assure firm contact
Good images in only part of print rest in greyness with no detail	Shadow falling across the print during exposure blocking some or all of light in that area	eliminate shadow
Developer seems to get weaker (i.e. developing is taking longer than normal)	1. developer too old	1. replace with fresh solution
	2. developer contaminated with "Fixer and/or Stop Bath"	2. do not dip anything into developer after having been in other solutions. Wash ladles before using them for mixing a different chemical.

APPENDIX 3

KEEPING PROPERTIES OF CHEMICALS

NAME	*STOCK SOLUTION*		*WORKING SOLUTION*
	Well stoppered bottle		
	Full	Half Full	
DEKTOL	6 mos.	2 mos.	1 session
Indicator Stop Bath	concentrate-keeps indefinite		3 days
FIXER	2 mos.		1 week

APPENDIX 4

STEP BY STEP INSTRUCTIONS

1. Mix developer, watch temperature, pour in tray, 32 ounces per tray will suffice.

2. Wash out cylinders with clean water (no soap).

3. Mix stop bath, watch temperature, pour in tray.

4. Wash out cylinders with clean water.

5. Mix fixer, etc.

6. Wash ladle, cylinders, etc. and put aside.

7. Mark trays so you don't mix them up.

8. Place tweezers (one at each tray).

9. Place index grid on table and tape down (must be flat).

10. Place field sheet on top of index.

11. Turn off main light, darkroom lamp on.

12. Remove required amount of sheets of paper from package.

13. Place into box or other device that is lightproof.

14. Put remainder of paper away in safe place.

15. Place 1 sheet of 8 x 10 underneath field sheet and line up with first rectangle of index with light sensitive side up

(the back of the paper is dull, the light sensitive side is therefore easily recognized.).

16. Place glass plate on top of field sheet (to ensure flatness and good contact you can apply pressure with hands on the glass, making sure your hands or head do not block the light for exposure).

17. Turn on main light or whatever source you use for the exposure.

18. Remove paper from underneath field sheet and put into developer tray (face up or down) after the light is turned off again.

19. Make sure developer covers entire sheet.

20. Agitate paper.

21. After 90 seconds remove from tray, drain above tray.

22. Put in stop bath 5-10 seconds, remove and drain abov tray.

23. Put in fixer for about 5 minutes, remove and drain above tray.

24. Make sure tweezers stay with their respective trays so they do not contaminate the other solutions and shorten their lives.

25. Place paper in washing container.

26. Wash for 30 minutes.

27. Hang or place on table to dry.

N.B. Always add chemical to water when mixing.

CONSTITUTION

CANADIAN HYDROGRAPHERS' ASSOCIATION

Article 1: Name

This organization shall be known as the "Canadian Hydrographers' Association".

Article 2: Aims

Section 1. To advance the technical and professional ability of hydrographers by:

a) Encouraging members to acquire a comprehensive knowledge of hydrography, by a continuing program of study and development;

b) Maintaining high standards of work;

c) Fostering a critical interest in hydrography;

d) Encouraging interest in the work of related organizations and disciplines.

Section 2. To encourage a spirit of co-operation, tolerance, understanding and equality amongst all members in order that unity of purpose, throughout the Association can be established and maintained.

Section 3. To promote the free exchange of information and ideas in order to keep members better informed and to generally establish and maintain lines of communication between Branches.

Section 4. This Association shall not enter into any trade union activities concerning working conditions or remunerations.