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Lighthouse

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Letters to the Editor / Lettres au rédacteur en chef

Data, Datums, and Grammar

Dear Sir:
These two little latin words, meaning literally "something that is given", are used nowadays with two different meanings, and with quite a mix-up over singulars and plurals.

Everyone knows what **data** is. Thousands of people make a living out of pushing it around in computers. I think it has become a collective noun, like "information". I've never heard anyone describe one piece of data as "a datum", and for me to have written above "...pushing **them** around in computers" would sound very odd. So it seems to me pedantic to insist on using a plural verb with it, for example "...everyone knows what data are..." as some insist on saying.

On the other hand, a **datum** means to readers of this journal a defined surface, either the tidal datum used as the reference level for depths on a chart, or the geoidal surface used as a framework for describing geographic positions. Two datums don't make a data, but I have seen "...conversion between the NAD'27 and NAD'83 data" which strikes me as being thoroughly confusing.

Of course, the latin plural of datum is data, but usage has changed in the last 2,000 years. Let's stick to "data **is** and "datums are"!

R. Mike Eaton
Dartmouth, N.S.

More on Data and Datums

Dear Sir:
There is not a mix up over singulars and plurals for data and datum. The problem is that English speaking peoples have two distinctly different groups of lexicographers. One group in the United Kingdom compile the Oxford Dictionary and a second group in the United States compile Webster's.

The important point with respect to spelling is to be consistent. Canadian Sailing Directions have always used the Oxford Dictionary; it is very adamant that data is plural for datum and allows for no variation. Webster's state that datums is plural for datum when used as a basis for calculating or measuring. Can we use Webster's as our authority for datums and retain the Oxford Dictionary for all other spelling? This is not consistent.

A group of Canadian lexicographers have compiled the Gage Canadian Dictionary. The Canadian Government Style Manual recommends use of this dictionary. This solution will allow us to use datums but we will lose control over our harbours.

Al Smith
Sailing Directions Officer, CHS
Pacific Region

Editor's note: To further this discussion the following definitions of data and datum are supplied:

from "Webster's Ninth New Collegiate Dictionary", 1990.

"**data** .../*noun plural but singular or plural in constr, often attrib* [L, plural of *datum*] (1646) : factual information (as measurements or statistics) used as a basis for reasoning, discussion, or calculation <the data is plentiful and easily available .....> < comprehensive data on economic growth have been published...>

usage Although still occasionally marked with a disapproving [sic], *data* is well established both as a singular and as a plural noun. The singular *data* is regularly used as a mass noun denoting a collection of material; it is almost never used as a count noun equivalent to *datum*. Our evidence shows plural use to be considerably more common than singular use."

"**datum** ...**1** *plural* **data**.../ something given or admitted especially as a basis for reasoning or inference **2** *plural* **datums** : something used as a basis for calculating or measuring usage see DATA.";

from "The Oxford Dictionary", Great Britain, 1971:

"**datum**, noun (plural-*data*). Thing known or granted, assumption or premiss from which inferences may be drawn; fixed starting-point of scale etc.; (plural) facts of any kind, notes.";

from the Gage Canadian Dictionary, 1983:

"**data**, noun, plural of **datum**. Facts or concepts presented in a form suitable for processing in order to draw conclusions: *All the data indicate the beginning of an economic boom.*

Usage. **Data** is the plural of the seldom-used singular datum. Since its meaning is often collective, referring to a group of facts as a unit, data is often used with a singular verb in informal English: *The data you have collected is not enough to convince me.* Formal English continues to regard **data** as a plural rather than as a collective noun: *We will analyse the data that have been obtained."*

"**datum**, noun, plural **data**. A fact from which conclusions can be drawn.";

and from the International Hydrographic Organization's (IHO) "Hydrographic Dictionary", Monaco, 1974:

"1096 **data.** General term used to denote facts, numbers, letters, and symbols. The basic elements of information; usually but not always expressed in numerical form."

"1098 **datum**. Something known or assumed.
The base value, LEVEL, DIRECTION, or POSITION from which any quantity is measured.
For a group of statistical references, the plural is DATA. When the concept is geometrical and particular, the plural is datums."

Editor's Note: It appears that technically there is clearly not one correct usage of data/datums, much like the spelling of harbour/harbor. Providing writers are consistent in their usage of the terms either way is correct.

CHA Membership

Dear Sir:
Enclosed please find a completed application for membership form to your fine organization. My payment has been previously made, however, I neglected to complete this form. A cordial call yesterday from someone on your staff (I regret I did not note the name) pointed this out to me.

Your caller asked me to include some background information on myself, which is provided.

Your fine magazine is one of the valuable resources I use in staying abreast of the latest developments in hydrographic survey tools and techniques; it is extremely interesting and fun to read! I look forward to a long and educational membership.

George E. Betts
AT&T
Morristown, New Jersey

Message from the National President / Mot du Président national

Cycle: *Webster's dictionary definition - "an interval of time during which a sequence of a recurring succession of events or phenomena is completed."*

A cycle may be beneficial, detrimental or some combination thereof.

In an Association composed of volunteers common accord, interest and reasonable expectation of personal growth drive its "cycle." If one of the components is removed then it goes flat.

The important point is that a cycle, paraphrasing its definition, is "a recurring succession of events." Stability, continuity, and expectations are words which can be used to express the requirements of an Association to maintain a positive profile.

Individual members are the integral component of this "Association cycle". Fortunately the CHA has a membership which will maintain the momentum to drive the cycle.

The latter part of the cycle definition "is complete" while suggesting finality in reality implies a continuation to the next "succession of recurring events".

Events, rather than phenomena, fulfill the requirements of an association whether these are regular meetings, seminars, or the task of election of officers. Again terms such as expectation and continuity form the basic elements to support the members and thereby the association.

When I started to prepare this message, my intention was not to ramble, but rather to pat each CHA member on the back and to say thank-you for your enthusiasm. There are times when the CHA may have seemed to be in a single cycle, however your momentum has driven it into the next cycle.

Dave

UPDATA QUESTIONNAIRE

UPDATA Incorporated, funded by a contract from the Canadian Hydrographic Service, is circulating a questionnaire to persons, private sector or government, with skills in the marine geomatics field. The data collected from this questionnaire will be placed on a database, maintained by UPDATA, for controlled referral by prospective contractors.

The Canadian Hydrographic Association is assisting with distribution of questionnaire as a service to its members and others.

Please complete the questionnaire, inserted into this issue of Lighthouse, and mail it to UPDATA.

Thank you.

Dave Pugh

QUESTIONNAIRE UPDATA

Le Service hydrographique du Canada a passé un contrat avec la société UPDATA Inc. En vertu de celui-ci, la société fera circuler un questionnaire auprès des personnes qui ont des aptitudes en géomatique marine, dans les secteurs public ou privé. Les données ainsi compilées seront introduites dans une base de données tenue par UPDATA qui régira l'accès de cette base aux entrepreneurs éventuels.

L'Association canadienne d'hydrographique (ACH) participe à la distribution du questionnaire auprès de ses membres et d'autres personnes.

Veuillez avoir l'obligeance de remplir le questionnaire inséré dans cette copie de Lighthouse et le poster à UPDATA.

Merci de votre collaboration.

Dave Pugh

Lighthouse Abstracts / Résumés pour Lighthouse

Impulse Radar Bathymetric Profiling in Weed-Infested Fresh Water

by

Austin Kovacs

Introduction

The dense vegetation that grows in many rivers and lakes can reach the water surface and fan out from depths in excess of 3 meters. These weeds can foul propellers and make a waterway unnavigable to conventional power boats. This vegetation growth has often prevented bathymetric surveys that have used traditional acoustic depth sounders operating in the 100 to 200 kHz frequency band. This inability to obtain accurate depth profiles through dense weed areas along the lakes and riverways of the St. Lawrence Seaway has often forced the Canadian Hydrographic Service (CHS) either to undertake shallow-water bathymetric surveys early in the spring, before weed growth affects acoustic depth sounding, or to take spot soundings using a lead-line.

This report presents the results of a test to determine if impulse radar can be used for depth sounding in the dense weed areas along the St. Lawrence River.

Early Impulse Radar Uses and Bathymetry Studies

The first commercially available impulse radar sounding system was built in 1976 by Geophysical Survey Systems Inc. (GSSI) and purchased by the U.S. Army Cold Regions Research and Engineering Laboratory (CRREL), of Hanover, New Hampshire. Prior to this, a prototype system was used by the CRREL in 1974 to detect crevasses and profile internal layers and thickness of shelf ice and icebergs in the Antarctic [5, 6, 7] and subsequently to profile lake ice thickness and under-ice water depth [9, 13]. Helicopter tests in Alaska also showed that both lake and sea ice thickness and the depth of water under fresh water ice could be profiled from an airborne platform [8, 10, 11]. Many other investigations have since repeated or expanded on these results [1, 20]. Also of note are the ground-breaking studies at GSSI on impulse radar sounding of lake and sea ice thickness, fresh water bathymetry, and permafrost features. [3, 14, 16]

Impulse radar was also used by GSSI staff in 1975 to profile sludge sediments, with methane gas inclusions, in the Charles River, Boston, Massachusetts [15]. At the time, Professor Albert Edgerton, of the Massachusetts Institute of Technology was attempting, without success, to profile the thickness of the sediments using a variety of acoustic sounding techniques. The impulse radar system successfully obtained profiles of both the top and bottom of the gaseous sludge fill. This allowed an estimate to be made of the amount of sludge material to be removed. In addition, impulse radar was used in the mid-1970's to profile the thickness of a layer of sunken logs near a paper mill in the St. James River, Maine, and to detect logs floating below the water surface [15]. An acoustic depth sounder was also used for sounding the log layer thickness, but without success.

It was the success of these early surveys as well as a demonstrated capability to profile the depth variation and internal structure of snow, sand and other air-entrained materials that gave reason to believe that impulse radar could provide bathymetric profiles in weed-infested waters where acoustic sounders could not.

Operating Principles

Ground-penetrating impulse radar sounding systems typically operate in the VHF and UHF frequency bands (between 30 MHz and 3 GHz) with 300 MHz as the center frequency separating the two bands. In the GSSI systems, an impulse of electromagnetic energy of a few nanoseconds (ns) duration is transmitted from an antenna into a material. The transmitted wavelet has a broad band with a frequency bandwidth in the order of 100 MHz at the -3 dB power level. The center frequency of the transmitted wavelet spectrum and the time duration of the energy emission in air are functions of the size of the antenna and its dampening characteristics, as well as the impulse transmitter characteristics. When the electromagnetic energy is radiated from an antenna into a material and it impinges on a horizon or object of dielectric contrast, a portion of the energy will be reflected. The amount of energy reflected back to the receiver will depend on the distance, size, roughness and slope of the target, as well as the electrical contrast at the interface. The energy not reflected back will either be scattered or will continue onward to repeat the process or until the energy is completely attenuated. The depth of penetration is dependent on the electrical properties of the subsurface materials, such as: the relative dielectric constant, which governs the wavelet velocity; the conductivity, which governs energy attenuation; and on-beam spreading losses.

The reflected energy sensed by the receiver is frequently displayed in real time on a graphic recorder in a manner similar to a time-domain acoustic sub-bottom sounding system used to profile marine sediment layers. This is how the impulse radar system was used in this field study. The data may also be displayed in real time on a color cathode-ray tube (CRT) display or stored on magnetic tape for later playback and analysis. The primary quantity measured is the two-way travel time between various targets or subsurface interfaces.

Theoretical Considerations

The effective wavelet propagation velocity of the transmitted electromagnetic pulse in a medium can be calculated from:

$$V = \frac{c}{\sqrt{\varepsilon' \ \mu_r}} \qquad \text{Equation 1}$$

Where: c = electromagnetic wave velocity in air (~0.3 m/ns)

ε' = real dielectric constant of the medium

μ_r = relative magnetic permeability (unity for non-magnetic materials)

Depth, D, can be estimated from:

$$D = \sqrt{\left(\frac{{}^tD^v}{2}\right)^2 - \frac{S^2}{4}} \qquad \underline{\text{Equation 2}}$$

where: ${}^tD$ = wavelet travel time from the surface to some sub-bottom interface and return

S = separation distance between transmit and receive antennas

Where a single transceiver antenna is used, this equation reduces to:

$$D = \frac{{}^tD^v}{2} \qquad \underline{\text{Equation 3}}$$

The relative dielectric constant (ε') of many materials is frequency and temperature dependent. For example, in the UHF frequency band, water at 0°C has an ε' of approximately 88 whereas at 25°C it is approximately 80. During any bathymetric survey it is unlikely that water temperature would vary significantly and adversely affect the sounding results. As an example, for a temperature change from 20°C to 15°C, the real part of the dielectric constant, which affects wavelet velocity (equation 1), of fresh water would increase by about 1% at the operating frequencies. This would decrease the wavelet velocity by 0.0002 m/ns. Therefore, when all other conditions are constant, once the radar is calibrated, the soundings should be very accurate.

For most materials in situ an estimate of ε' is often used to determine the wavelet velocity. When borehole information exists on the depth of subsurface layers or the depth of water is accurately known at a calibration site, this depth information can be used to determine V and ε' using the above equations, or it can be converted into a depth scale on the graphic recorder.

Past experience with GSSI impulse radar systems revealed that they can be affected by temperature variations, probably because military specification electrical devices are not used. A sudden large temperature change may cause drift in the time base which could adversely affect the sounding results. Therefore, after initial calibration, the radar console should be protected from sudden or large temperature changes.

GSSI antennas transmit a conical beam. The -3 dB width in air is approximately 90° perpendicular and about 80° parallel to the antenna electric field. For most surveys, and in particular for shallow water surveys in low-loss materials, the footprint can be considered circular and may be determined by:

$$2 \sin^{-1} (1/\sqrt{\varepsilon'})$$

where ε' = the real part of the complex dielectric constant.

Since ε' is 1 in air, the calculated beam-width is then 90° and when the antenna is in contact with fresh water, which has an ε' of approximately 81 at 20° Celsius, the beam-width could narrow to about 13°. For shallow water surveys (less than 5 m) with the antenna resting on the water surface, an approximation of the beam radius would be 0.1 X the water depth (R = 0.1D). Therefore, for 2 m-deep water, the beam diameter would be about 0.4 m.

Further narrowing of the beam width can be achieved by lifting the antenna above the surface. To produce the minimum beam width in water, the antenna needs to be raised approximately 0.1 x λ meters, where λ = the length of the transmitted wavelet's center frequency in air.

Therefore, at 300 MHz, where λ is 1 m, the antenna should be elevated about 0.1 m above the water surface to achieve a minimum footprint. However, there are other effects to consider, especially those related to energy transfer. To maximize energy transfer, the antenna should be placed on the water surface [18, 19].

A factor that may on occasion be important is the effect of bottom slope on the radiated beam "cone" angle in water. As the antenna approaches a steeply shoaling area, the forward edge of the beam "sees" the bottom first. The related two-way slant-range travel time to this location, as displayed on the graphic record, will therefore indicate a depth somewhat less than that which exists directly below the antenna. The variation from the true depth below the antenna will depend upon cone angle, bottom slope and the slant range. For shallow bathymetric surveys, such as in weed-infested waters, this effect should not be of consequence. In deep water with abrupt bottom variation, a comparative bathymetric survey using the impulse radar and an acoustic sounder would be desirable, in lieu of simple, but not necessarily appropriate calculations, for assessing sounder depth differences. The use of separate transmitter and receiver antennas would certainly aggravate this sounding situation and should be avoided.

When an antenna is placed on water or on any other material, there is an impedance loading associated with the dielectric properties of the material. This loading reduces the center frequency of the radiated wavelet. For example, from transmission studies using borehole antennas [12] the center frequency, in air, of the wavelet spectrum at the receive antenna was about 140 MHz. When the transmit and receive antennas were placed in separate boreholes spaced about 5 m apart in ice with an apparent dielectric constant of 3.15, the transmitted wavelet recorded at the receiver had a center frequency of about 111 MHz. Disregarding any frequency-dependent attenuation effects, the result of antenna loading was a reduction in the transmitted wavelet center frequency of about 20%. In another test antennas were placed in -0.25°C water with an apparent dielectric constant of 88, the center frequency of the received wavelet was 104 MHz or about 25% less than the free-space value.

Another indication of the effect of antenna loading was demonstrated during a test [11] where a GSSI Model 3105 (300 MHz) antenna was used to sound sea ice thickness both from the surface and from a platform. The free-space center frequency of the wavelet spectrum transmitted by this antenna was found to be 280 MHz. When the antenna was placed on the sea ice, the center frequency of the reflected wavelet from the ice bottom was 131 MHz compared with 174 MHz when the antenna was elevated about 1.7 m above the surface. Here the frequency-dependent attenuation of the ice, the ice bottom roughness characteristics, and the electromagnetic properties of the reflective boundary were not changed. Impedance loading did occur when the antenna was on the ice, and this caused a 25% decrease in the center frequency of the reflected wavelet.

Based on these findings it is reasonable to expect that, for a GSSI antenna resting on fresh water, impedance loading will reduce the center frequency of the transmitted wavelet by about 25% from the free-space value. This reduction will be dependent on parameters related to the antenna housing and the medium (air, wood, rubber, etc.) between the housing and the water. In short, a GSSI antenna's radiating element is seldom in direct contact with the medium being sounded. In addition, a further reduction in the center frequency will occur with increasing water conductivity and depth [21] since the higher frequencies are attenuated in a conductive medium. Therefore, the reduction in center frequency noted above could indeed be larger.

Another parameter that may be estimated is the wavelength of the wavelet's center frequency in water. If an antenna, with a transmitted center frequency of 300 MHz in air, is set on water, impedance loading may reduce the center frequency of the radiated wavelet by about 25% to 225 MHz. At 225 MHz the wavelength:

$$\lambda = C/f$$

where C = the velocity of light in air (300 m/μs); and
f = the impulse wavelet's center frequency (MHz).

Therefore, the radiated wavelength is approximately 1.33 m, but as the wavelet travels into the water it reduces to $\lambda/\sqrt{\varepsilon}$ or to approximately 0.15 meters. The affect of these reductions should be an increase in sounding depth and increased resolution since objects on the order of one-half the wavelength should be detectable.

The radar range equation was modified [2] to take into account the effect of electromagnetic attenuation in conductive materials. Formulations were used to estimate the

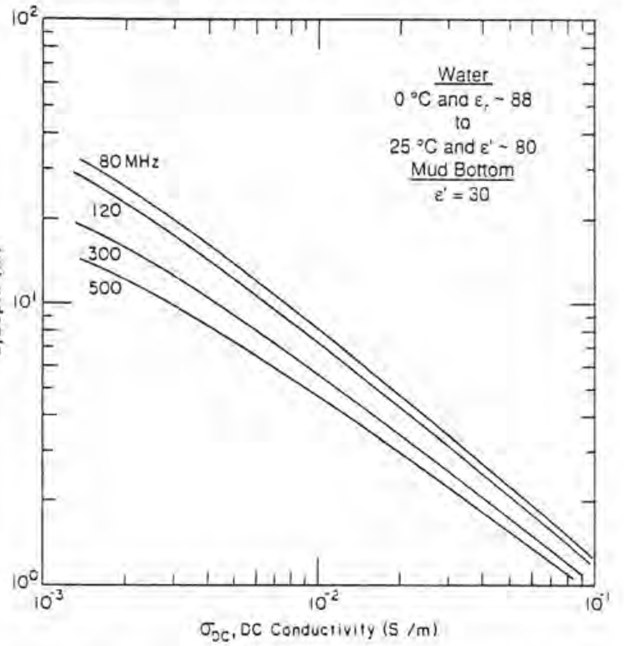

Figure 1: Estimated impulse radar profiling depth versus water conductivity with transmitted wavelet center frequency in water as a parameter

sounding depth of the impulse radar in water versus water conductivity (Figure 1). In the analysis a smooth mud bottom with a relative dielectric constant of 30 was used. The curves shown in Figure 1 are representative for the wavelet center frequencies shown and water temperatures between about 0 and 25°C. The conductivity of the water at our study sites at the western end of Lake St. Francis, St. Lawrence River, was measured to be 3.1 milliSiemens per meter (mS/m). Therefore, at 100 MHz, the impulse radar should be capable of profiling the bottom to a depth on the order of 19 meters while at 400 MHz this depth would be about 7 meters less. It should be clear from Figure 1 that impulse radar depth sounding in water with a conductivity greater than 0.1 Siemens per meter is extremely range limited and is therefore of no practical value in seawater.

Study Areas

Impulse radar sounding tests were made at three sites in the St. Lawrence River. Initial tests were made in the Grass River, which runs through Massena, New York and discharges into the St. Lawrence River just below Snell Lock, to confirm the operation of both the GSSI System 3 impulse radar and the Ross 801 precision acoustic depth sounder systems. In this water course thick weed growth was found near the river banks and on shoal areas.

The second and most important site was along the western edge of an area called Grass Island, about 0.5 km northeast of St. Regis Island, near St. Lawrence Seaway buoy D81. At this site there was dense weed growth up to 3 meters thick. Three different varieties were found: Milfoil, which has finely divided leaves; a broadleaf weed; and a long stringy water grass. At this site, the weeds not only reached the water surface but grew to such lengths that they streamed with the current for a meter and more along the surface.

The last site was near South Lancaster, Ontario, where the weed growth generally did not reach the surface but was very dense.

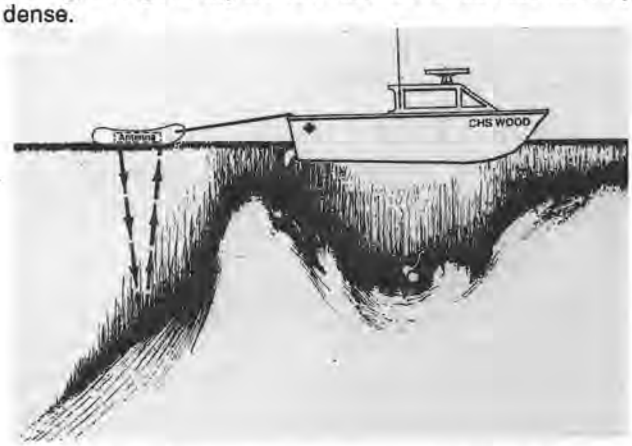

Figure 2: Antenna arrangement used during impulse radar bathymetric sounding

Operations

A 7 meter-long CHS fiberglass launch was used for the field test. Mounted in the bottom of this vessel was the acoustic transducer for the sonar system. An inflatable rubber boat was used to carry the GSSI 120, 300 and 500 MHz antennas, one at a time (Figure 2). The inflatable boat was towed about 2 meters behind the survey launch. This distance and the use of a rubber boat provided adequate antenna isolation to prevent the recording of reflections from metal objects, such as found in the survey launch. Some unwanted electronic noise was recorded, which produced horizontal banding through the radar's graphic record.

In addition to the antennas, the radar system included a graphic recorder with built-in radar controller electronics. This unit, about 45 cm by 45 cm by 25 cm in size and about 20 kg in weight, was operated from the back deck of the survey launch. The radar system is configured to run on 20 to 32 V DC or 115 V AC current and in this study was powered by a small gasoline generator, which was also set on the back deck of the launch.

During the course of the evaluation, the sonar record was used for comparison with the radar record. A lead line measurement was used to provide depth information for calibrating both sounding systems. Lead line measurements were also used to verify the radar system's depth results where thick weed growth prevented the sonar system from detecting the bottom.

Results

An example of the radar and sonar system records obtained on the Grass River is shown in Figure 3. The radar records were obtained with the 120 MHz antenna. This figure shows that the radar system not only provided a good profile of the river bottom but also showed a sub-bottom layer as well as an indication of fish at a depth of about 3.3 and 4 meters.

The sonar record in Figure 3 shows specular noise in the first 2 to 3 meters of depth. This is probably attributable to electronic noise produced by the recording system.

Both sounding systems provided good depth information, except over the shoal where the sonar system detected only the top of the weeds. While the sonar record showed no river bottom at the shoal area, the radar record clearly showed the bottom. The radar system's depth was verified by a lead line depth. Note also the significant riverbed roughness (shown in both records) to the left of the shoal. While this bottom relief was not observed at any other location, it does allow a subjective comparison of the resolution of the two systems to be made. For the conditions at this site, it would appear that the two systems provided very similar micro-scale relief information.

The deepest water found in the Grass River was about 9 meters. Radar provided good bottom profiles at this depth.

Following the trials with the 120 MHz antenna, the shorter wavelength higher resolution 300 and 500 MHz antennas were used. The 300 MHz antenna was not limited by depth in these waters, while the 500 MHz antenna only provided depths to about 6 meters.

At Grass Island, radar profiles were made using the 300 MHz antenna. An example record showing a comparison between the radar and sonar profiles obtained are given in Figure 4. These figures clearly show that the sonar system was unable to penetrate the weeds but did provide the depth to the top of the weed layer. The sonar system lost bottom return in water 2 to 2.5 meters deep where the weeds reach a critical density. At this weed density the transmitted acoustic energy could no longer reach the bottom, or the reflected energy from the bottom was scattered or otherwise attenuated and could no longer be detected at the receiver.

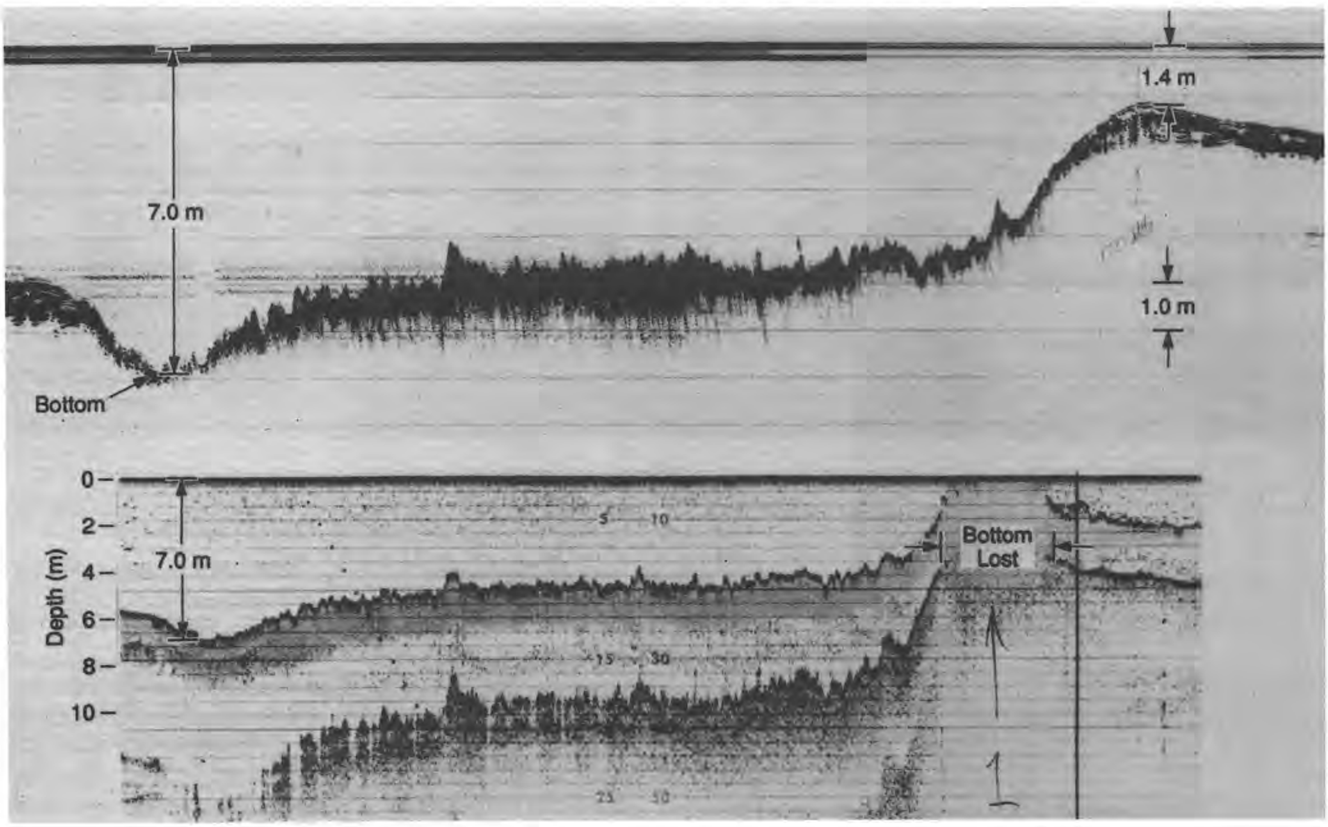

Figure 3: Radar (top) and sonar (bottom) profiles obtained in the Grass River

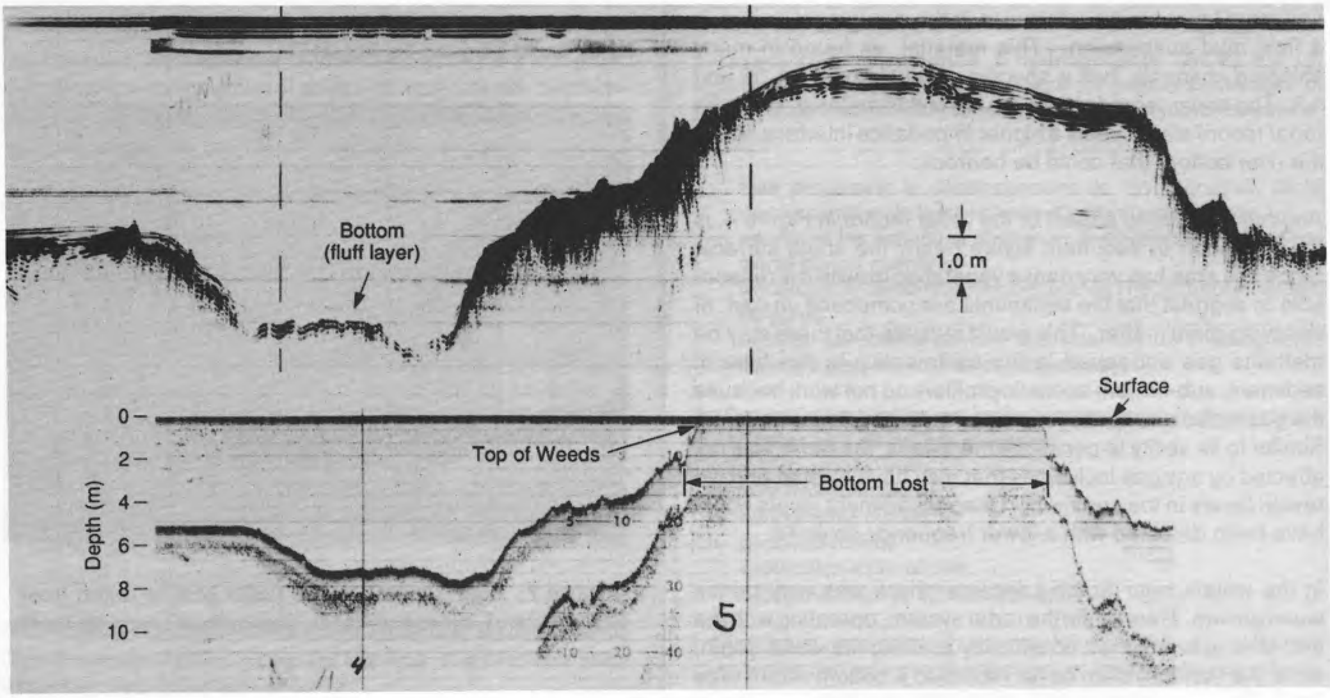

Figure 4: Radar (top) and sonar (bottom) profiles obtained off Grass Island

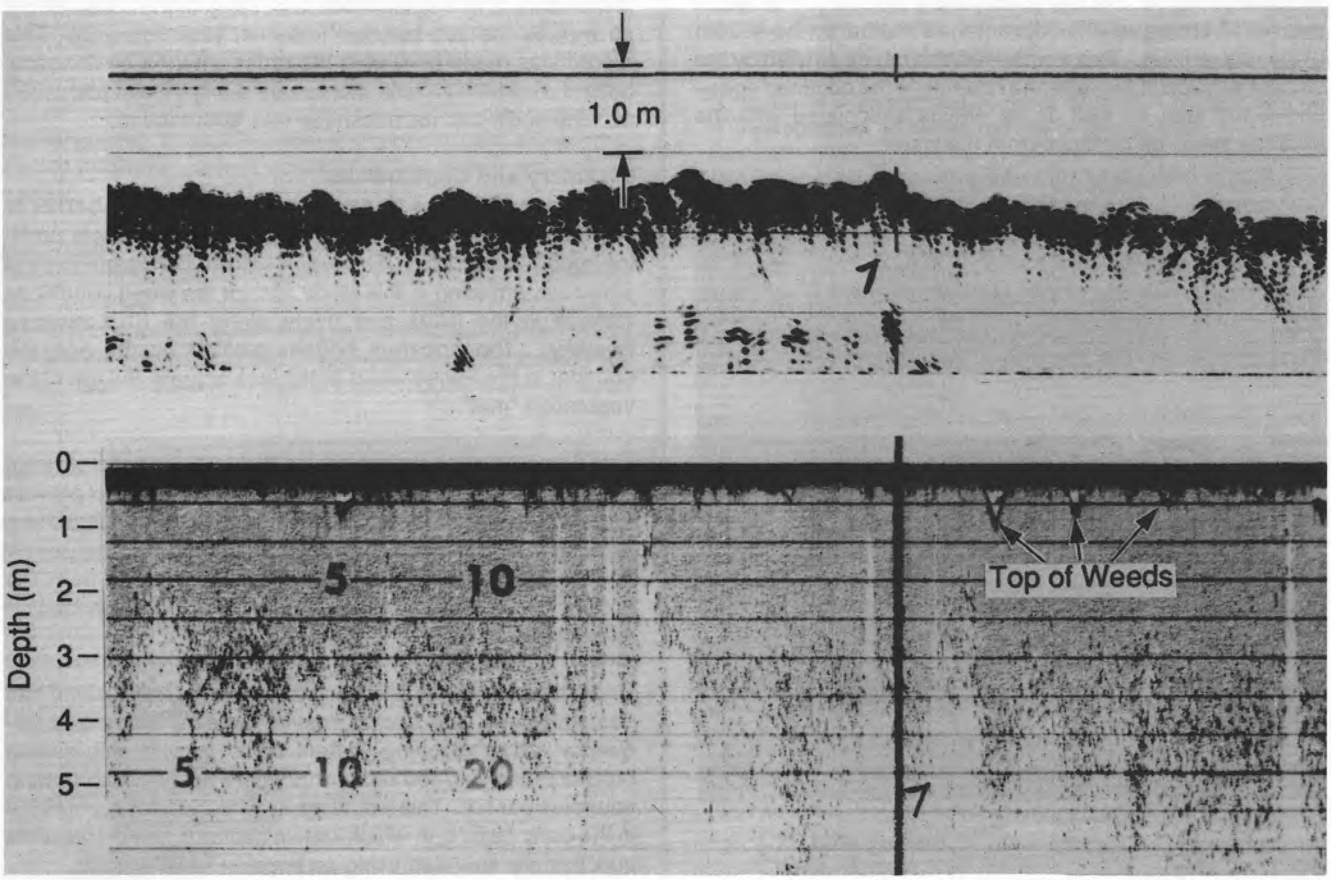

Figure 5: Radar (top) and sonar (bottom) profiles obtained on the north side of Lake St. Francis near South Lancaster

An interesting bottom return, shown in the radar record in Figure 4, is the one labeled "fluff layer." This deep water area was near the shipping lane and may represent a loose sediment layer or one referred to in the dredging industry as a fluid mud suspension. This material, as found in many shipping channels, has a specific gravity between 1.05 and 1.3. The sonar record shows the top of this material, while the radar record also reveals a higher impedance interface below the river bottom that could be bedrock.

Another interesting aspect of the radar record in Figure 4, is the indication of sediment layers below the shoal surface. Since this area has very dense vegetation growth it is reasonable to suggest that the sediments are composed, in part, of decaying plant matter. This would indicate that there may be methane gas entrapped in the sediments. In this type of sediment, sub-bottom acoustic profilers do not work because the gas inclusions scatter and attenuate the acoustic energy. Similar to its ability to penetrate the weeds, the radar was not affected by any gas inclusions that may have existed and did reveal layers in the sediment. Deeper sediment layers could have been detected with a lower frequency antenna.

In the waters near South Lancaster there was very dense weed growth. Here again the radar system, operating with the 300 MHz antenna, had no difficulty profiling the water depth, while the sonar system never recorded a bottom return (see figure 5).

In this same area, the 500 MHz radar antenna (15 cm high, 30 cm wide, and 36 cm long) was placed on the deck of the survey launch (between the inner and outer hull of the launch is a core of foam of that is probably 2 to 4 cm thick). The return was not as strong as when the antenna was set on the bottom of the rubber boat. This may have been caused in part by the slanted attitude of the antenna housing in the confined space above the keel as well as by effects associated with the antenna stand-off distance from the water.

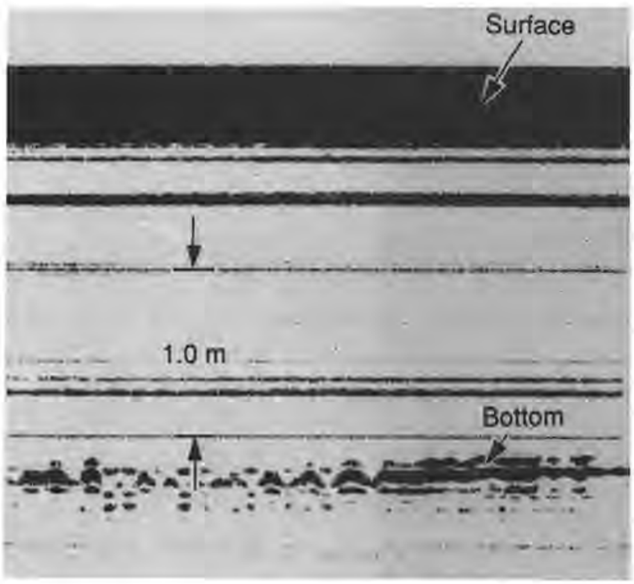

Figure 6: A through-hull bottom profile made with a 500 MHz antenna. The water is about 2.2 m deep.

Fish were also detected in the radar record where two apparent fish targets were recorded using the 300 MHz antenna (see figure 7). The detection of fish was not surprising since it had been previously demonstrated that impulse radar could be used for this. [17]

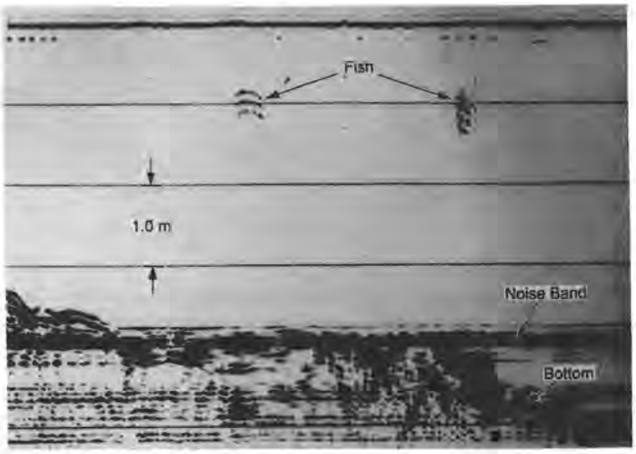

Figure 7: Fish targets in the radar profile taken near Grass Island, where several "fishermen" were at work.

In March 1989, while profiling the snow thickness, ice thickness and the bottom of Lake Nipissing (located north of Toronto, Ontario) apparent fish targets were also seen in the radar record. This record was also obtained using a 300 MHz antenna. Water conductivity was measured to be 4.3 mS/m in this lake. Once again, note the quality of the radar record as well as the sub-lakebed features. (see figure 8). This record was made by towing the radar antenna on the snow behind a tracked vehicle and covers a distance of about 300 m. The snow and ice thickness was about 0.9 m.

Summary and Conclusions

Vegetation of various types can act as an acoustic barrier or scatterer to prevent conventional sonar systems from profiling bottom topography. This was clearly demonstrated for the sonar system used in this study and for the weed conditions existing in the lakes and rivers along the St. Lawrence Seaway. The apparent bottom profiled by the acoustic sounder in the dense weed areas was actually the top of the vegetation "mat".

This demonstration study showed that impulse radar was not only capable of sounding through dense weeds to provide correct bottom profiles but also revealed shallow sub-bottom layering. Analysis of the phase, amplitude and frequency spectra of the reflected electromagnetic wavelet from the bottom could lead to a determination of the type of bed material [4].

Under the assumption that the sediments at Grass Island had gas inclusions, the survey results indicate that a low frequency radar sounding system could provide sub-bottom profiles in gas charged sediments where acoustic sub-bottom sounders cannot. This would agree with the findings of GSSI in the early 1970's, in which known gaseous sediments were successfully sounded using an impulse radar system.

A comparison between the sonar and radar records outside

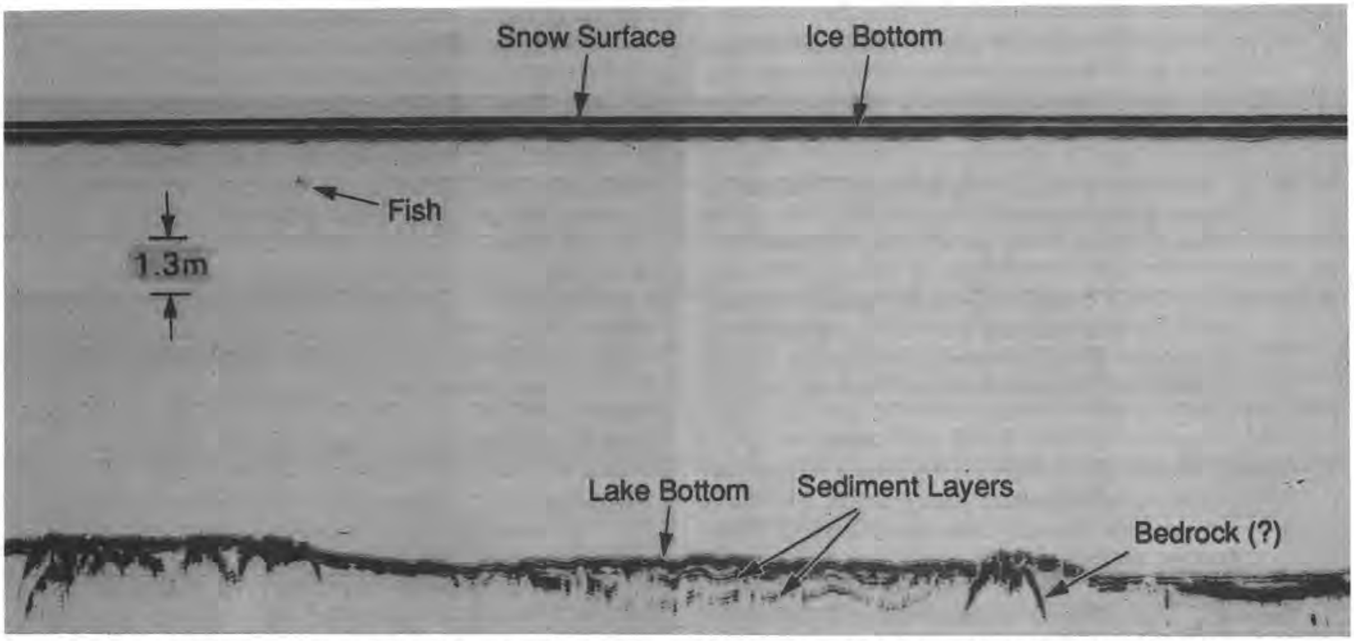

Figure 8: Radar record showing the snow thickness, ice thickness and bathymetry at a Lake Nipissing site.

the weed infested areas revealed good correlation in bottom detail and depth.

Impulse radar technology can overcome the problem of sounding through dense weeds in fresh water using, standard acoustic depth sounding systems. However, a conveyance other than a boat with a propeller will be needed for surveys in weed-infested waters. The propeller of the boat used in this test did pick up weeds, which had to be removed by hand. A jet boat may work but it may require special screens over the suction inlet or a method to backflush weeds off the intake screen should this be necessary. An airboat or a special hovercraft-type vessel may also be appropriate.

To improve the display of the radar record, certain real-time processing of the data can be done. For example, a correlation function may be used that captures a reflected wavelet from the water surface and the lake bottom and then tracks these two returns. The display can show two black lines on the graphic record, one for the surface and one for the bottom, or a display where the two black lines overlay the radar record. The former is shown at the extreme left and the latter in the remaining record in Figure 9.

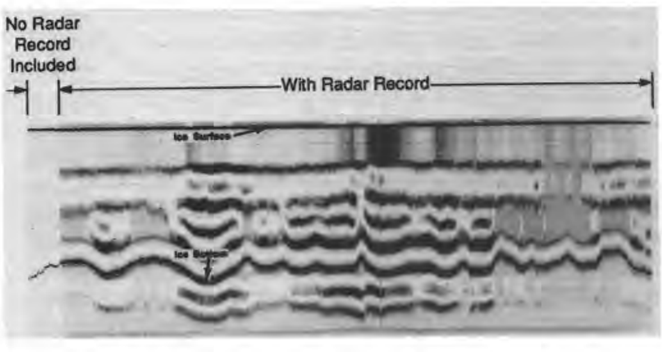

Figure 9: Radar record of snow-free sea ice, approximately 1.7 m thick.

This real-time record shows a short profile made on sea ice nearly 10 years ago [11]. The distance between the two lines of course represents the two-way transit time, which can be converted to a depth or digitally recorded for plotting at a later time. The dark, narrow bands were produced by an interface tracking algorithm. These bands represent the top and bottom of the ice. Note the undulating sea-ice bottom relief associated with snow cover variations. Where the snowcover was thick, the ice was thinner. This radar record covers a track about 80 m long.

Acknowledgements
The author wishes to acknowledge the assistance of: Michael R. Crutchlow, Dennis A. St. Jacques and Paul G. Millette, of the Development Division, Central and Arctic Region, Canadian Hydrographic Service (CHS), during the St. Lawrence River field study; Greg McKenna of the St. Lawrence Seaway Development Corporation, Marine Yard, Massena, New York, for providing launching and docking facilities; J. Scott Holladay, of Aerodat Ltd., during the Lake Nipissing survey; and the technical advice of Rexford M. Morey on aspects of impulse radar sounding and his review of this paper. Above all, the author again acknowledges Michael R. Crutchlow, who was interested in and arranged for the comparative sonar and radar sounding field trials, arranged for reviews of this paper by the CHS and provided background material for this paper.

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About the Author

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Surveying with Radio and Acoustics

by
Al Miller

Let's look back over fifty years to an experiment that took place when the Canadian Hydrographic Service (CHS) came under the Department of Mines and Resources. The program called Radio Acoustic Range, or RAR for short, was first planned in 1938 and the last test took place in 1940. The decision to proceed originated in Ottawa, and was either proposed by Henri Parizeau (Regional Hydrographer - Pacific Region 1920 - 1946) or handed to him as a project. The original concept developed by the U.S. Coast and Geodetic Service was used with some success.

In the pre-war days accurate positioning to hydrographic standards was not possible out of sight of land. The purpose of RAR was to extend this accuracy out an additional 50 or 75 miles. The program commenced with Art Nesbit in complete charge of making all arrangements. This included everything from planning and construction, through to testing and operation. Art was already employed as the Wireless Operator-in-Charge on board the C.S.S. William J. Stewart and RAR was just added to his regular duties. The U.S. Geodetic had six men doing the same job. Nesbit went down to the U.S. base in Oakland, California for two weeks for an initial familiarization. Upon his return he immediately commenced organizing equipment, material and frequencies. At this stage it became obvious that he couldn't do it alone. This is where I came into the picture as his assistant.

The RAR system involved placing three specially equipped buoys in accurately known positions, as far offshore as possible. The 'Stewart' would then steam to the survey area, out of sight of land, day or night and drop a quart can of TNT. The sound from the explosion travelled through the water to a buoy hydrophone which amplified it to a level sufficient to trigger a small radio transmitter. The signals from each of the three buoys were received back on the Stewart through a high quality receiver and recorded. The recorder used several styli which etched a trace on a wax covered tape. This recording also included half-second ticks from a split-second chronometer and the time of the initial TNT explosion. Prior to the test, the sea water was tested for temperature and salinity to compute the speed the sound took to reach the buoys. With this information the position of the ship was quite accurately calculated.

The buoys, being the heart of RAR, were of special interest. The basic unit was an odd shaped tobacco barrel. These barrels were obtained from a tobacco-growing area in the southern United States. The lower or bottom section was fitted with a galvanized bracket and a heavy counter-balance pipe. Provision was also made for an anchor chain and hydrophone cable. Another bracket was fabricated for the upper section to mount the antenna and antenna tuning unit. The electronic equipment was a single unit using a tube-type high-gain audio amplifier to actuate a simple radio transmitter. All the radio equipment was built aboard the Stewart, including the grinding of the quartz crystals. The ship's engineers made the hydrophone casings from about four-inch round aluminum stock turned on the engine room lathe.

An interesting problem was an occasional 'beep' signal transmitted by one of the buoys for no apparent reason. It could only be guessed that it was a curious fish bumping its nose against the hydrophone unit.

Early in the program a short wave transmitter was built to keep in touch with the U.S. Survey ships working in the Aleutians. They were extremely helpful in solving some of the problems. One of these major problems concerned the insistence that the CHS use only Canadian components wherever possible. A Canadian manufacturer claimed he could duplicate a key transformer used in the audio amplifier of the buoy unit. In order to prove it was unsatisfactory the CHS arranged directly by radio to borrow the recommended type from the U.S. Geodetic Survey.

It is interesting to note the Americans were already using RAR to rush their survey work in the Aleutians in 1939, long before the Japanese invasion of Attu.

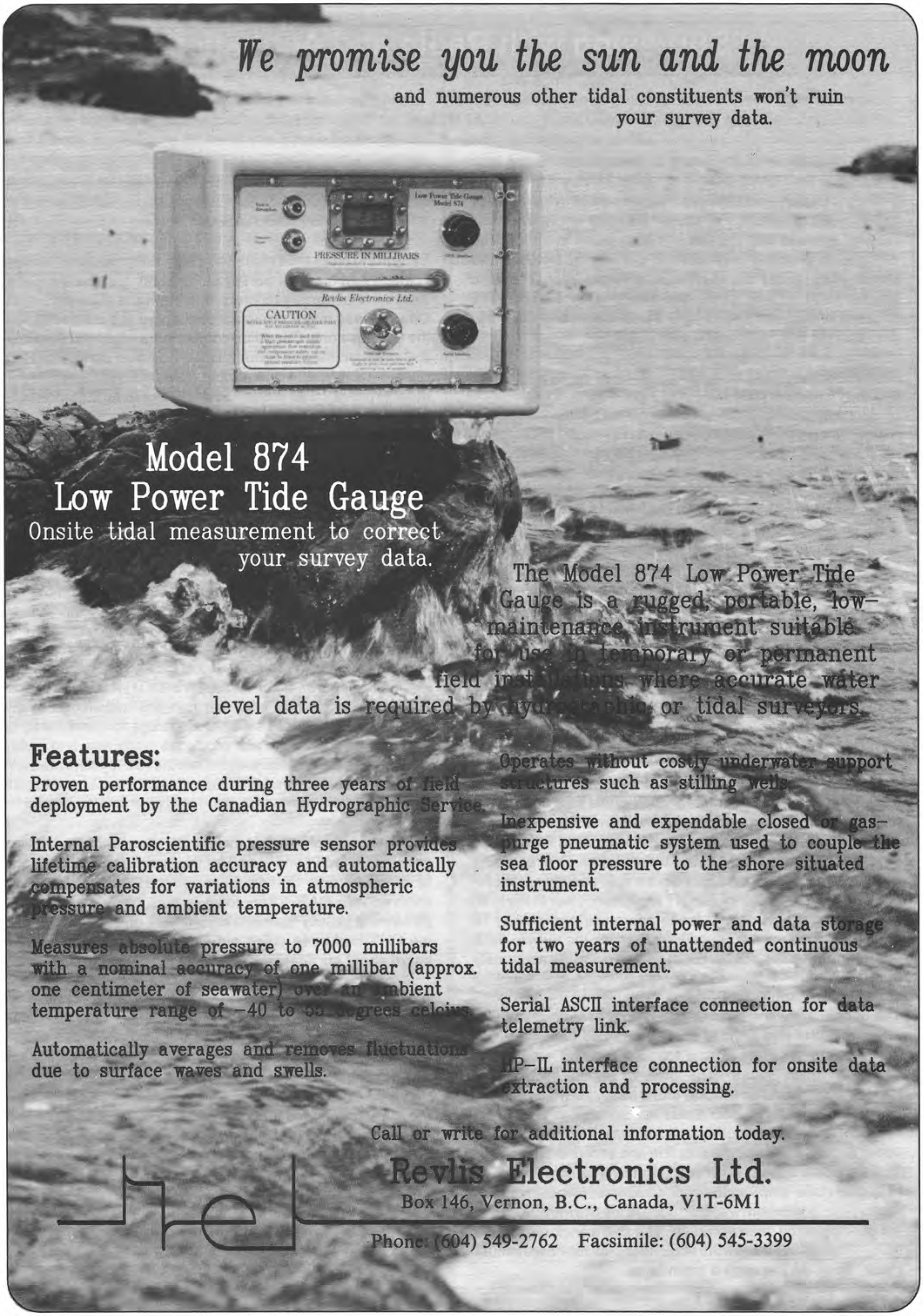
The program in Canada never got beyond the testing stage. In the summer of 1940 Nesbit left the CHS to attend a Radio Engineering school in Washington, D.C. I was promoted to his position, not only to take over RAR but also to maintain all the launch and ship sounding machines, to do clerical work, to work on the pay-list and to operate the Wireless. After a flat refusal to supply an assistant I left at the end of February 1941 to join the Department of Transport's (DOT) Aeradio Service. As there was no one else that had any knowledge of the program, everything was placed in storage for the duration of the war. Of course the war produced many new and highly accurate positioning aids which made the RAR system obsolete and consequently the intended dream died a premature death.

Strangely enough, almost exactly 25 years later while I was attending a DOT seminar in Montreal with the manager of the Montreal Aeradio Station, I learned that he had also been involved with RAR. Unknown to both of us he had been performing exactly the same kind of work on the east coast as the CHS had been doing out west. Unfortunately I never heard about his final results and he is now deceased.

About the Author *(by R.W. "Sandy" Sandilands)*
Shortly before I retired (see Lighthouse Edition #40, Fall 1989) I had a visit from Mr. Miller who was visiting Victoria and was interested in discovering if any of his old shipmates were still alive and living in town.

Mr. Miller mentioned that he had been involved in an experimental Radio Acoustic range program for positioning offshore and volunteered to write it up.

Al and his wife Margaret are keen ham radio operators and would like to hear from any ham enthusiasts who may read this. The call signs are VE7KC (Al), VE7DKC (Margaret) and they live at: 162 Corry Place, Penticton, British Columbia, V2A 3S1.



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The KEL 320A Arctic Sounder

by

William D. Fretts and Michael R. Crutchlow

Arctic Sounding

Accurate charts are essential for safe navigation. This is especially true of the world's arctic regions where a maritime accident can cause an ecological disaster. The KEL 320A Arctic Sounder has been designed by Knudsen Engineering Ltd. (KEL) of Perth, Ontario for the Canadian Hydrographic Service (CHS) to acquire bathymetric data in this hostile region. The KEL 320A is part of an integrated helicopter survey system which collects highly accurate spot soundings through sea or freshwater ice. This task is especially difficult because it requires the transmission and reception of acoustic signals through a water column and through a layer of ice that can be several metres thick.

The KEL 320A was chosen as a replacement for the EDO 9040 echo sounders that have been used in helicopters by the CHS Arctic Survey for the previous 20 years. Conventional marine echo sounders were not considered a viable alternative since they have not been designed to operate in this environment and do not contain the required functionality.

Some of the considerations for the design of the arctic sounder were:

Cold Weather Storage
The instrument must endure very cold temperatures while left in the helicopter for extended periods, without the need for external preheating prior to use.

Cold Weather Operation
The instrument should not require frequent calibration to compensate for severe temperature variations. The instrument controls should be large and easy to use by a heavily-mittened hand.

Grounded Ice
The digitizer has to recognize when ice and bottom meet and no water depths are attainable.

Shallow Water
The instrument has to recognize when the near-bottom return echo is masked by the ice and transducer reverberation.

Frequency Sensitivity
A wide frequency of operation is required to accommodate both shallow (24 kHz) and deep water (12kHz) sounding.

Instrument Automation
Harsh climatic conditions and high operating costs justify automating manual processes.

Light-Weight Hardware
Helicopter fuel payloads are higher and flight duration greater with reduced instrument weights.

Noise Rejection
Helicopter turbine and rotor noise must be eliminated from the receive signal. Earlier research suggests that helicopter-based sounding will be most favourable above 20 kHz. [1]

Low Electromagnetic Interference
Electromagnetic (EM) emissions must not interfere with radio communications and electronic positioning.

The CHS, Central and Arctic Region, conducts an annual Arctic hydrographic survey on polar ice beginning in late winter. In order to collect a through-ice sounding a small area of the ice is cleared of snow and a small amount of bonding liquid is poured onto the ice surface to displace any air and the transducer is placed on the ice. A graphical recording is then taken of the depth, and the location and depth are recorded in the operator's notebook.

Some research on alternative methods of transducer deployment (spike and pressure) has been done in an attempt to eliminate the necessity for manual transducer placement [2]. However, it remains the most reliable method in such ice conditions as: rough ice, where a good mechanical bond is prevented by the uneven surface; deep snow, which is a problem for spike transducers; and deep water, which requires high projected power and high receiver sensitivity. High power sounders with 12 kHz transducers are often used by the CHS in water depths over 1000 metres.

KEL 320A Design

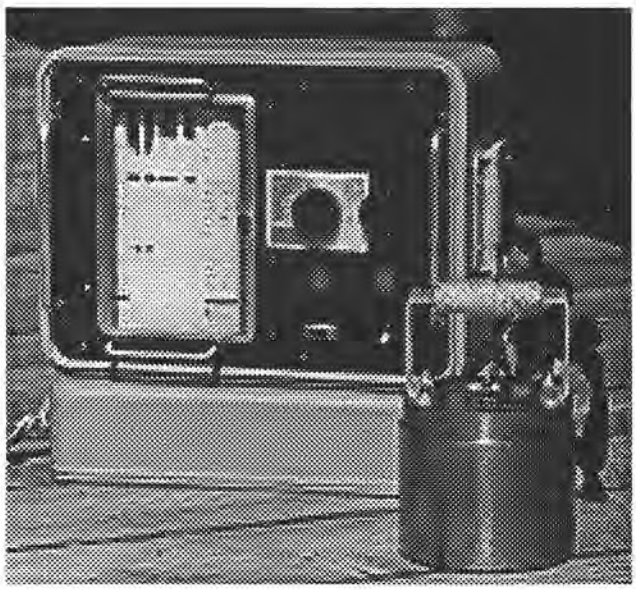

Figure 1: The KEL 320A Arctic Sounder

The KEL 320A echo sounder (Figure 1) is comprised of a compact, high performance, programmable computer, with integral thermal printer and sonar transceiver peripherals. The entire computer section is constructed of low temperature CMOS (Complimentary Metal Oxide Silicon) materials, programmed through software and clocked by precision quartz oscillators. The result is a robust and reliable machine which inherently maintains its calibration timing regardless of temperature or aging.

Transceiver

The integral sonar transceiver contains a 2000 watt, root-mean-square, high efficiency, Class D switching power amplifier capable of producing source levels up to 221 dB using an EDO 6469 transducer. The transmit pulse is dynamically synthesized by the digital signal processor (DSP) to produce any arbitrary pulse length, power level, frequency or envelope required for the application, with a high degree of accuracy and repeatability. The amplifier receives direct digital drive without the requirement for a low-level analog pre-amp signal.

Direct digital power modulation offers some exceptional benefits for the Arctic application. Transducer braking can be performed after the transmit pulse to provide exceptional shallow water sounding with a transducer that would otherwise resonate for several milliseconds, obscuring the near bottom (0-3 metre) or grounded ice details. Virtually any pulse shape can be programmed or accommodated, including chirps for optional correlation processing. Transmitted signals have the inherent accuracy of quartz crystal timing.

Thermal Printer

The thermal printer produces high resolution gray-scale images on a stable, thermally sensitive plastic medium. Closely related to FAX technology, the "paper" moves in this stylus-free recorder while the recording head is stationary. Unlike FAX printers, however, this system has software to cope with extremely cold storage or operating conditions and algorithms to produce photographic quality gray-scale images. Various parameters that have been used to collect the depth are displayed on the paper along with the depth. Figure 2 illustrates the type of display produced from one sounding record.

The thermal printing method requires individual thin film resistors to transfer heat energy to the recording medium. The heat required when the print-head body is at 40 degrees below zero produces unacceptable thermo-mechanical stress for reliable operation. The KEL 320A system detects the initial print-head temperature and initiates heating of both the head and the neoprene contact roller. This is accomplished using the integral print-head heating elements at low power until the mechanism is within operating limits. A brief warm-up period is required on cold mornings.

Gray-scale recording is accomplished by performing multiple "burns" on stationary paper. Each gray level consists of a number of successive burns of different duration. A sequence of 10 burn intervals can reproduce a good 32 level gray scale.

The local print-head temperature has a strong influence on the pixel density for a fixed burn duration. The printer control computer must continuously monitor the head temperature and compute adjusted burn durations in order to preserve the gray level.

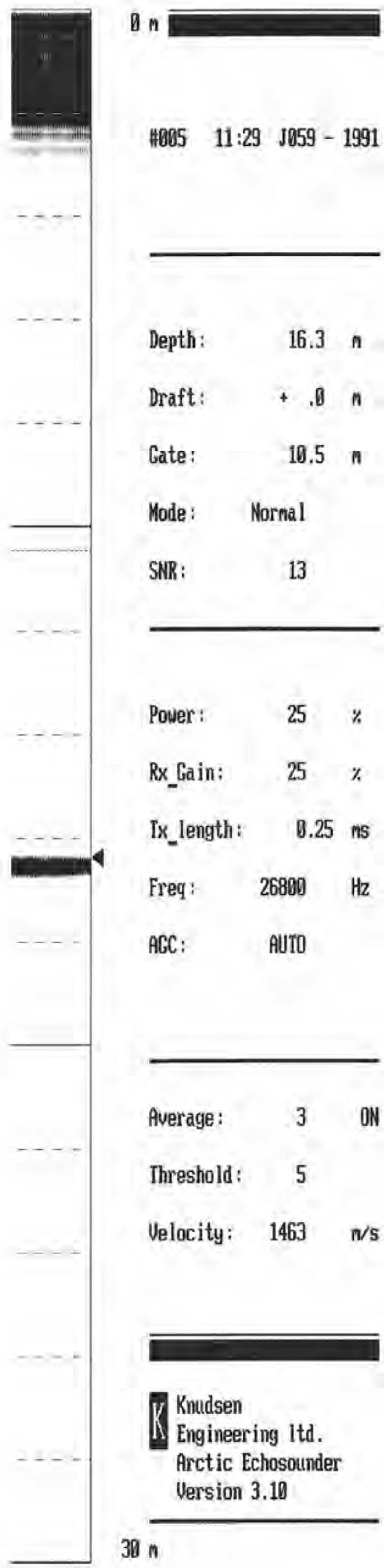

Figure 2: Sample sounding record

Digital Signal Processing

This is essentially a digital emulation of conventional analog narrow-band processing. The DSP creates a digital pulse train where the transmitted signal is a tone burst of selected frequency and duration and where the depth resolution is inversely related to pulse length. The synthesized pulse is contained in the transmit random access memory (RAM) allowing automatic re-transmissions of the buffer to the power amplifier over four optically isolated digital control lines. The digital transmit pulses control a high voltage MOSFET (Metal Oxide Silicon Field Effect Transistor) drive bridge configured as a class D amplifier.

The high voltage transmit pulses are filtered to remove the 400 kHz modulation from the amplifier output and also to reduce potential electromagnetic radiation from the transducer cable The amplified pulse train is then sent to an externally-connected transducer.

The portable transducer's ceramic piezo-electric stack acts as both the projector and the receiver in the system configuration. The transducer's projecting mass is acoustically matched to the density of sea ice for maximum coupling efficiency. A transducer braking sequence can be programmed to follow the transducer output signals in an effort to silence the mechanical ringing of the transducer mass. This detail allows shallow water operation even with relatively large-mass transducers.

The return signal is coupled by using a small instrumentation transformer on the power amplifier. A limiter circuit is included to clip overloading signals while passing the low-level echo signal unattenuated. Small return signals riding on large, out-of-band helicopter noise, must not be clipped; so the limiter design has some compromises.

The front-end preamplifier on the power amplifier is a high performance, ultra-low-noise device which feeds a digitally-programmed analog gain stage. The pre-amp and the programmable gain stage are highly isolated from both the power amplifier's DC to DC switching converter and the DSP digital noise. This is an important consideration in keeping the overall signal-to-noise ratio (SNR) as high as possible.

A hardware anti-aliasing filter provides a critical band limiting function for the sampling analog-to-digital converter (ADC). All frequencies above the sampling frequency are cut off according to the Nyquist sampling theory. The ADC provides 12 bit (4096 level) digitization of the analog signal at the sample frequency. The ADC also provides over 72 dB of dynamic range. The incoming digital data is fed directly to the processor buffer memory prior to digital filtering. The signal processing kernel is an optimized DSP aggregate algorithm which computes the band-pass, square law and low-pass filtering in real time.

The noise-rejection band-pass filter is implemented with 16 bit precision by the Texas Instrument TMS320C25 DSP in real time, in firmware. All aspects of the filter are under program control, including center frequency, bandwidth and stop band rejection. Filter coefficients are quickly computed on demand, to match the operator's selected operating frequency and bandwidth. The noise-rejection performance of the filter is significantly better than the analog circuits traditionally used.

The detection stage applies a square-law decimation filter to the band-pass result, followed by a scaled squaring operation. Computer-controlled scaling enables the sounder to maintain uniform image presentation while the SNR varies with the pulse length.

The output of the detection stage must be low pass filtered. A low pass filter (LPF) is used to recover the envelope of the return signal which contains the bottom echo information. The bandwidth of the LPF envelope (nominally the inverse of the transmit pulse length) determines the bottom resolution.

Noise rejection band-pass filtering, detection and the LPF are simultaneous functions performed by repeated iterations of a single program loop, which executes once for each input sample. Thus all of the signal processing is performed in a single pass.

The reduced resolution LPF output is stored in a 16K word section of data RAM for processing by the decimation and bottom detection routines. The LPF result contains a variable number of samples determined by the top and bottom range settings. The decimation process re-samples the result to display 1728 printable pixels.

The bottom detector employs sophisticated bottom-echo identification and ranging to isolate the bottom signal. The two-stage process uses a correlation-anticorrelation ratio with a programmable bias threshold. An automatic gain control function provides automatic computerized image enhancement of the data to extract extremely small details from the signal for display on the thermal printer.

Once determined, the bottom must be corrected for draft, sound velocity, and scalar metric units. The digitized depth is then displayed in the large liquid crystal display on the front panel and is stored in non-volatile memory.

Arctic Results

Two Arctic evaluations have taken place. The prototype system was evaluated during May 1989 at Resolute Bay, N.W.T., and in the Arctic Ocean. The results from this phase of the program were reported in a paper presented at the 1990 U.S. Hydrographic Conference [3]. Further testing of a pre-production system was again carried out during May 1990, near Resolute Bay and in the deep waters of the Arctic Ocean. Logistical support was provided by the Polar Continental Shelf Project (PCSP) of the Department of Energy, Mines and Resources.

1989

Barrow Strait (near Resolute Bay)

The prototype system was initially characterized in 150 metres of water through 1.5 metres of first-year ice at a temporary ice camp in Barrow Strait. Clear returns from the bottom and from a metal calibration bar, suspended 50 metres beneath the ice surface, were visible. A number of tests were conducted to observe the results using the wide range of functions available. The results of these tests were the basis for the re-design of this "Phase I" system.

The use of a low power, low mass, low quality-factor transducer for shallow water operation was recommended, as a result of the test. Pulse braking proved effective in enabling a reduction in resonance time by nearly 50%.

Arctic Ocean
The prototype echo sounder was unable to detect the bottom in deep water testing. This was not unexpected because the bulk of the effort had been put into designing it to detect shallower depths. The efforts of this deep water test were not wasted, since areas of improvement were identified and implemented during the re-design stage.

1990
Barrow Strait
The pre-production or "Phase II" system was evaluated and tested in the ice-covered waters surrounding Resolute Bay. Sled and snowmobile were used to transport the echo sounder to areas that displayed the various ice and water conditions required to adequately evaluate the new design features.

The re-design proved itself in the shallow waters. A low quality-factor transducer manufactured by BM-Hitech Ltd. of Collingwood, Ontario was used in the shallow water and grounded-ice conditions. Depths as shallow as 3 metres were observed. Depths to 150 metres were again observed utilizing the minimum settings.

A "spike" transducer that had been used with the EDO 9040 echo sounder was evaluated with the 320A. The results were impressive. Depth returns were observed with minimal pressure required on the transducer. This significant improvement may enable the spike transducer to be used with a mechanical actuator on the helicopter. This could eliminate the need for bonding fluid and manual operator intervention.

Ambient noise tests were conducted to determine if the helicopter-generated noise would degrade the performance of the echo sounder. The sources of this noise are the turbine and blades, mechanical skid gear coupling through the ice and radio interference. There was no discernible effect on the echo sounder.

The bottom-detection capabilities and sensitivity of the echo sounder were demonstrated when the first sounding was obtained from the transducer, which was placed on top of the snow with no pressure or bonding fluid used. Although this was not achievable on a consistent basis, it did demonstrate the success of the design.

Arctic Ocean
The "Phase II" system proved to be much more capable in deep water than the "Phase I" system. Depths of 1,844 and 2,934 metres were recorded with medium power and medium transmit pulse lengths. A depth of 538 metres was recorded, at the PCSP camp, located on the Ice Island, through 42 metres of ice!

Conclusions
The KEL 320A echo sounder demonstrated, during Arctic testing, that it can meet all of the survey requirements. Depths from 3 metres to 3,000 metres were obtained through ice ranging in thickness from 2 metres to 42 metres. A variety of transducers were used and all proved to be compatible with the KEL 320A. These transducers were both single and multi-element with center frequencies of 12 kHz or 24 kHz. The unit survived and operated in adverse climatic conditions with temperatures ranging down to -40 degrees. The mechanical integrity and rugged design was proven when the echo sounder survived the many kilometres of abusive handling, strapped to a sled, towed behind a snowmobile. The design allows for semi-automatic operation in addition to the normal operator override mode. Operator control over the large number of parameters built into the system, adds to its versatility.

Five KEL 320A sounders were used by the CHS in 1991 to collect soundings in Admiralty Inlet and Pond Inlet, at the north end of Baffin Island.

Future sounder modifications being considered for the model 320A are interfaces to other sensors such as positioning systems and velocimeters which would allow all survey data to be logged in the echo sounder. Software enhancements that would detect grounded ice and ice thickness are also under consideration.

Acknowledgements
The authors would like to thank the Polar Continental Shelf Project for the support provided during the field trials of the sounding system.

Software engineering was provided by Jeff Ross of KEL. The hardware design was led by co-author Bill Fretts of KEL. Thanks also go to the other participants in the design and construction of the KEL 320A echo sounder.

Paul Millette and Buster Waldock, from the CHS, provided the technical review and background information during the design and construction stages of the KEL 320A echo sounder.

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Canada's Lighthouse Stamps / Timbres des phares canadiens

by / par
Roger Robitaille

Introduction
Stamp collecting has changed! The traditional approach is to group stamps by country and organize them in chronological order, by date of issue. Today, many collections are organized with the subject matter of the stamp as the unifying theme, or in the vernacular of the stamp world, topical collecting. This not only involves collecting postage stamps but also conducting research to accurately describe the subject portrayed on the stamps.

Some facets of topical collecting have been around for decades. With the burgeoning number of stamp issues general topical collections, such as flora and fauna, have become unwieldy. A more specialized topic is required to restrict the number of stamps in the collection. For example, a small exhaustive presentation of the orchids of South America could be extracted from the large topical collection of flora and fauna.

The list of topical collections is endless. Three of interest to hydrography are: charts, buoys, and lighthouses. Here is Canada's contribution to the lighthouse topical collection together with the Canada Post Corporation's description of them.

Canada Post Corporation has authorized the reproduction of their stamps and narratives, from the "Lighthouses of Canada" series, for this article.

Gibraltar Point Lighthouse
(date of issue - September 21, 1984)
Gibraltar Point Lighthouse, although the second to be built on the Great Lakes, is the oldest extant lighthouse in the region, and the second oldest in the whole of Canada.

Authorization by the legislature of Upper Canada for construction of the lighthouse, on what was then known as the York Peninsula and subsequently as Toronto Island, was dated 1 May 1808. The hexagonal tower was built of limestone to a height of 67 feet (20.43 m) with a 15-foot (4.57 m) extension added in 1832. The walls at the base are about 4 feet (1.22 m) thick. A spiral staircase inside the tower leads to the polygonal lantern. In 1832 the original fixed light was replaced by a revolving one activated by clockwork weights.

According to local lore, the first lightkeeper died under mysterious circumstances, and the subsequent discovery of a skeleton near the lighthouse gave rise to the belief that the structure was haunted.

The Gibraltar Point lighthouse was removed from service on 30 June 1907, but has been preserved as a historic site by the

Introduction
La collection des timbres a changé! L'approche traditionnelle est de grouper les timbres par pays et de les classer chronologiquement par date d'émission. Aujourd'hui, plusieurs collections de timbres sont classées par sujet uniformisé, ou dans le jargon du timbre mondial, collection par thème Ceci implique non seulement la collection des timbres-poste mais aussi conduit la recherche à décrire précisément le sujet montré sur les timbres.

Quelques aspects des collections par thème existent depuis des décennies. Avec le nombre croissant de timbres, des collections générales telles la flore et la faune sont devenues difficile à manier. Une meilleure spécialisation des sujets est requise pour restreindre le nombre de timbres dans la collection. Par exemple, une petite présentation complète des orchidées de l'Amérique du Sud pourrait être extraite de la vaste collection par thème de la flore et de la faune.

La liste des sujets de collection est infinie. Trois sont d'intérêt pour l'hydrographie: les cartes, les bouées et les phares. Voici la contribution du Canada à la collection par thème des phares avec la description de ceux-ci faite par Poste Canada.

Poste Canada a autorisé pour cet article la reproduction de ses timbres de la série "Phares du Canada" et de leurs descriptions.

Le phare de la Pointe Gibraltar
(date d'émission-21 septembre 1984)
Le phare de la pointe Gibraltar, même si c'est le deuxième à être érigé sur la rive des Grands Lacs, est le plus vieux qui soit encore dans la région et le deuxième plus ancien qui existe encore au Canada.

C'est le 1er mai 1808 que l'Assemblée législative du Haut-Canada autorisait la construction d'un phare à l'endroit connu alors sous le nom de péninsule de York, maintenant l'Île de Toronto. La tour hexagonale de pierre calcaire s'élevait à 67 pieds (20, 43 m) et, en 1832, on l'allongea de 15 pieds (4, 57 m). À la base, les murs ont 4 pieds (1, 22 m) d'épaisseur, et à l'intérieur, un escalier en spirale mène à la lanterne polygonale. En 1832, la lampe fixe du début fut remplacée par une autre, rotative, actionnée par des poids d'horloge.

Selon une légende locale, le premier gardien du phare serait mort dans des circonstances mystérieuses et la dévouverte subséquente d'un squelette, près du phare, fit croire que la structure était hantée.

Le phare de la pointe Gibraltar fut mis hors d'usage le 30 juin 1907, mais la ville de Toronto en assure l'entretien comme lieu historique.

Fisgard Island Lighthouse

(date of issue - September 21, 1984)
Fisgard lighthouse was built simultaneously with that of Race Rocks in the strait of June de Fuca in 1860. They were the first two lighthouses on the Pacific coast of British North America.

Both projects were jointly undertaken by the Imperial and Colonial Government (Vancouver Island), although construction of the towers was solely the responsibility of the colony.

Fisgard Island, at the entrance to Esquimalt harbour, was selected as the site for this lighthouse in August 1859. The tower and attached dwelling were built of brick; the foundations of the lighthouse, of masonry; and the walls at the base were 4 feet (1.22m) thick. The tower tapered from a base diameter of 13 feet (3.97m) to 9 feet (2.75m) at the top. Messrs. Wilkins of London supplied the octagonal iron lantern, and the well-known Birmingham firm of Chance Bros., the optical apparatus for the light. The two-storey attached dwelling communicated directly with the tower from the second story.

Fisgard lighthouse is still in service, but is now maintained as a historic monument by Parks Canada.

Le phare de l'Île Fisgard

(date d'émission - 21 septembre 1984)
Le phare de Fisgard fut construit en même temps que celui de Race Rocks, dans le détroit de Juan de Fuca, en 1860. Il s'agit des deux premiers phares sur la côte du Pacifique, en Amérique du Nord britannique.

Les deux projets furent entrepris conjointement par les gouvernements impérial britannique et colonial (île de Vancouver), la construction des tours relevant entièrement de la colonie.

L'île Fisgard, à l'entrée du havre d'Esquimalt, fut choisie comme emplacement de ce phare, en août 1859. La tour ainsi que la résidence attenante furent construites de briques. Le phare, dont les murs atteignent 4 pieds (1, 22m) d'épaisseur à la base, fut érigé sur des fondations en maçonnerie. La tour de forme conique a un diamètre de 13 pieds (3, 97 m) à la base et de 9 pieds (2, 75 m) au sommet. Messieurs Wilkins de Londres fournirent la lanterne octogonale de fer, et la Chance Bros. de Birmingham, les dispositifs optiques de la lampe. La résidence de deux étages communique avec la tour au niveau du deuxième. Le phare de Fisgard est toujours en usage, et Parcs Canada en assure l'entretien en tant que monument historique.

Louisbourg Lighthouse

(date of issue - September 21, 1984)
This was the first lighthouse built on Canadian shores, and the second on the North American continent.

A circular stone tower of coursed rubble was begun in August 1731 and was completed two years later to a height of about 70 feet (21.3m), but delay in the delivery of the lantern glazing from France held up the exhibiting of the sperm-oil light for the first time until 1 April 1734. The light, for which a range of 6 leagues in clear weather was claimed, consisted of a circlet of oil-fed wicks set in a copper ring and mounted on cork floats.

Unfortunately, the original lantern contained combustible elements, which resulted in a fire on the night of 11-12 September 1736, destroying the lantern, which was then replaced by a six-sided fireproof lantern of stone and bronze. The height of the new lighthouse from base to vane was 68 feet (20.74m), including the 23-foot (7.02m) lantern completed in July 1738. In 1758 the addition of parabolic reflectors increased the range of the lamps.

After twenty years' service, however, the Louisbourg lighthouse was badly damaged by a British bombardment on the night of 9 June 1758, and was let fall to ruin. A successor was not built at Louisbourg until 1842.

Le phare de Louisbourg

(date d'émission - 21 septembre 1984)
Ce phare fut le premier à être édifié en sol canadien et le deuxième sur le continent nord-américain.

La construction de la tour circulaire de pierre a débuté en août 1731. Un délai dans la livraison du verre retarda d'autant l'achèvement de la lanterne, et ce n'est que le 1er avril 1734 que jaillit pour la première fois la flamme de sa lampe à l'huile de baleine. La lumière, qu'on affirmait avoir une portée de six lieues par temps clair, avait comme source un petit cercle de mèches alimentées à l'huile et serties dans un anneau de cuivre, le tout monté sur des flotteurs de liège.

Malheureusement, la première lanterne comportait des éléments inflammables, et elle fut détruite par un incendie dans la nuit du 11 au 12 septembre 1736. On la remplaça par une autre plus sûre, construite en pierre et en bronze. Le nouveau phare s'élevait à une hauteur totale de 68 pieds (20, 74 m) comprenant la lanterne de 23 pieds (7,02 m) achevée en juillet 1738.

Dans la nuit du 9 juin 1758, le phare de Louisbourg fut sérieusement endommagé lors d'un bombardement, et on le laissa ensuite tomber en ruine. Ce n'est qu'en 1842 qu'un autre phare fut construit à Louisbourg.

Île Verte Lighthouse

(date of issue - September 21, 1984)

Built in 1809, Île Verte lighthouse is the third oldest extant lighthouse in Canada, and the first to be built on the shores of the St. Lawrence River.

As early as the 1780's, treacherous tides and currents at this point off the mouth of the Saguenay River indicated the need of a light, but it was not until 1806 that a contract was let for a circular stone tower on Île Verte. The London firm of George Robinson supplied the copper lantern. The light apparatus, comprising 13 oil lamps fitted with silver-plated parabolic reflectors was designed and installed by Messrs. Brickwood and Daniel of London and first exhibited in 1809. At a subsequent date this catoptric light apparatus was replaced by dioptric, consisting of reflecting and retracting elements surrounding the light.

Île Verte lighthouse's configuration (round with a slight taper and with a slight overhang to the cornice or lantern platform) was similar to several other lighthouses subsequently built in the region at Point des Monts and on Anticosti Island.

Île Verte lighthouse is still in service and listed in the latest issue of *List of Lights, Buoys and Fog Signals,* published annually by the Department of Transport.

Le Phare de l'Île Verte

(date d'émission - 21 septembre 1984)

Construit en 1809, le phare de l'île Verte est le troisième plus vieux phare encore en existence au Canada, el le premier qui ait été érigé sur les rives du fleuve Saint-Laurent.

Dès les années de 1780, des marées et des courants dangereux près de l'embouchure de la Saguenay rendaient nécessaire la construction d'un phare. Toutefois, ce n'est qu'en 1806 qu'un contrat fut passé pour la construction d'une tour à l'extremité nord-est de l'ile Verte. La société londonienne de George Robinson fut chargée de la fabrication de la lanterne de cuivre. Le dispositif d'éclairage, composé de 13 lampes à huile munies de réflecteurs paraboliques, fut conçu et installé par messieurs Brickwood et Daniel de Londres, et c'est en 1809 que la lumière en jaillit pour la première fois. Par la suite, ce dispositif d'éclairage caloptrique fut remplacé par un autre, dioptrique.

Le phare de l'ile Verte, rond el légèrement conique avec une corniche ou plateforme de lanterne légerèment en surplomb, ressemble à celui d'autres phares érigés plus tard dans la région, notammenl à Pointe-des-Monts et sur l'île d'Anticosti. Le phare de l'île Verte est toujours en usage et on en fait mention dans le dernier numéro du *Livre* des *feux, des bouées et des signaux de brume,* que publie chaque année le ministère des Transports

The Sisters Islets

(date of issue - October 3, 1985)

The Sisters Islets are two small rocky outcrops lost in the middle of Stevens Passage, about 15 km east of Vancouver Island.

The first lighthouse, erected in 1898 on the larger of the two islets, was operated by a single keeper who lived there year-round with his family. This structure was replaced in 1968 by more modern facilities, consisting of four buildings that house living quarters, power generation and other equipment, storage and workshops. The two-man crews alternate running the lighthouse every sixteen days, flying in by helicopter from Victoria, B.C.

The round white concrete tower supports a light 21.3 metres above sea level, visible for 21 nautical miles (38.9 km) in clear weather. Two foghorns, pointed to the northwest and the east, provides a warning on the odd occasion when visibility is poor; this area of British Columbia records only 180 hours of fog in an average year. The lighthouse is also equipped with a radio beacon transmitting the letter M (—) in Morse code.

Sisters Islets

(date d'émission - 3 octobre 1985)

Les îlots Sisters sont deux petites formations rocheuses perdues au milieu du Passage Stevens et situées à environ 15 km à l'est de l'île de Vancouver.

Le premier phare fut érigé en 1898 sur le plus grand des deux îlots; un gardien, qui y vivait avec sa famille à longueur d'année, en assurait le service. Ces installations ont été remplacées en 1968 par des bâtiments plus modernes. La station comprend 4 bâtiments qui, en plus d'abriter les pièces que l'on peut retrouver dans une habitation, prévoient des aires de rangement et des ateliers d'entretien de l'équipement. Deux équipes de deux hommes se relaient maintenant au phare à tous les seize jours, par hélicoptère.

La tour circulaire blanche en béton porte un phare à 21, 3 mètres au dessus du niveau de la mer; il est visible à 21 milles marins (38,9 km) de distance par temps clair. Deux cornes de brume, orientées vers le nord-ouest et vers l'est, sont utilisées lorsque la visibilité devient difficile, ce qui est peu fréquent dans cette région puisqu'on n'y relève qu'environ 180 heures de brouillard par année. Ce phare est aussi équipé d'un radiophare, qui transmet un signal en code morse, dans ce cas-ci la lettre (—) M.

Pelee Passage
(date of issue - October 3, 1985)
This lighthouse sits on a shoal in western Lake Erie, near Point Pelee National Park in Ontario. The light, which guides heavy ship traffic between Canadian and American cities from April to the end of December, is fully automated. A maintenance crew visits the lighthouse regularly by helicopter.

The diesel generator that originally supplied power has now been replaced with solar panels. The photocells on the roof of the lighthouse tower provide electrical current through a storage battery. The generator has been retained, however, for emergencies.

Solar panels, similar to those on the Pelee Passage station, have been installed on more than 1,000 lighthouses across Canada.

The 33-watt white light has a nominal range of 5 nautical miles (9.3 km) in clear weather.

The Pelee Passage lighthouse is also equipped with a radar beacon (Racon) which responds to marine radar with the letter M (—) in Morse code.

Pelee Passage
(date d'émission - 3 octobre 1985)
Cette station fut construite sur un haut-fond situé dans la partie ouest du lac Erié, près du parc national de la pointe Pelée en Ontario. Fonctionnant du mois d'avril jusqu'à la fin décembre, le phare, qui guide un important trafic maritime desservant plusieurs agglomérations canadiennes et américaines, est complètement automatisé. Une équipe d'entre-tien s'y rend régulièrement par hélicoptère.

Pourvu à l'origine d'une génératrice au diésel, le phare est maintenant équipé de panneaux solaires. Les collecteurs photo-voltaiques, placés sur le toit de la tour du phare, fournissent l'energie électrique nécessaire à son fonctionnement par l'entremise d'un accumulateur. La génératrice est cependant conservée en cas d'urgence.

Au Canada, plus de 1 000 stations d'aide à la navigation sont équipées de panneaux solaires semblables à ceux utilisés au phare du passage Pelée.

Le feu blanc, d'une puissance de 33 watts, a une portée de 5 milles marins (9,3 km) par temps clair.

Le phare du passage Pelée est aussi pourvu d'une balise radar (Racon) qui répond aux radars des vaisseaux en leur transmettant la lettre (—) M en code morse.

Haut-fond Prince
(date of issue - October 3, 1985)
This unusual lighthouse sits on a shoal in the St. Lawrence River near the mouth of the Saguenay River, 8 km from Tadoussac. The Prince Shoal lighthouse was built in dry dock in the Lauzon shipyards near Quebec City and towed to its present site in 1964.

The pier supporting the light, heliport, and keeper's quarters is formed of two vertical cones joined tip-to-tip. This unique structure, known as a "wasp waist" was developed in Canada. The upward slope of the lower cone helps to break up jams of drifting river ice; the downward slope of the upper cone effectively deflects waves, which have exceeded heights of five metres in this area of the river.

Two two-man crews alternate duty every 14 days to supervise operation of the light. Three sets of foghorns, with a power of 400 watts each, are used in bad weather and during the 1,300 hours of fog the area encounters each year. The Prince Shoal light, with a potential output of 1.8 million candle power, can be seen 20 nautical miles (37 km) away in clear weather.

Haut-fond Prince
(date d'émission - 3 octobre 1985)
Ce phare d'aspect unique est situé sur un haut-fond du fleuve Saint-Laurent, près de l'embouchure de la rivière Saguenay, à 8 km de Tadoussac. Le Prince dut construit en cale sèche dans les chanteirs de Lauzon au Québec et remorqué par voie d'eau jusqu'à son emplacement actuel en 1964.

Le pilier qui soutient le phare, l'héliport et les quartiers des gardiens, est formé de deux cônes superposés et unis en étranglement. Cette structure originale, dite "taille de guêpe", fut mise au point au Canada. Le cône inférieur, de par son inclinaison en recul devant les glaces à la dérive, aide à briser les embacles, tandis que le cône supérieur défléchit efficacement l'action des vagues qui, quelquefois, dépassent 5 mètres de hauteur dans cette région du fleuve.

Deux équipes de deux hommes se relaient à tous les 14 jours pour assurer le bon fonctionnement du Prince. Trois jeux de cornes de brume, d'une puissance de 400 watts chacun, sont utilisés par gros temps et durant les 1 300 heures de brouillard que subit le secteur à chaque année. Par temps clair, le phare du Prince, dont l'intensité lumineuse peut atteindre 1 800 chandelles, est visible à 20 milles marins (37 km) de distance.

Rose Blanche
(date of issue - October 3, 1985)
This semi-automated lighthouse is located on Cains Island, a rocky formation on the southwest coast of Newfoundland near the village of Rose Blanche. The first Cains Island lighthouse was built in 1904, and the remains are still visible near the modern structure, completed in 1980. It guides the hundreds of fishing vessels that cruise the area year-round, as well as the many other boats from northern Newfoundland which head there in winter to fish for the abundant cod.

Two keepers look after the light, buildings and foghorns.

At Rose Blanche, foghorns are a very familiar sound: more than 2,000 hours of fog are recorded each year - the equivalent of 83 days of fog, one of the highest averages in the country!

In clear weather, the 500-watt red light, located 15.2 metres above sea level, is visible for 8 nautical miles (14.8 km).

Rose Blanche
(date d'émission - 3 octobre 1985)
On retrouve cette station semiqutomatisée sur l'île Cains, une formation rocheuse au sudouest de l'île de Terre-Neuve, tout près du village de Rose Blanche. Le premier phare de l'île Cains fut bâti en 1904 et on peut en voir les vestiges à proximité de la station moderne, complétée en 1980. Celle-ci guide à longueur d'année les centaines de navires de pêche qui sillonnent la région. Dès l'arrivée de l'hiver, de nombreux bateaux provenant du nord de l'île de Terre-Neuve se dirigent dans les environs de Rose Blanche afin d'y pêcher la morue qui y est abondante.

Deux gardiens veillent au bon fonctionnement du phare, des bâtiments et des cornes de brume.

À Rose Blanche, il n'est pas rare d'entendre le sourd beuglement des sirènes de la station: en effet, plus de 2 000 heures de brouillard sont enregistrées chaque année, ce qui équivaut à 38 jours de brume, une des moyennes les plus élevées du pays!

Par temps clair, on peut cependant apercevoir le feu de couleur rouge, d'une puissance de 500 watts et élevé à 15,2 mètres au-dessus du niveau de la mer, à 8 milles marins (14, 8 km) de distance.

About the Author
Roger Robitaille, an avid lifetime stamp collector, is a Hydrographic Cartographer with Central and Arctic Region of the Canadian Hydrographic Service, in Burlington, Ontario.

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The Electronic Chart in 1991 - The CHS' Changing Development Role

by

The CHS Electronic Chart Working Group

Introduction

In the early 1980's the Canadian Hydrographic Service (CHS) realized the potential of incorporating a navigational chart data base into an integrated navigation system and took an active role in the development and promotion of this concept. The term "Electronic Chart" (EC) was coined by the CHS at this time. The initial focus was on hardware and software development in order to demonstrate and prove the value of the EC, and to gain some experience with it. The primary aspects of EC technology are now reasonably mature and the importance of the EC as a navigational aid to prevent marine disaster has become broadly recognized (see Lighthouse Edition #41). Although development of EC technology will continue, it will most likely be done by others. This means that the CHS's developmental role requires some re-evaluation to ensure that the limited resources available will be used to put the CHS in the best possible position to provide the new or modified products that will be needed.

The CHS Electronic Chart World

As indicated in the centre of Figure 1, the main role that the CHS is expected to have, with respect to the Electronic Chart, will be to provide digital products for safe navigation. Around this core responsibility are shown the six major activities with which the CHS has been concerned. A brief description of each of these areas is followed by a detailed summary of CHS projects and activities under the same heading.

<u>1. Electronic Chart Display and Information System (ECDIS) Development</u>

During the 1980's the majority of CHS development funding was used for hardware and software development of integrated EC navigation systems. Although it is still possible to develop even more advanced systems, other needs are currently more important and direct CHS support of ECDIS development (unless given new resources) will decline.

<u>2. Leadership and Promotion</u>

During the past few years it appears that important progress has been made in making the marine industry and government legislators aware of the value of the ECDIS to prevent marine disasters. However, the number of systems actually being installed in oil tankers and other commercial ships is still negligible. It appears that such users are waiting for legislation, while the legislators are waiting for standards to be developed and for users to get more experience with the new technology.

<u>3. Marine Law and Regulation</u>

It will take many years to have new or modified laws in place. Will Canada lead or follow the international community? Due to the impact of the integrated navigation systems on changing traditional, and internationally accepted, practices this appears to be a complicated and slowly moving area, that can seriously affect their rate of implementation.

<u>4. Electronic Positioning</u>

The Global Positioning System (GPS) is one of the key technologies that is pushing the strong interest in integrated navigation systems and it will have a major impact on navigation and chart use. For example, what is the impact on the safety of navigation when navigators can position themselves to an accuracy that is better than that available to the hydrographers in the past, whose data forms the basis of our current charts? Also, to gain maximum benefit from these systems a differential correction is needed. How will it be implemented?

<u>5. Standards</u>

Compared to the data standards needed for the paper chart, the electronic chart data required for an ECDIS creates a more complicated world. The success of the ECDIS internationally will depend on the availability and acceptance of a

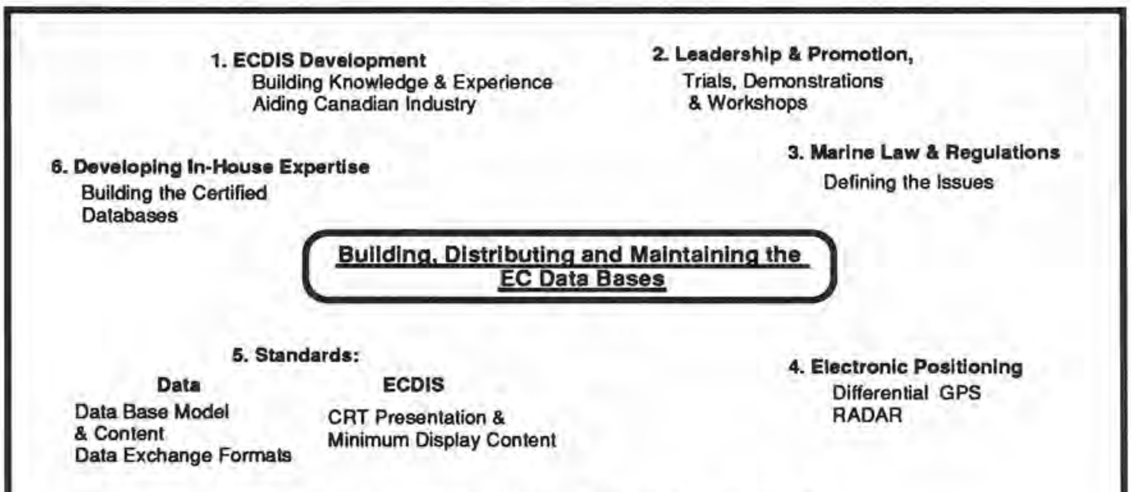

Figure 1: Overview: The CHS Electronic Chart World

variety of standards such as the following.

Navigational Data
This standard covers the distribution and updating of the basic data, and must include all nautical publications. This involves standardized structures, or models of the data, plus standardized mechanisms for packaging (i.e., formats), distributing, and updating the data.

Data Display
The symbolization and colours used on an electronic screen must be standardized to avoid confusion that could lead to ECDIS generated accidents. Different standards are needed for day and night.

ECDIS
The minimum content of the EC data base and Cathode Ray Tube (CRT) display, internal data structuring, etc., must be standardized.

User Interfaces
In critical situations an operator could become confused and make a mistake if systems differ greatly.

6. Building the ECDIS Databases
For the CHS, this is an important activity since it is one that most closely relates to the CHS's reason for existing, and until recently it had not received much attention. This does not mean just digitizing existing charts, but includes the structuring, certification and maintenance of the digital data sets. In addition the CHS must determine how to deal with the data massaging necessary to satisfy current industry needs, as well as the evolving ECDIS requirements. Serious thought must be given to the new or modified infrastructure that will be required to build and certify the Electronic Navigational Chart Data Base (ENCDB).

The six major areas of endeavour, just described, cover a relatively wide range of activities whose coordination, in the CHS, has primarily through been through the following groups:

1. The CHS Development Coordination Committee for research and development coordination; and
2. The Electronic Chart Working Group (ECWG) for managing the EC projects.

Coordination and information sharing with other interested Canadian groups, has generally been through the following two groups:

1. Electronic Chart Steering Committee (CHS, Canadian Coast Guard, Dept. of National Defense, Port Authorities, Marine Institutes, etc.); and
2. Ad Hoc Electronic Chart Project Meetings (Information sharing between agencies mentioned above, as well as private industry).

Internationally, coordination and information sharing have been primarily through the International Hydrographic Organization (IHO) and it's two EC committees:

1. The Committee On Electronic Charts (COE); and
2. The Committee for the Exchange of Digital Data (CEDD).

Information sharing and coordination with the United States is through the:

1. U.S./Canada Electronic Chart Advisory Group: with representation from the National Ocean Service, CHS, Canadian Coast Guard and U.S. Coast Guard); and
2. Radio Technical Commission for Maritime Services.

Status of Projects and Activities
This section describes the Electronic Chart projects and activities that the CHS has been involved in over the past few years, as well as, those currently under way. They are summarized in Figure 2 under the six major areas described earlier.

1. ECDIS Development
CARIS Testbed
This was the CHS's first major EC project and it has been very successful. The Computer Aided Resource Information System (CARIS) mapping system, which is employed for chart production in the CHS, was used as the basis for an experimental ECDIS to investigate the components of an EC system and to test and demonstrate them in several trials in Halifax Harbour (1986-1988), and in the North Sea (1988). The testing It provided a testbed to study CRT display design, including the use of colours and symbols. The ECDIS was also interfaced to radar, which enabled the CHS to demonstrate the importance of a radar overlay to confirm the registration of electronic positioning systems, such as LORAN C, as well as showing the presence of other vessels on one integrated display. The test provided an opportunity to investigate data base structures, and perhaps most importantly, it enabled many sceptical mariners to view an operational system during sea trials, and to understand the value of such a system for navigating under difficult circumstances. The software modifications needed in CARIS were done by Universal Systems Limited (USL), who have used this work to create a commercial package called the Electronic Chart Management System (ECMAN).

McGILL Radar
This was a feasibility study by the McGill Radar Observatory to investigate the comparison of radar echoes with a database of previously recorded echoes, and to use a correlation process to determine vessel position. In trials on Bedford basin, in October 1989, it was shown that accuracies of the order of tens of meters were possible. Although the feasibility of this approach was demonstrated, considerable effort is still required to create a commercial product.

2. Leadership and Promotion
Trials and Demonstrations
These are usually part of other projects but they have been of enormous value in promoting the EC concept. There are still many people in the marine world, who continue to ignore the EC, or write it off as an interesting technical gadget. Since there are very few ECDISs in operation, it is difficult for most people to observe them in use at sea. Trials have been held by the CHS in Halifax, Nova Scotia and Prescott, Ontario. Both the CARIS Testbed and the Precise Integrated Navigation System (PINS) produced by Offshore Survey Limited (OSL) had a very successful participation in the North Sea Trials, held in October 1988. This was documented in a video produced by the CHS in 1988. A second EC video was produced in 1989 which focused on the technology and value of the EC to prevent marine disasters. A third video that documents the Electronic Navigation Chart (ENC) trials on the St. Lawrence River, in April 1990 is presently being prepared. Data collected during the testbed trials have also been used to give ECDIS simulations on the CARIS system.

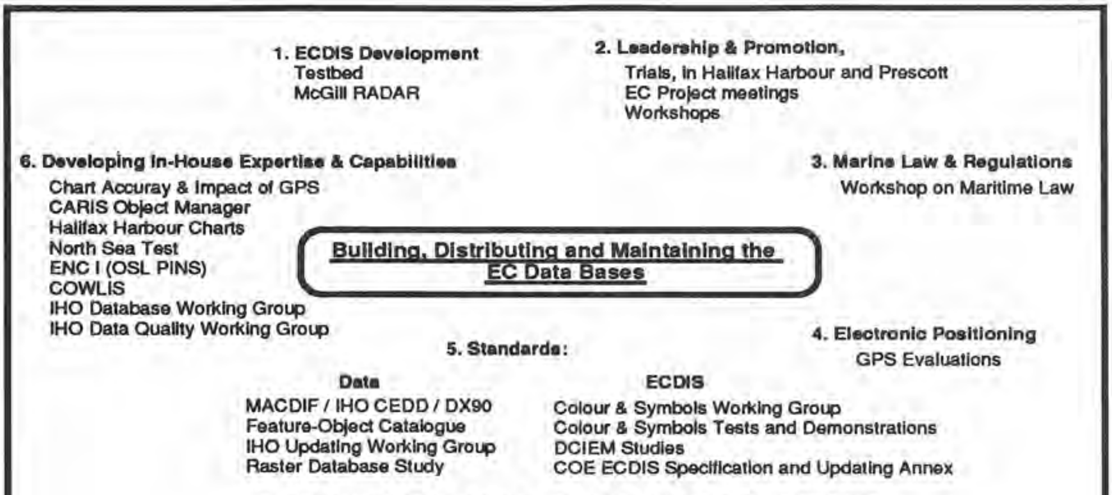

Figure 2: CHS Past & Current Electronic Chart Projects & Activities

A system installed in Hamburg, Germany was used to give demonstrations to the International Maritime Organization (IMO)/ IHO Harmonization Group. Another system installed in The Hague, Netherlands was used to give demonstrations to the IHO Committee On Electronic Charts.

EC Project Meetings
Since 1985, the CHS has held these meetings which have been open to those individuals interested in Electronic Charting. Generally these meetings were held in conjunction with a trial and were intended to share information and get constructive criticism on various activities. The meetings also enabled CHS staff to learn about progress and activities in other agencies. Whenever feasible the private sector was also invited to participate in these meetings. Seminars or presentations on specific projects have also been organized when appropriate.

3. Maritime Law & Regulations
A two-day international conference on "Maritime Law and the Electronic Chart" was held in Ottawa in November 1990. The main topics of discussion were Copyright, Regulation, Safety, and Civil Liability. Attended by close to one hundred individuals from around the world, the conference was very successful in examining how the various legal issues may affect ECDIS use. The conclusions tended to imply that without supporting legislation ECDIS acceptance will be slow. [20]

4. Electronic Positioning
The CHS anticipates that the GPS will have a great impact not only on the way that hydrographic surveys are carried out but also on the manner in which navigators relate to chart data. To evaluate GPS effect on hydrographic surveys, a cost/benefit analysis was carried out which showed that use of the GPS should provide a 42% boost in productivity when compared to conventional methods of survey positioning. Over the past 8 years the CHS has carried out many experiments to determine the optimal method of actually using the GPS. Some of the problems explored by these experiments are:
- the effect of GPS differential corrections;
- different algorithms for integrating pseudo range observations with carrier phase observations;
- the effect of multi-path and how to counteract it;
- different methods of transmitting differential corrections to survey vessels; and
- the use of GPS observations for measuring heave movement of the survey vessels.

These experiments have also resulted in working software able to process raw data from a number of commercial receivers in an optimal manner. Further GPS testing is planned to evaluate, in a controlled dynamic environment, software from major manufacturers, as well as, the CHS-developed Hydrostar software (a generic PC-based package developed for hydrographic surveys using differential GPS positioning) [18]. These tests will have a major influence on what the CHS will eventually implement.

To evaluate the impact of GPS on the Electronic Chart, a CHS commissioned study found that there are potential dangers associated with putting powerful GPS/EC products into the hands of navigators. By using a positioning system that in many cases is more accurate than the one used to survey an area, a navigator may be tempted to perform more dangerous passages than if he was using a positioning system that provided less accuracy than GPS, particularly when coupled to an EC. The positioning of the soundings underlying the EC data base may not have been accurate enough to support the sophisticated EC features which tend to give mariners greater confidence when approaching dangers. The implication of this is that hydrographic surveys may have to be upgraded to provide the needed accuracy. Alternatively, the EC must incorporate warnings to alert the navigator to potential positioning errors in the chart data and limit his confidence in the GPS-displayed position with respect to the chart data [17].

5. Standards
Present efforts on ECDIS standards can be grouped into the two disjoint areas, which includes specifications for the hardware and the software, and for the navigational data that will be fed into the integrated navigation system.

ECDIS
- ECDIS Specification: A draft is being circulated by the IHO which attempts to define or specify, as much as possible, what the ECDIS is, in anticipation of regulations which will be set by

the IMO and to provide engineers, manufacturers and data producers with the information they need to develop prototype packages. The specifications are revised periodically by members of the IHO Committee on Electronic Charts of which the CHS is a member.

- Colour and Symbols: This concerns CRT cartography. The CHS experience with producing the paper chart is of limited value when constructing a chart presentation on a new medium such as the CRT. The integration of radar, and the flexibility to add or remove information (thus reducing chart clutter) makes the ECDIS a very powerful medium in which to present graphic information, but also makes it difficult to optimize. The CHS has had a very active role in this work and has chaired the IHO working group.

- ENC Dissemination and Updating: A proposed system for ENC dissemination and updating and its infrastructure is available as an annex to the ECDIS Specification. Standards for data exchange are covered by another group.

- User Interface: There are no specific activities in this area yet, but it is obviously related to the work done by the colours and symbols group.

- Certification of Commercial Systems: How will a mariner know if the system he buys is safe to use? Some form of hardware and software certification has been discussed but there are no specific activities in progress to solve this problem. This is a major problem requiring investigation.

Navigational Data

The current focus is to provide digital nautical chart data, for the ECDIS, but eventually all related navigational information published by the CHS, such as Sailing Directions, will have to be issued in an electronic form. At the moment many nations are attempting to develop or implement national standards for the exchange of digital map and chart data. Two groups; the IHO and the Digital Geographic Information Working Group (DGIWG), are attempting to develop international exchange standards. The IHO is focusing on ECDIS needs. The DGIWG, which is a North Atlantic Treaty Organization (NATO) derived military group, is currently concentrating on land and air requirements, but is strongly interested in covering the marine side as well. Discussions between the IHO and DGIWG are being held to determine if a common international exchange specification is feasible. In Canada, a national Committee on Geomatics under the Canadian General Standards Board has been established in an attempt to fulfill Canada's need for geomatic standards. Standards are required for data models, feature classification, updating, encoding schemes, data quality, the exchange medium, and catalogues and directories.

The following specifications are being investigated by the Canadian General Standards Board for possible adoption as Canadian National Exchange Standards [10]:

- Map and Chart data Interchange Format (MACDIF)/Map Interchange Format (MDIF): Initiated by the CHS and the Ontario Ministry of Natural Resources this was the first attempt to develop a spatial exchange standard based upon the open systems interconnection concept of the International Standards Organization, and it was the first project to advocate spatial data exchange by telecommunications. Although not likely to become a standard itself, it is having a strong influence on other similar projects [21].

- DX90: This is an exchange format proposed by the IHO CEDD to cover physical media. Exchange by telecommunications will be dealt with later and is not included in this.

- Digital Geographic Standards (DIGEST): Developed by the DGIWG for physical media only, it covers several types of data (e.g., Vector, Raster and Digital Terrain Model), and will be used for the Digital Chart of the World Project which may make DIGEST a de facto world standard. Due to its work on the MACDIF, Canada was asked by the DGIWG to develop a compatible version of DIGEST for the telecommunications medium [21].

- SDTS: This is a general exchange mechanism developed in the U.S. and may soon be adopted as their national standard.

- Spatial Archive and Interchange Format (SAIF): This is a very advanced proposal for data exchange developed by the British Columbia, Ministry of Crown Lands.

- Canadian Council on Geomatics Interchange Format: This is the Canadian standard for the exchange of topographic data. It was also adopted as the Alberta provincial standard.

Also of special interest is the "Feature-Object Catalogue" which was started by the German Hydrographic Office and the CHS [22]. This catalogue presents a more modern way of modelling the features of the real world in a computer, and of structuring them so that a computer program can actually scan the chart data base and warn the navigator of any potential underwater dangers. It is being proposed as an IHO standard. The CHS is evaluating the Feature-Object Catalogue in an upgrade of the Halifax Harbour ENC.

6. Developing In-House Expertise & Capabilities

This section gives brief summaries of various projects involving the CHS over the past few years:

Halifax Harbour

A prototype ENC of Halifax was developed for the CARIS Testbed trials. It is now planned to revise and upgrade this file using the model and specifications described in the Feature-Object Catalogue. This is an important project for developing experience in designing the chart for CRT medium, as well as, testing and evaluating the Feature-Object Catalogue.

North Sea Test

Similar to the previous task; in this case charts of several North Sea Ports were digitized and customized for the CARIS Testbed. The CHS produced a video of this event.

ENC I

Carried out by OSL, this was a project designed to create an ENC using a CHS digital chart file. The ENC was formatted in MACDIF and fed to a PINS, a commercial ECDIS manufactured by OSL and now used in several parts of Canada. This project provided important feedback on the use of CHS chart files for creating ENC's. The results of this effort were demonstrated in a trial held on the St. Lawrence River in April 1990. A Notices to Mariners update, using MACDIF, was also sent electronically to the test vessel while underway.

CARIS Object Manager
From a proposal, initially developed by the CHS and USL, SUSAN in Hamburg, have been dveloping CARIS tools that can be used to create an object-based data base for Electronic Charting .This work stems from the effort to develop the "Object Catalogue" for the IHO CEDD.[22]

Chart Accuracy and Impact of GPS
The availability of relatively inexpensive GPS receivers means that navigators will have the capability to position themselves with much greater accuracy than hydrographers had in the past. This is of some concern since chart data may not be adequate when used in conjunction with such a high accuracy absolute positioning device. How serious it is and what the CHS can do about it are the topics being studied in this effort.

IHO Data Quality Working Group
Related to the previous task, how will chart producers inform ECDIS users on the quality of the navigational data being provided, a working group was formed in 1990. The working group is chaired by Australia and Canada is a member.

IHO Database Working Group
This is mainly a group of North Sea countries who are planning further sea trials in the North Sea to continue evaluating proposed ECDIS specifications, as well as the proposed data exchange standards. [15] Canada is an observer, but will participate as much as possible.

Coastal Ocean Water Level Information System (COWLIS)
Although not directly related to the EC, the COWLIS provides an opportunity to gain experience with the dissemination of information through a telecommunication link.

Raster Database Study [23]
Significant advances in raster-based technology are changing Geographic Information Systems into a "multimedia" environment with the integration of both vector and raster spatial data. Since the CHS cannot currently meet the demand for digital vector chart data, a raster scanned data base of all CHS charts offers the possibility of an interim solution that could satisfy up to 80% of current user demands. This study describes the raster technology and it's potential for the CHS.

Recreational ECDIS Study
The recreational boating community is leading in the purchase of "non-standard" Electronic Chart systems. This refers to systems that will not conform to the proposed IHO/IMO standards. These systems generally operate on personal computer systems and are becoming relatively cheap. There is a major initiative among some manufacturers to provide accurate geographically-registered raster images of the paper chart. These systems are flexible navigational aids and imply "paper chart equivalency". They include a vector overlay capability so that the user can add additional information, including chart corrections. Sales of these are expected to climb rapidly. The study is an ongoing effort to monitor the benefits, dangers, and needs generated by the use of such systems.

Proposed Projects and Activities for 1991/92:
The primary thrust for development will be to gain the knowledge and build the in-house expertise required for the CHS to build, distribute, and maintain the appropriate EC Data Bases. Minor projects supporting the development of various ECDIS standards will also continue. The proposed CHS projects for 1991/92 follow.

<u>EC Pilot Project</u> [3]
Although Electronic Chart systems have received some degree of recognition, as a navigational tool that can reduce the probability of a marine disaster, there is little movement by the commercial marine industry to actually buy and install systems. This reluctance to take action is natural considering that there are no regulations to cover ECDIS use. Further, there is confusion among potential users as to what a system should entail. Proponents of raster-scanned based systems, claim "paper chart equivalency", while users of vector based systems cannot, at the moment, obtain certified digital data. To help move through this impasse the CHS has proposed a pilot project where a number of oil tankers or vessels carrying hazardous materials, in a selected area of Canada, would be outfitted with EC systems. The CHS would participate in the construction of the data base and would be expected to deal with the certification and updating of the EC database. This project could have an important impact on ECDIS use in Canada and also aid industry. Special funding is sought to pay for this project.

<u>Electronic Positioning</u>
The adoption by mariners of GPS receivers will be swift due to its ease of use, reliability, and low cost. The effort to deal with the impact on charting from the mariner's use of GPS will follow on from the 1990/91 study and the work will look at possible negative effects and potential solutions.

In 1991, the CHS will be deploying GPS receivers on a number of surveys. The 1991 CHS Arctic Survey used off-the-shelf GPS equipment. Trips to various surveys will be made this summer to familiarize survey staff with "Hydrostar" and get feedback on its use.

<u>ECDIS Standards for Colour and Symbols</u>
This task will be to research and determine how to calibrate CRT's so that a consistent colour representation can be achieved. This is a basic requirement if the recommendations of the IHO Symbols and Colours Working Group are to be implemented. The CHS will also cooperate with Memorial University, of St. John's, Newfoundland, in a graduate project to study the eye movement involved in using the CRT for the ECDIS (using Testbed) and for chart construction.

<u>Data Exchange Specifications:</u>
- MACDIF: The CHS ECWG will develop a plan of action for the CHS, and the Department of Fisheries and Oceans, to implement data exchange standards for the short and long term and prepare a study of operational impact. CHS participation is also planned in the development of a geographic architecture with the Department of National Defense (DND). Fifty percent of the overall funding is expected to come from the National Archives of Canada.

- DX90: On-going support for this format will be provided to the CEDD; specific tasks will depend on its acceptance by the IHO community.

- DIGEST: The DND will be assisted in the evaluation and promotion of this broad family of standards. The possibilities of using the raster specifications for a prototype data base of hydrographic charts and of using the vector specification to produce a "Compact Disk-Read Only Memory" (CD-ROM) of the west coast Natural Resource Map data base will also be investigated. The CD-ROM would use the standards and personal computer software developed under the Digital Chart of the World Project. [13]

- Feature-Object Catalogue: The ECWG will work with Germany and the CEDD to evaluate this catalogue, add any necessary enhancements to the object model and begin to have it introduced into CHS chart production.

ENC II
This is the second phase of a long-term project involving the compilation of an ENCDB, of various parts of Canada. This is a "follow-on" from the ENC I project and will involve CHS chart production staff. It is an ambitious project that involves development and testing of:

- international standards for data content, dissemination and presentation;
- methods and procedures to produce and distribute the electronic navigation charts; and
- a mechanism to maintain the electronic navigation charts and disseminate updates.

Hapag-Lloyd Cruise
This refers to a trial cruise, of a German ship, to several North Sea and North American ports, including Halifax, to test the proposed CEDD object approach in building electronic chart data bases. CHS (Ottawa) plans to upgrade the Halifax ENC built for earlier "Testbed" trials.

CARIS Object Manager
Canada worked with Germany and the United States to develop the idea of adding more "intelligence" to how digital data is collected and organized for electronic chart use. This effort led to the CEDD Feature Object Catalogue and a better approach to modelling the real navigational world in a digital data base. In the PINS ECDIS, OSL also uses a proprietary object structure, but the concept does not yet have a broad understanding, or acceptance, and additional promotion is needed. Some new tools must also be added to CARIS in order to create and manipulate these objects. SUSAN and the CHS are working with USL to build these tools which include an Object Manager for CARIS.

Prototype Raster Database
A video disk of the British Columbia coastline is being built by the DND's Search and Rescue Unit. This includes CHS charts and topographic maps at scales of approximately 1:50,000 and smaller. The result will be a geographically-scaled mosaic, any part of which is accessible at the touch of a mouse button. The video images of the chart and maps are generated from a high-resolution digital raster-scanned image and the video disk can store 54,000 images, any one of which can be accessed in a fraction of a second. Such products are important for command and control operations for both the military and the coast guard. Also in the U.S., raster scanned copies of National Ocean Service and CHS charts are being produced and there appears to be a good market for these products, in low-cost but very useful non-standard electronic chart systems. According to one manufacturer 1 $^{1}/_{2}$ hours are required to scan a chart and process the data for resale. [12] Although the integration of published, certified vector data bases of these charts would be of enormous value it could be another decade before such products are available. To break this impasse, it has been proposed that a prototype high-resolution data base of the Pacific coast be made to supplement the video disk product. Although not funded, this project would build on the effort provided for the video disk, and would be done in cooperation with the DND and possibly other agencies who have a strong and immediate need for such digital chart data. It has been estimated that 80% of the current need for digital chart data could be satisfied by a raster data base (as opposed to the additional intelligence in a vector data base), since most applications can be satisfied with a pictorial. Furthermore future EC systems will likely be "multi-media" and will need to be able to display both raster and vector charts. The raster product raises some issues of chart scheming, chart projection, data formats, and updating.

Chart Data Accuracy
To avoid some of the potential dangers associated with the use of the GPS for navigation with chart data bases built from older survey data the perceived needs are to:

- define and record measurement accuracy;
- provide the estimates of the accuracy of interpolated depths;
- record bottom roughness to help make this estimate; and
- store and display accuracy estimates in the ENCDB and on the ECDIS respectively.

CHS plans are to research one or more of the topics as resources permit.

ENC Quality Control and Certification
The CHS does not have the resources to make both paper and electronic products. If the interest in Electronic Charts continues to grow, contract work may have to be done, but the CHS must set and monitor the quality of the electronic products, and CHS staff must obtain the appropriate knowledge and skills to be able to do this. Although these are important activities, they are not suitable for research and development funding and other resources must be found to sponsor them.

Recommended Five Year Goal
It is difficult to predict what the status of the Electronic Chart will be in five years and therefore it is also difficult to provide a clear answer as to where the CHS should aim to be in five years. Furthermore this question should be considered in the larger context, in that the CHS will continue to slowly evolve to a completely digital operation, including hydrographic surveys, source and product data management, and chart production. The ECWG also expects that this transition would be followed by the provision of most, if not all, CHS navigational products in a digital form. In any final plan all of these areas must be considered, but for the ECWG to devise a good development program for the next few years, it would benefit from a better grasp on where the CHS might want to be, assuming that it is somehow prepared to change. Without more feedback there will be a tendency to continue to use the small resources available for small projects of special interest to ECWG members, or for solving specific national or international problems, which although important for electronic chart systems, may not be of direct benefit to the CHS.

For the ECWG, the problems and issues of creating prototype ENCDBs will form the core of its effort for the next few years.

The primary goals will be:

1. to gradually develop and build the skills and knowledge across the CHS that will be needed to build an ENCDB (even through it's specifications are still evolving);

2. to develop the specifications, ability, and tools in the CHS necessary to certify, maintain and update the ENCDB for navigational use;

3. to participate in the development of higher order objects so that a search through the ECDIS data base can be made and the navigator warned of potential hazards in a ship's path. Also to implement the IHO Feature-Object Catalogue in the CHS and ensure that an "object manager" for CARIS is available for the construction of an object-oriented ENCDB.

4. to move forward with a new paradigm for depth representation. Using concepts developed in the CHS Atlantic Region [24], replace the traditional discrete (X,Y,Z) point model for depth representation with a (code, depth) area-based model to specify a variable-sized area for depth representation. It is believed that such a shift would aid the development of an automated chart compilation process, as well as the development of automated quality control processes. It would also make it easier to build a more advanced EC, incorporating dynamic tide corrections.

If these goals can be accomplished, then the CHS will be in a position to create future digital products, oversee their construction by industry and continue to participate in the advancement of integrated electronic chart navigation systems.

Conclusions

This report has attempted to provide a summary of past, present, and proposed Electronic Chart projects and activities in the CHS. It is hoped that individuals not closely associated with EC developments will get some appreciation of the CHS' broad involvement and significant contribution to the advance of the technology.

The primary focus for the CHS over the next five years will be to develop flexible skills so it can not only produce, manage, and maintain the new digital products, but be able, in a changing environment, to deal with quality control issues even if the navigation products are produced by third parties.

Summary of Acronyms used in this article

BSH:	Bundersamt für Seeschiffahrt und Hydrographie (Germany)
CARIS:	Computer Aided Resource Information System (produced by USL)
CD-ROM:	Compact Disk-Read Only Memory
CEDD:	Committee for the Exchange of Digital Data (of the IHO)
CHS:	Canadian Hydrographic Service
COE:	Committee On Electronics Charts (of the IHO)
COWLIS:	Coastal Ocean Water Level Information System
CRT:	Cathode Ray Tube
DGIWG:	Digital Geographic Information Working Group
DIGEST:	Digital Geographic Standards (of DGIWG)
DGPS:	Differential Global Positioning System
DND:	Department of National Defence
DX90:	Digital Exchange 1990 (of the CEDD)
EC:	Electronic Chart (Integrated positioning, Data base and CRT Display)
ECDIS:	Electronic Chart Display and Information System
ECMAN:	Electronic Chart Management (Product from USL)
ECWG:	Electronic Chart Working Group (of the CHS)
ENC:	Electronic Navigational Chart
ENCDB:	Electronic Navigational Chart Data Base
GPS:	Global Positioning System
IHO:	International Hydrographic Organization
IMO:	International Maritime Organization
MDIF:	Map Interchange Format
MACDIF:	Map And Chart Data Interchange Format
OSL:	Offshore Systems Ltd. (produces PINS)
PINS:	Precise Integrated Navigation System (produced by OSL)
RTCMS	Radio Technical Commission for Maritime Services
SAIF:	Spatial Archive and Interchange Format (of British Columbia)
SDTS:	Spatial Data Transfer Specification (of the United States)
SUSAN:	Fachhonchschule Hamburg - Shiphandling and Simulation Facility,
USL:	Universal Systems Ltd. (produces CARIS)

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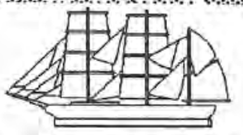

When the ship's at sea

As we set sail
On our voyage of life,
My partner and I,
The hydrographer's WIFE.

Romantic and tender
The man I adored
He looked at me sternly,
And said, "Welcome Aboard."

The course we had chosen,
The forecasters said,
Could be rocky and rough ...
It was full steam ahead.

Year one, had its weather,
At times it got sore,
The honeymoon had ended,
But there would be more.

My Hydrographer was gone,
I was empty and blue,
He'd shipped out to sea,
For a mere, month or two.

Year two had its storms,
But only a few,
'cause it seemed it was time
To be starting a crew.

With crew underway,
It flowed like a stream,
A husband, a child,
Life was peaches and cream.

Soon one became two
And the Captain at sea,
It wasn't exactly
As I'd hoped it would be.

The car, it was sick,
The bills overdue,
Mom's near a breakdown
Because of the crew.

"Honey, don't worry,
I'll be home very soon."
How often have YOU heard
That familiar tune ?

And home he did come
Bearing treasures and tales,
Like a proud little sailor
With wind in his sails.

With the passage of time
We managed survival
Thru turbulent teens,
and Rocky revival.

The memories we share
Take forever to tell,
A lifetime of pleasures
And you know them well.

The waters seem calm
With a sparkling lull,
As sunset and memories
Bring home the hull.

It gives me great pride
As I look back on my life,
I would be none other
Than a Hydrographer's Wife.

It's the trust that we share
And together we've known
When the ship's at sea,
The Anchor's at Home.

Anonymous 1991

SAIL System 8700 family of components provide a simple, economical, and modular approach to constructing a high performance hydrographic data acquisition and processing system best suited to solve your unique application. SAIL is an acronym for Serial ASCII Instrumentation Loop, a data collection network and protocal defined by ANSI/IEEE Std. 997–1985. All System 8700 family components may also be utilized in non–SAIL environments to enhance the capabilities of your existing hydrographic data acquisition and processing systems.

Sensing Capabilities:

Loran–C, satellite navigation, positioning and ranging systems, depth sounding, and speed log and gyrocompass (yields vector averaged heading).

Winch cable length and speed, barometric pressure, air temperature, and windspeed and direction (yields vector averaged wind velocity). Humidity module in development.

Seawater surface temperature, conductivity, flow rate, salinity, velocity of sound, and density. Dissolved oxygen and PH modules in development.

Power supply, loop distribution, RS–232 conversion, ruggedized IBM–AT compatible loop controller, data logging and processing system.

Call or write for additional information today.

Features:

Field proven performance on two continents.

Meets or exceeds all SAIL requirements defined by ANSI/IEEE Std. 997–1985.

Default or programmable SAIL communication rates from 110 to 19200 baud.

Complete electrical isolation between all SAIL loop connected instrumentation.

All System 8700 components can operate in non–SAIL systems to enhance the sensing capabilities of those systems.

Local two line by sixteen character liquid crystal display for meaningful diagnostics and data messages.

All internal assemblies secure, ample internal connector clearances provided, rugged environmentally resistant construction and packaging.

Revlis Electronics Ltd.

Box 146, Vernon, B.C., Canada, V1T-6M1

Phone: (604) 549-2762 Facsimile: (604) 545-3399

Lighthouse Puzzler / Casse-tête du Lighthouse

by
Beth Weller

One day this past year the CHS Revisory Survey had several distinguished visitors at a time when there were several jobs needing to be done, including positioning a new range light. So Revisory pressed the visitors into service and sent out four teams.

Things went well and all the work was done in an exemplary manner. Can you report on the teams and their activities that day?

The clues:

1. The four teams were: Dave and his partner (who did not visit the marina); the two who used the truck; Tom and his partner; and the two who went to check out the reported rocks awash.
2. The two who used the helicopter left after Larry and Sheila who were not together.
3. Bruce did the stadia work but did not use the truck or go with George.
4. Jim discovered (but not on foot or using the launch) that the "rocks awash" were actually an overturned paddle-boat.
5. Sheila, Barry and Jim fueled up on their way home and all arrived back at different times.

Dave	and		did		by
Larry	and		did		by
Bruce	and		did		by
Jim	and		did		by

	Tom	George	Sheila	Barry	Range Light	Stadia	Visit Marina	Rocks Awash	Launch	Truck	Foot	Helicopter
Dave												
Larry												
Bruce												
Jim												
Launch												
Truck												
Foot												
Helicopter												
Range Light												
Stadia												
Visit Marina												
Rocks Awash												

Solution to Fall Puzzler

FIX
LINE
SONAR
SURVEY
SEXTANT
OVERTIME
NORTHEAST
DIRECTIONS
STRETCHLINE
HYDROGRAPHER

LIGHTHOUSE

Coming Events / Événements à venir

The **15th International Cartographic Conference**, will take place from September 23 to October 1, 1991, at the Bournemouth International Centre in Bournemouth, England. The theme of this conference, *"Mapping the Nations"*, has been chosen to reflect the many national mapping organizations now in existence. Sub-themes include Marine Cartography, the impact of ECDIS, GIS technology, Cartographic Expert Systems, national mapping organizations in the 1990's, the development of global digital cartographic databases, and the use of maps and spatial data.

For further information please contact the Conference Organisers at:

Conference Services ICA,
Congress House,
55 New Cavendish Street,
London W1M 7RE

The **Second Australian Hydrographic Symposium,** will be held at the University of New South Wales in Sydney, Australia, from December 9 to 12, 1991. The Symposium is jointly organized by the East Australia Region of the Australasian Branch of the Hydrographic Society and the School of Surveying at the University of New South Wales. The theme for the Symposium is *"Our Maritime Environment: A Fragile Resource"*. This theme was chosen to highlight the need for proper management of our ocean environment and the fundamental need for underlying data upon which environmentally sound decisions can be made.

More information may be obtained by contacting:

Ron Furness, Program Director
c/-RAN Hydrographic Service,
PO Box 1332,
North Sydney, NSW, 2059,
Australia

U.S. Hydrographic Conference '92: The fifth biennial National Ocean Service International Hydrographic Conference will be held February 25 to 28, 1992 at the Omni Inner Harbor Hotel in Baltimore, Maryland. It is hosted by the National Ocean Service (of NOAA), The Hydrographic Society of America and the International Federation of Surveyors (FIG). The theme for this conference is *"Exploration Age to Information Age"* which signifies the transition from the accomplishments of Christopher Columbus during the Exploration Age to the latest technological advances in navigation and hydrography in the Information Age.

For further information contact:

Commander George W. Jamerson, NOAA
U.S. Hydrographic Conference '92
P.O. Box 732
Rockville, Maryland
20848-0732
Telephone: 301-443-8536 Fax: 301-443-8459

The **Seventh International Symposium on Vessel Traffic Services** "VTS '92" will be held at the Hyatt Regency Hotel in Vancouver, B.C. Canada, from June 8 to12, 1992. The Canadian Coast Guard is organizing the symposium under the direction of an International Organizing Committee representing major maritime organizations. The theme for the symposium is *"Vessel Traffic Services in the Global Environment"*. The goal is to further the understanding and development of VTS by exchanging ideas and sharing experiences. The program should appeal to anyone with an interest in VTS operations, training, development or equipment.

Further information may be obtained by contacting:

Richard S. Bryant, Secretary,
7th International Symposium on Vessel Traffic Services,
Canadian Coast Guard,
Box 220 - 800 Burrard Street,
Vancouver, B.C., Canada V6Z 2J8

The **XVII Congress of the International Society for Photogrammetry and Remote Sensing (ISPRS)** will be held in Washington, D.C. during August 2 to 14, 1992. This quadrennial event is hosted by the American Society of Photogrammetry and Remote Sensing for the first time in forty years. See the advertisement on page 50.

HYDRO '92: The Eighth Biennial International Symposium of the Hydrographic Society will be held November 30 to December 3, 1992, in Copenhagen, Denmark.

The HYDRO '92 Symposium will have a variety of papers on subjects related to hydrographic surveys for offshore operations, seabed exploration and navigation. Abstracts for papers are required by February 1, 1992.

For more information contact:

International Conference Services
P.O. Box 41
Strandvejen 171
DK-2900 Hellerup, Copenhagen, Denmark
Telephone: +45 + 3161 2195
Telefax: +45 + 3161 2068

The Canadian Institute of Surveying and Mapping 85th Annual General Meeting will be held from June 23 to 26, 1992 in Whitehorse, Yukon.

For more information contact:

1992 CISM Annual General Meeting
P.O. Box 3937
Whitehorse, Yukon, Canada Y1A 5M6
Telephone: 403-668-6039 Fax: 403-668-3421

The combined **Canadian Hydrographic Conference and 86th CISM Annual General Meeting** is jointly sponsored by the Canadian Hydrographic Service and the Canadian Institute of Surveying and Mapping. The conference will be held in Toronto, Ontario from June 8 to 11, 1993.

For more information contact:

Earl Brown, Conference Co-Chairman
Canadian Hydrographic Service
867 Lakeshore Road,
Burlington, Ontario, Canada L7R 4A6
Telephone: 416-336-4811 Fax : 416-336-4819

News From Industry

The Canadian Hydrographic Service

CHS Headquarters Marine Cartography

Management

In addition to the normal liaison and support roles, Headquarters was heavily involved in preparing and supporting a successful Treasury Board submission to cover the costs of printing charts at the Special Operating Agency of Supply and Services Canada, developing cost recovery plans in response to Treasury Board guidelines and defending CHS' chart pricing policy.

Cartographic Development

The Cartographic Development Section supported CHS/CARIS while concentrating their development efforts primarily on data base developments. These included:

version 1.0 of a Chart Distribution System that provides inventory and accounting support for the Headquarter's Chart Distribution Office;

versions 1.0 and 1.1 of a Notices to Mariners data base that supports the entry of draft notices and the office procedures of the Notices to Mariners Unit at Headquarters;

version 1.0 of a Software Status Reporting (SSR) system that provides better control of software versions and enhanced bug log support;

developing the design of a Digital Chart Management System (DCMS) by demonstrating a prototype to all CHS regions and obtaining user input; and

assisting the move of the Fixed Aids data base from the CYBER to the Microvax 4000 computer at CHS Headquarters before the CYBER shut down.

Chart Maintenance and Distribution

The Headquarters Distribution office distributed 235,000 charts and 70,000 publications in 1990. A new dealership agreement was also implemented for the network of over 400 dealers that are administered from Ottawa. The Unit also developed the user requirements for the new Distribution System and managed the development to ensure that the system delivered would suffice.

The Hand Amendments Unit made 3,500,000 corrections to 350,000 charts in 1990.

The major responsibility of the Reprints Unit is to ensure that charts do not go out of stock. In 1990, the Unit produced 42 Reprints, 30 Notices to Mariners Patches and New Editions of 4 chart catalogues. The 1991 Catalogue 3 (Great Lakes) was redesigned to a booklet type format.

The Nautical Information Unit promulgated 873 Notices to Mariners during 1990.

The major activity in the Hydrographic Data Centre was the re-working of the data base from the System 2000 data base on the CYBER computer to an ORACLE data base on the VAX computer. This data base is now being fine tuned.

CHS participated in the Winterlude snow sculpture contest at Dow's Lake. The following people dedicated many evenings and a couple of weekends to support this endeavour. Their efforts paid off and they won second prize in the Government category. These people included Steve Glavin, Susan and Stacey Greenslade, Ilona Hilbert-Mullen, Richard Horrigan, Trevor Hutchinson, Lise Laguë, Dick MacDougall, Keith McCooeye, Jo-Anne Pears, Bruce Pettinger, Gil Pitrie, Anna Singerff, Vicki and Gord Smith, Mark Weber, and Michel Wolfe.

Several staff members reached major milestones in their careers. The Wilson boys, twins Don and Doug, have completed 35 years of loyal service, while Theresa Wilson, who assures us she is no relation of "the boys", has completed 25 years of devoted service.

Jo-Anne Pears, a term employee in the Chart Amendment Unit, has left the CHS.

Ocean Mapping Section

The Ocean Mapping Section has been very active in promoting digital cartography and with the publication of bathymetric charts 801 and 802, all production is now digital.

The major production effort is being directed at completing a digital data base of all 1:250,000 scale Natural Resource Maps on the west coast of Canada. In concert, combinations of technologies such as raster scanning, character recognition, computerized contouring and topologically structured data are being investigated.

Sailing Directions Section

Desk Top Publishing is now firmly established as a production tool at Headquarters with the last several publications being produced on the system.

Lise Laguë has moved from Coast Guard and joined the staff of the Section as a Sailing Directions Officer.

Quality Control Section

In addition to providing final quality control of CHS products, the Section is also responsible for Production Monitoring, Nomenclature, Formats and Reprographics Services.

Ray Chapeskie was the successful candidate for the position of Chief, Quality Control. Clay Fulford retired as acting Chief of the section in March 1991.

CHS Central and Arctic Region

1991 Field Surveys

The 1991 Lake Ontario survey will complete the coastal survey between Point Petre and Prince Edward Bay. The area was last surveyed in 1912 by leadline. The data will be used during the production of the confluence chart on the east end of Lake Ontario, which is a CHS/NOS co-operative chart, and will also be used to produce new large scale Canadian charts.

The 1991 Arctic Survey was recently completed in Pond Inlet and Admiralty Inlet obtaining gravity readings and spot soundings on a 1 and 2 kilometre grid. The survey collected data for tanker routes and the survey camp was located at Nanisivik, NWT. The survey used GPS to position helicopters, and a new Arctic sounder, developed by CHS under contract. (see page 17)

In Georgian Bay, the Region has begun a coastal survey between Port Severn and Christian Island, and in Nottawasaga Bay at scales of 1:10000 and 1:25000. Much of this area was surveyed in the late 1800's or early 1900's. As well as providing data for larger scale charts (part of the area is covered by a general chart only), the data will be used by the Regional Fisheries Branch.

A LARSEN survey, to be conducted under contract, is taking place in Lake Huron at the north end of the Bruce Pennisula. This is an ideal area since the water is clear and generally shallow. Shoals will be examined and ground truth data collected by the CHS.

The Revisory survey will continue an annual program to resolve chart queries on scheduled new editions.

Data for the production of a new edition of the Georgian Bay Small Craft Guide will be collected. Dealership inspections will be carried out for dealers within the survey areas. A LORAN-C calibration took place in Lake Simcoe early in the 1991 field season. Surveys in Hudson Bay will not be carried out in 1991, because there is no ship available to support the program. In addition, the Lake Timiskaming survey has been postponed due to recent budget reductions.

Chart Production

Since November, the following charts have been produced:

- 2165 New Chart (Wheatley Harbour);
- 1439 New Edition (St. Lawrence River - Carleton Island to Charity Shoal);
- 2225 New Edition (Approaches to Parry Sound);
- 5621 New Edition (Entrance to Chesterfield Inlet); and
- 5624 New Edition (Chesterfield Inlet).

Chart Production staff attended a Seamanship and Navigation course as part of the CHS Basic Hydrography module.

Development

Regional development activities have focused on improving methods of collecting bathymetric data through the ice. Two major projects are currently underway:

TIBS, an airborne through-ice bathymetry system, will provide CHS with the ability to collect continuous profiles through full or partial ice cover in water depths up to 50 metres. The project received a serious setback in the spring of 1990, when two birds were accidentally dropped during field tests in the Beaufort Sea. The birds have been rebuilt and have undergone final trials in Tuktoyaktuk. If Arctic trials are successful, the system will be used in a production capacity on the 1992 survey of Pelly Bay.

A fully digital echo sounder has been developed for collecting spot soundings through the ice under arctic conditions. The project was contracted to Knudsen Engineering Limited of Perth, Ontario. (see page 17)

Other development activities in the Region include: adapting ground penetrating radar for freshwater sounding in weed-infested areas (see page 7); implementing ISAH data loggers for field survey operations; developing semi-automated generalization tools for computer-assisted chart production; studying standards and data needs for Recreational Electronic Charts; providing software maintenance, systems operations and plotting services; and developing data management procedures and applications.

CHS Pacific Region

Mr. Fred Stephenson was appointed Regional Tidal Superintendent in early January succeeding the recently retired Willie Rapatz.

The first meeting of the Pacific Region Interdepartmental Hydrographic Committee was held in February. The purpose and proposed function of the committee is to improve service to clients and to add a measure of communication and coordination to hydrographic activities on the Pacific Coast. Membership is comprised of representatives from CHS, EMR-PGC, DPW, DND-HO and MOT-CCG.

On Friday March 1st, Captain T. Richards of the NOAA Ship RAINER, 13 hydrographers from the National Ocean Service facility at the Pacific Marine Center in Seattle, Washington, and 4 scientists from the Pacific Marine Environmental Laboratory in Seattle visited the CHS, Pacific Region.

The purpose of the visit was to enable the visitors to gain an understanding of CHS programs, equipment and techniques. Similar programs are being conducted by NOAA in Seattle and the personnel involved on both sides can benefit by discussing common problems and exchanging common information.

The visitors toured the four Divisions of Hydrography; of particular interest was the demonstration of automated cartography, the ISAH logger and navigation system and a battery performance analyser developed by Institute Electronics.

Field Surveys

Surveys in Esquimalt Harbour, required to provide the information necessary for charting after extensive construction, are already underway. This survey will be followed by work in the lower portions of the Fraser River. Barry Lusk is in charge. Vern Crowley will be involved with Revisory surveys in Campbell River, Jervis Inlet and Pender Harbour.

George Eaton and the PENDER will again be in the Hakai Passage area. Kal Czotter and the R.B. YOUNG will work at Lasqueti Island, Rivers Inlet, then over to the west coast of Vancouver Island for surveys in Barkley Sound, Clayoquot Sound and Nootka Sound.

Development

Field Support-Mike Woods has improved the dialogue between Pacific Branch and the B.C. Government, so that our control data is input to their network database (especially

NAD83 control). The downstream advantage to CHS Pacific is read access to an up-to-date control network. The field survey package has been upgraded by Kal Czotter and Mike to run on any datum, but especially NAD 83. Finally, Pete Milner is working with Jim Galloway to perform an extensive Atlas Fansweep evaluation in June.

Chart Construction-The new Versatec plotter is up and running; it is being used for quality control, in preference to the Kongsberg. Interactive compilation is dramatically changing the approach to jobs.

Engineering Services-As a result of the last field season, there were identified problems with batteries, with poor depth response from Raytheon sounders and with poor radio datalinks. A Battery Capacity Analyzer has been designed and built, and has discovered a plethora of problems; it is the subject of a suggestion award and technology transfer. The sounders at this time appear fine, with the problem seemingly related to launch installation. The radio datalinks will be investigated in mid-1991.

Enormous effort from both the Field side and Engineering went into ensuring that the new ISAH dataloggers were completely tested. It was at times stressful, but the final product from Quester Tangent is very impressive. The effort culminated with a major operator and maintenance course. This new equipment will be used in production during the upcoming field season.

A system to steer launches along precomputed lines is proceeding well, with UVIC assistance.

Office Automation-All interested CHS Pacific offices have now been wired with what has become the IOS standard. This includes a 10-Mbit/second ethernet line, and two undedicated four-pair cables. The latter are intended to provide dumb terminal support, future ISDN access and general inter-office wiring needs.

Tides and Currents

There have been two currents cruises, one in January and one in February, both to recover previously deployed moorings in Queen Charlotte Sound as part of the Tides and Currents contribution to the PERD program. The next cruise in this on-going program is planned for July.

Tides has been active for the last six months with processing the year end information from the permanent and temporary gauges. There has also been the annual clean-up of the submersible gauges and processing of that information as well as replying to the perpetual requests for tidal and current information. The semiannual Vancouver Island maintenance trip is being planned, as is the Arctic field season.

Chart Production

The cartographic staff's major initiative during the last few months was the interactive production of an 8 strip (4 chart) series covering the Columbia River and Arrow Lakes from the U.S. border to Revelstoke. This is the first major production project utilizing data which is exclusively in a digital format.

NOAA

NOAA, the National Oceanic and Atmospheric Administration, is home to the U.S.A.'s seventh, and smallest uniform service; the NOAA corps.

In 1907, President Thomas Jefferson and the U.S. Congress established a survey of the coast to begin charting U.S. coastal waters. During the early years, officers were assigned to survey ships from the Navy. The NOAA corps was created in 1917 as the U.S. Coast and Geodetic Survey Corps to provide officers to command the survey ships and field survey parties. In 1970, this small pool of scientific and engineering officers helped make up the newly formed NOAA, which also included the Weather Bureau, the Bureau of Commercial Fisheries, and the venerable Coast and Geodetic Survey, renamed the National Ocean Survey.

During World War I corps officers and the hydrographic survey ships Isis, Surveyor and Bache worked alongside and under the command of the military. During WWII, corps officers, half the civilian workforce of the survey, and six of its nine ships were transferred to the U.S. Navy.

In the 1950's and 1960's, corps officers were instrumental in continuing advances in science and engineering, particularly in the refinements of sonar, radar, aerial mapping and hydrographic and meteorological instrumentation and in their applications to civilian needs.

The 1960's and 1970's saw the emergence of automated data collection and processing. Corps Officers recognized the utility of computerized calculations to collect and process the massive amounts of information needed to compile and update nautical charts, make tide predictions, and carry out sophisticated environmental analyses.

The 1970's and 1980's brought about an expansion of NOAA and Corps responsibilities due to growing public environmental awareness and concern.

American Underwater Search and Survey Limited

American Underwater Search and Survey Limited, of Cataumet, Maine, announces the release of a new Sonar Manual, "Sound Underwater Images, A guide to the Generation and Interpretation of Side Scan Sonar Data" by J.P. Fish and H. Arnold Carr. This new book is a comprehensive training manual and operational guide for side scan sonar programs and includes; sonar operational theory, advanced applications; 150 side scan records, unusual sonar phenomena with explanations; small target detection, aircraft search, wide area survey, mosaic and detail mapping operations and ground-truthed sonar imagery.

Andrews Hydrographics Ltd. UK

While satellite positioning is sufficiently accurate for navigation purposes, its accuracy and effectiveness for precise offshore positioning and surveying will depend upon the availability of the satellites and the quality of simultaneous differential correction signals. Offshore surveyors, Andrews Hydrographics are currently conducting field tests on different systems which provide the correction signals.

They have examined the option of 'piggy back' satellite data on existing terrestial positioning systems and have turned their attention to long-range dedicated correction services using both terrestial shore-based transmitters and geostationary satellites. Part of the Andrews programme of trials will give due consideration to both these types of service.

In addition, the company has gained some initial success in the use of short-range dedicated systems established for small survey areas, up to 50 km radius from a known point. Andrews have purchased a short-range system using Trimble receivers and will consider others as they become commercially available. As far as they are aware, there seems to be little reported field experience from surveyors working close to platforms and it is in this area of operation where Andrews expect their trials to be most revealing. They will have further information on the accuracy, availability and cost of viable GPS positioning on completion of their trials due early in the summer.

Until such time as GPS positioning is proven to be satisfactory, Andrews will offer a GPS service in tandem with existing Artemis positioning. This will enable both their own surveyors and those of their clients to gain valuable satellite positioning experience and hopefully full confidence in this new and exciting field.

Bytown Marine Limited, Ottawa

Bytown Marine is introducing the Sutron Model 8200 family of data recorders. The Model 8200 is a new electronic data recorder/transmitter from the Sutron Corporation that will store over 64,000 readings in battery backed RAM and operate over the temperature range of -40° to +60°C, making it ideal for remote applications.

The 8200 features front panel programming with a 16 character LED display, touch sensitive keypad and user prompting software eliminating the need to carry a portable computer. Input capabilities include 5 analog and 5 digital channels along with SDI-12 and RS-232 data interfaces.

Communications are supported by several means including direct serial port connection, synthesized voice/data modem, simplex or duplex terrestial radio, cellular radio and satellite radio.

Applications for the 8200 include data collection and telemetry for remote process monitoring, waterlevel stations, weatherstations and precipitation networks. Utility software for communications, statistical analysis and data plotting are provided with the 8200.

Channel Technologies Inc.

Channel Technologies Inc., of Santa Barbara, California, has acquired the assets and operations of the General Instrument Undersea Systems Division. Renamed SeaBeam Instruments Inc., the Westwood, Massachusetts based operation will function as a subsidiary of Channel Technologies and will continue to design and manufacture its line of Sonar Products out of its present location.

SeaBeam Instruments' products include the SEA BEAM 2000, SEA BEAM, Hydrochart, and Sonar Array Sounding Systems, used for wide-swath hydrographic and bathymetric mapping. In addition to the Ocean Mapping Systems, SeaBeam Instruments' products include various other sonar systems and transducers used by U.S. Navy surface ships and submarines for communications and ASW operations, as well as Navy diver support.

Channel Technologies owns Sonatech, an undersea navigation and sonar system manufacturer; International Transducer Corporation, which makes a broad line of acoustic transducers; and Channel Industries a piezoelectric ceramics manufacturer since 1959.

Del Norte Technology Inc.

Del Norte, of Texas, offers a global positioning system and post processing in a single box with two new models, the 1008 and the 1012. The units act as a combination satellite receiver and compact computer providing precise positioning information anywhere in the world, to geodetic accuracies. Both models rely on a constellation of 21 Navstar Satellites in highly predictable orbits around the globe for basic positioning information. Model 1008 can receive up to 8 channels of L1CA code and the 1012 can receive up to 12 channels. These surveying systems record and process all available information.

Also new on the market is the DMU/586 from the Trisponder line of radio positioning equipment. The 586 is a controller for radio ranging systems and can be used with the current Trisponder series of transponders plus multi-user mode with the current 540/542 DMU's. The 586 accepts serial data from external sources, interrogating and outputting data from as many as 12 remote stations. Serial input/output ports allow raw ranges, smooth ranges, X-Y coordinates and depth data.

The 586 design is based on the same processors and architecture as other Del Norte products and can be upgraded later to a full Global Positioning system by installing a global positioning circuit board. This would give the 586 the same capabilities as the 1008 and the 1012.

The Hydrographic Society

Proceedings of Hydro '90, The Hydrographic Society's seventh biennial international symposium held at Southampton University last December, which was attended by over 350 delegates from 21 countries, have been published for general distribution. They comprise a series of papers on legal and professional aspects of hydrography, acoustic measurement, environmental applications, GPS, the electronic chart and dredging operations presented by leading speakers from Australia, Belgium, Canada, France, the Netherlands, Norway, the UK and USA.

Innerspace Technology Inc.

Innerspace Technology of Waldwick, New Jersey announces the availability of their new range/azimuth Total Station. The Model 604 Hydrographic Total Station (HTS), is designed for tracking a moving vessel and determining its position.

The unit features 3D position updates in 0.5 seconds and a tracking capability of 10 metres per second. An audible track lock tone and distance display keep the operator on target.

The environmentally secure, Model 604 HTS, comes complete with RS232 output to allow connection to a data logger or computer. When combined with other Innerspace products including depth sounder, UHF data link and IBM PC software and computer, the 604 HTS becomes a key component of an automated, hydrographic surveying data acquisition system.

INTERMARINE

INTERMARINE is a new Canadian-based company which has formed a joint venture with some of the Soviet Union's most prestigious scientific organizations. These are: the Academy of Sciences (Moscow, Estonia, Murmansk and the Far East Branch); the Ministry of Fisheries (Research Arm in Moscow, Murmansk, Kershe and Vladivostok); the State Oceanographic Institute (Moscow); and the Hydrometeorological Institute (Vladivostok).

INTERMARINE can now make available internationally the fleet of oceanographic vessels, icebreakers, submersibles (both MIR and PISCES) and aircraft that are owned by these agencies. The fleet being offered comprises a wide choice of vessels ranging in size up to 7,500 tons. The MIR manned submersibles are capable of diving to 6,000 metres and the PISCES to 2,000 metres. Chartering is flexible, either for projects or on a per diem basis.

Klein Associates Inc.

Klein Associates Inc. announces that a Klein Digital Side Scan Sonar with a dual frequency 100/500 KHz towfish played a key role in surveying two of America's most historic warships. The LAND TORTOISE, a radeau warship sunk in 1758 was located in Lake George, New York, and the MONITOR, a Civil War ironclad was located in 230 feet of water off Cape Hatteras, North Carolina sank in 1862.

The Klein 590 DSSS consists of three primary pieces: the graphic recorder, the towfish and the tow cable. The Klein 590 is lightweight, low cost user friendly and can be deployed from a fishing boat, large cabin cruiser or military craft. With the simultaneous 100/500 KHz dual frequency towfish the sonar has the advantage of high resolution as well as long range.

A new Video-Based Digital Side Scan Sonar System has been announced by Klein Associates. The system is comprised of the Model 395 Digital Side Scan Sonar Transceiver and the Model 615 High Resolution Digital Video Display. The combination known as the Model 390 System provides the user with a paperless side scan sonar display while retaining all the operator controllable features of the field-proven Model 590 system.

Krupp Atlas Elektronik

John E Chance & Associates of Lafayette, Louisiana, a large offshore survey company in the United States, has ordered Krupp Atlas Elektronik's new Fansweep multibeam swath sounding system. To be installed in a newly constructed U.S. Coast Guard-approved 38 ft catamaran survey vessel, the system will be used for nationwide river survey operations, including those on behalf of the U.S. Army Corps of Engineers. The system includes an Atlas BMR 1027 bottom mapping recorder providing three selectable presentations of data, together with purpose-designed post-processing software developed by EIVA A/S of Denmark.

Designed for precision inshore and coastal surveys and covering a swath width equal to four times water depth over ranges from 3m-100m, Fansweep uses advanced electronic beam-forming techniques to give 100% bottom coverage via a single transducer assembly. Typical measurement accuracy is +/-0.15 m, +/-0.5% of depth with system control being exercised via a keyboard-controlled color graphic display unit showing real-time cross profiles and other survey parameters.

Newly developed by Krupp Atlas Elektronik as part of a series of advanced multibeam sounders for all types of hydrographic and oceanographic research applications, Fansweep has also been ordered by two major European survey organizations, Oceonics (UK) and A/S Geoconsult of Bergen, Norway.

Krupp Atlas also announces it has extended its established range of DESO high-precision survey echosounders with the introduction of new DESO 21 and DESO 22 models. Derived from the DESO 20 (in service world-wide with leading survey organisations and port authorities) both feature built-in annotator and serial data interface facilities.

DESO 21 is a low-cost single channel unit which can be fitted with any Krupp Atlas Elektronik transducer within a frequency range extending from 33kHz to 210kHz. Its price has been considerably reduced, making it suitable for those users who require a high quality echosounder but whose budgets are otherwise limited.

DESO 22 is a dual channel version designed for both shallow and deep water applications. In addition to providing accurate depth data, it can also be used for acquisition of reliable information on bottom structures such as sediments, layers and wrecks. As with DESO 21, it can be deployed either as a portable sounder on small-size vessels or as part of fully integrated survey systems aboard larger craft.

Both units are fully compatible with DESO 20 models, including interfacing and spare parts. They are also fitted with a bi-directional serial data interface for depth readout as well as annotation of charts by an external keyboard/computer; additional features include integral clock/calendar functions, so that event data can be annotated with date and time.

Millar and McTay / SWATH OCEAN

SWATH OCEAN announces it has reached an agreement with James N. Millar & Sons at St. Monans, Fife, Scotland to produce the Anglo-American based Swath Ocean 2000 and 4000 classes of fast ferries and work boats for the European Market, for a minimum three year period. Millar's Shipyard was established in 1747 and has a reputation for high quality, excellent labor-management relationships and lean pricing.

"Swath" means a small waterplane area twin hull, and is the smoothest riding of all surface vessels in the world today. The craft are virtually immune from seasickness and to an exceptional extent can maintain most of their normal service speeds in less-than-ideal seaway conditions. The vessels are designed to meet the U.K. Department of Transport and Lloyd's Register Classification Society Standards.

Navitronic

Navitronic of Denmark announces a portable hydrographic survey system has been delivered to Morocco. Laboratoire Public d'Essais et d'Études in Morocco requested a portable survey system from Navitronic. The system was to be used for surveys in the very shallow waters along the coast of Morocco, and had to be a small portable system that could be operated from a zodiac, with data processing equipment installed in a van.

Since the surveys would be close to shore a laser range/bearing unit was chosen for positioning and a NAVISOUND 10 was chosen for the sounder. The depth data was transmitted to the shore for processing and storage. The depth data would be received by the datalink placed in the van, related to the position measured by the laser unit and fed into the NAVIPRO 2000 computer for processing and logging.

A HYDROFLEX 1000 was used to combine the depth data with the position from the laser unit because it had the correct interfacing for the laser unit and could allocate the correct position to the depth.

On board the zodiac were the NAVISOUND 10 echo sounder, a laser positioning reflector, and a data transmitter. The position of the zodiac was measured by a laser range/bearing unit located on shore which manually tracked the boat.

NOAA

On the retirement of Rear Admiral Wesley V. Hull, Rear Admiral J. Austin Yeager has assumed the duties of Director of Charting and Geodetic Services.

Qubit

Qubit announces, HMS Fawn has successfully completed Naval Weapons Sea Trials of its advanced new hydrographic survey system and is the last of the four sea-going survey information processing systems (SIPS) supplied by Qubit to become fully operational.

Qubit won the original SIPS contract in 1987 to develop and supply a hydrographic system to meet the Royal Navy's Cardinal Points specification. Experience with this system, installed in HMS Roebuck, provided the basis for a second phase of the contract. This provided for the supply of two shore-based systems and three ship-borne systems for HMS Bulldog, Beagle and Fawn. SIPS combines the latest advances in position fixing and survey data computing technology. Qubit has supplied similar systems to the Royal Australian Navy and for a number of research vessels.

Racal Marine Systems Ltd.

Racal announces an automatic hydrographic survey system. It is a data collection and processing system. The System 960, designed to give surveyors maximum efficiency and economy in carrying out hydrographic survey operations. The system has standard workstation concept; acquires and stores all raw data on optical disk.

Simrad Subsea A/S

The first EM12 full ocean depth multibeam echo sounder from Simrad Subsea A/S, Horton, Norway has been declared operational on the research vessel "Ocean Surveyor" by its owner, Worldwide Ocean Surveying Ltd., England. EM12 data has been collected for the scientific and commercial sectors and processed into charts and terrain models.

The Simrad EM12 is the first third generation deep sea multibeam echo sounder, with a sector coverage of either 90° with 81 beams, or 150° with 151 beams. In addition to increasing sector coverage and number of beams, the EM12 has also introduced seabed imaging as a new feature of a multibeam echo sounder. The seabed image created is comparable to a sidescan image in detail but is bathymetrically corrected both on screen and hardcopy recorder.

Trials in the Bay of Biscay showed that the unique phase detection principle used in the EM12 gave the benefits of higher accuracy, better range capability and less weather dependence as compared to other systems. The repeatability of the detections in a beam was in the order of 0.05% of slant range. The result was an accuracy over the whole 90° sector in the order of 0.1% in depths of 4500m. Reduction of power level showed that in good conditions full coverage of 90° will be achieved down to full ocean depth, 11,000m.

Scorpio Group

Scorpio Marine Electronics Ltd. has been appointed distributor for the range of Trimble Navigation marine products. Trimble is the world's leading supplier of GPS receivers for land, marine and airborne use and its range of marine products includes GPS receivers with the differential facilities which will enable Scorpio to offer these as part of its suite of DGPS packages.

With the agreement of the General Lighthouse Authorities for the UK and Ireland, Scorpio is independently providing a high accuracy differential GPS service for precise navigation and positioning from a number of existing lighthouse sites. The service is based on radio beacon equipment through which the differential GPS corrections are broadcast, providing coverage over British waters to ranges of over 400 miles.

The Scorpio Group operates two differential GPS services in North-West Europe. Scorpio Navigation Services provides the first dedicated commercial service giving better than 15-metre accuracy to the general marine industries and particularly for fishermen. Differential Technology meets the precise positioning requirements of the offshore oil industry with accuracies of better than five metres in dynamic mode and better than two metres in the static mode.

Seaway Technology Ltd.

Seaway Technology of Aberdeen, Scotland announces that the Synet Central chain is now operational and available to the industry. Synet Central represents a tremendous improvement in the operating integrity of a remote Syledis chain in that each beacon is performance monitored by a computer. This can report back via telecommunications on real time basis to the Synet Central control at our Aberdeen base. Both the continuous monitoring of beacon parameters and the ability to monitor base lines ensure that optimum performance standards are constantly maintained. In addition, the format can be modified remotely.

To ensure greater standard of accuracy, beacon sites have been chosen, where possible, on fixed sites rather than drilling derricks. Derrick sites can give greater range potential but are prone to skidding. The position of each site has been established by DGPS. The technology for operating and monitoring remote sites have been developed on Seaway Technology's Synet 1 chain in the southern North Sea.

TSS, Ltd. UK

The new TSS 325 Heave Compensation system for small survey craft is to be given an extensive series of sea trials by the US Navy Oceanographic Office and the Royal New Zealand Navy. TSS (UK) Ltd. has designed the system to provide heave, roll and pitch data for surveyors operating from small craft. The TSS 325 is compatible with any standard echosounder and is already in use with private survey and dredging companies in Europe and Australia.

Canadian Hydrographic Association / Association canadienne d'hydrographie

The **Canadian Hydrographic Association (CHA)** is a non-profit, scientific and technical group of about 500 members with the objectives of:

- advancing the development of hydrography, cartography and associated activities in Canada
- furthering the knowledge and professional development of its members
- enhancing and demonstrating the public needs for hydrography
- assisting in the development of hydrographic sciences in the developing countries

It is the only national hydrographic organization in Canada. It embraces the disciplines of:

- hydrographic surveying
- marine cartography
- marine geodesy
- offshore exploration
- tidal and tidal current studies etc.

The Canadian Hydrographic Association is formally affiliated with the Canadian Institute of Surveying and Mapping. It is informally associated with the Hydrographic Society.

<u>What the CHA Can Do For You</u>

- advance your knowledge of hydrography and cartography and associated disciplines and keep you abreast of the latest development in these disciplines
- enable you to develop and maintain contacts with others involved with hydrography, nationally and internationally

These benefits are provided through the publication of LIGHTHOUSE (one of only three journals in the world devoted exclusively to hydrography), through the sponsorship of seminars, colloquiums, training programs, national conferences and branch and national meeting.

<u>Lighthouse</u>

The journal of the Canadian Association, LIGHTHOUSE, is published twice yearly and distributed free to its members. Timely scientific, technical and non-technical papers and articles appear in the journal with authors from national and international academia, industry and government. Present circulation of LIGHTHOUSE is approximately 800.

<u>Membership</u>

Membership is open to all hydrographers, those working in associated disciplines, and those interested in hydrography and cartography.

<u>Branch & Regional Activities</u>

The Canadian Hydrographic Association has eight (8) branches located across Canada. National headquarters is located in Ottawa.

For further information write to:

National President
Canadian Hydrographic Association
P.O. Box 5378, Station F
Ottawa, Ontario
Canada
K2C 3J1

L'Association canadienne d'hydrographie (ACH) est un organisme sans but lucratif réunissant un groupe scientifique et technique de plus de 500 membres ayant des objectifs communs, comme:

- faire progresser le développement de l'hydrographie, de la cartographie et de leurs sphères d'activités au Canada
- permettre les échanges d'idées et le développement professionel de ses membres
- rehausser et démontrer l'importance de l'hydrographie auprès de public
- assister au développement des sciences de l'hydrographie dans les pays en voie de développement

Au Canada, l'Association est la seule organisation hydrographique qui embrasse les disciplines suivantes:

- levé hydrographique
- cartographie marine
- géodésie marine
- exploration extra-côtière
- étude des marées et courants, etc.

L'Association canadienne d'hydrographie est affiliée à l'Association canadienne des sciences géodésiques et cartographiques, et non-officiellement liée à la Societée de l'hydrographie.

<u>Ce qu'elle peut faire pour vous</u>

L'ACH vous offre des avantages tels que:

- parfaire vos connaissances de l'hydrographie, de la cartographies et des disciplines connexes, tout en vous tenant au courant des nouvelles techniques et des derniers développements réalisés dans ces domaines
- établir et maintenir des contacts avec ceux qui oeuvrent en hydrographie, au niveau national et international.

Ces avantages sont transmis par l'entremise de LIGHTHOUSE (une des trois revues au monde traitant exclusivement d'hydrographie) et par la tenue de séminaires, de colloques, de programmes de formation et d'assemblées régionales et nationales.

<u>Lighthouse</u>

La revue de l'Association canadienne d'hydrographie. LIGHTHOUSE, est publiée deux fois l'an et distribuée gratuitement aux membres. Des articles scientifiques, techniques et non techniques, provenant du milieu de l'industries ou du gouvernement autant national qu'international, apparaissent dans cette revue. Le tirage actuel de la revue est d'environ 800 copies.

<u>Comment devenir membre</u>

Le statut de membre est offert aux hydrographes et à tout ceux oeuvrant ou ayant un intérêt dans des disciplines associées à hydrographie ou à la cartographie.

<u>Sections et activités régionales</u>

L'Association canadienne d'hydrographie possède huit (8) sections à travers le Canada. L'administration central se trouve à Ottawa.

Pour plus d'informations, s'adresser au:

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1991 CHA Directors, Officers and Appointments

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Honorary CHA Membership - George Macdonald

The National Executive has awarded a Honorary Membership to George Macdonald in recognition of his efforts for 9 years as an Officer of CHA and 9 years in an editorial capacity of Lighthouse.

George's "career" with the CHA started in 1969 when he was an executive member of the Central Branch. He seemed to have enjoyed the CHA because in 1971 he went on to be elected Central Branch vice-president.

It was during this time that the CHA Newsletter, which had started in Ottawa, metamorphosed into a journal called "Lighthouse". There were many active participants in this transition; Ray Chapeskie, Bill Silvey and Pete Richards to name a few. Because of his enthusiasm George was listed as Editor and guided the journal which grew in content and popularity. George continued with the editorship until the start of 1974. At this juncture, Adam Kerr took over as Editor and Lighthouse changed its appearance once more.

In the CHA Executive though George continued as Central Branch vice-president in 1972 and then was elected National President for 1973.

In 1977 George filled the office of National Secretary-Treasurer and in 1978 was elected to his second one-year term as National President. In 1979 he was elected to a three year term as National President but stepped-down in 1981 to allow the terms of the CISM Hydrographic Committee Chairman and CHA National President to coincide.

At this point he resumed as co-editor of Lighthouse with Dennis St. Jacques for the following year. Then in 1982 Lighthouse was "transferred" to Atlantic Branch.

In 1988, George once again became Editor of Lighthouse and introduced methods to reduce production costs by using a Macintosh computer for page layout and preparing camera-ready copy and other publishing refinements. He passed the editorship of Lighthouse to Bruce Richards in 1990, but continues as an Assistant Editor.

Throughout George's very active personal involvement with the CHA he always maintained that the CHA was a team effort. Using this baseline he was able to solicit volunteers for the various activities required to support the CHA and Lighthouse.

1990 Lighthouse Awards

Best Non-Technical Article

$100.00 was awarded to:

Mr. William (Bill) Covey

for

"A Cartographic Tale a Half-Century Old"
(Lighthouse - Spring '90 - Edition #41)

Best Technical Article

$100.00 was awarded to:

W. Falkenburg, P. Kielland, G. Lachapelle, and D. Neufeldt

for

"Marine GPS using Code and Carrier in a Multipath Environment"
(Lighthouse - Spring '90 - Edition #41)

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Lighthouse Pin

Commencing with edition 24 (November 1981), a sterling silver pin has been awarded to all first-time writers of articles published in LIGHTHOUSE. This quality piece of jewelry, inlaid with an emerald-like gem, is being worn proudly by 110 different authors.

YOU can join this elite group by having your paper published in LIGHTHOUSE.

Remember that a maximum of two pins are awarded per article. Please let the editor know the identity of the primary authors so that the "Pin Man", Ray Chapeskie, can quickly forward these coveted keepsakes to LIGHTHOUSE's most valued contributors.

Épingle de Lighthouse

Commençant avec l'édition 24 (novembre 81), une épingle en argent a été remise à tous les auteurs d'articles parus dans LIGHTHOUSE. Cette pièce de collection, incrustée d'une pierre semblable à l'émeraude, est déjà fièrement portée par 110 auteurs différents.

Vous pouvez joindre ce groupe d'élite en ayant votre article publié dans LIGHTHOUSE.

Notez qu'un maximum de deux épingles est remis par article. S'il vous plaît identifiez au rédacteur en chef qui sont les auteurs principaux et "l'homme aux épingles", Ray Chapeskie, fera parvenir rapidement ces souvenirs convoités à ces collaborateurs les plus méritants de LIGHTHOUSE.

Sustaining Members / Membres de soutien

In 1987 the CHA defined a new form of membership to allow companies, closely linked with the hydrographic field, to become more involved with the activities of the CHA and to maintain closer contact with users of their products. Through LIGHTHOUSE these Sustaining Members are also able to reach a world-wide audience of people involved with hydrographic work. The benefits of Sustaining Membership include:

- a certificate suitable for framing;
- three copies of each issue of Lighthouse;
- copies of the local Branch newsletters;
- invitation to participate in CHA seminars;
- an annual listing in Lighthouse;
- an annual 250 word description in Lighthouse; and
- discounted advertising rates in Lighthouse.

The annual dues for Sustaining Membership in the CHA has been set at $150.00 (Canadian).

The names of each of the Sustaining Members are listed below.

Aanderaa Instruments Ltd.
560 Alpha Street,
Victoria, British Columbia,
V8Z 1B2
contact: Gail Gabel

Garde Côtière canadienne
104 rue Dalhousie, Suite 311,
Québec, Québec,
G1K 4B8
contact: Claude Duval

Institut Maritime du Québec
53 St-Germain Ouest,
Rimouski, Québec,
G5L 4B4
contact: Claude Jean

Krupp Atlas Elektronic
1075 Central Avenue,
Clark, New Jersey,
USA 07066
contact: Karl Wm. Kieninger

Quester Tangent Corporation
9865 West Saanich Road,
Sidney, British Columbia
V8L 3S3
contact: John Watt

Racal Positioning Systems Ltd.
118 Burlington Rd.,
New Malden, Surrey
United Kingdom
KT3 4NR
contact: I. Whatley

SURNAV Corporation
1000-38 Antares Dr.,
Nepean, Ontario,
K2E 7V2
Contact: Harold Tolton

Terra Surveys Ltd.
1962 Mills Road,
Sidney, British Columbia,
V8L 3S1
contact: Rick Quinn

Each issue of Lighthouse contains information about some of our Sustaining Members. This edition presents:

SURNAV Corporation;
Krupp Atlas Elektronik GmbH; and
Quester Tangent.

SURNAV Corporation

Surnav Corporation, based in the Ottawa area, supplies technologically advanced equipment to the Canadian Geomatics and Navigation marketplace.

Surnav's representation includes:

Del Norte Technology, Inc.
- Microwave and UHF Positioning Systems

Trimble Navigation, Ltd.
- GPS Receivers and Software

Krupp Atlas Elektronik
- Bathymetric and laser positioning systems

Comstar, Inc.
- Navigation and bathymetric data processors

Ocean Data Equipment Corp.
- Bathymetric and hydrology systems including the previous Raytheon Ocean Systems product line.

Clients include the Federal and Provincial Governments, Department of National Defence, survey and mapping, resource exploration, forestry, dredging, aerial application and aircraft manufacturing companies.

In addition to new equipment sales including lease to purchase agreements, Surnav provides an extensive inventory of GPS, microwave and UHF positioning and bathymetric equipment for term rental.

All equipment sold, leased or rented is technically supported throughout and after warranty by a fully equipped maintenance facility. Training services for first time clients are also available.

Surnav maintains close lines of communications to its principals, ensuring that the changing needs of the Canadian marketplace are met with the latest in technology.

Krupp Atlas Elektronik GmbH

Krupp Atlas Elektronik is headquartered in Bremen in the Federal Republic of Germany. The activities of Krupp Atlas cover a wide variety of applications including the engineering, design and marketing of high technology radar, echo sounders, sonar and hydrographic survey equipment.

SURNAV Corporation is the KAE agent in Canada for hydrographic survey equipment.

Krupp Atlas Elektronik is a company dedicated to continuous future-oriented research and development. The equipment and systems which are developed will meet not only the demands of today but also the needs of tomorrow.

Quester Tangent

The ISAH Operators' and Maintainers' Course, held for CHS Pacific during February, with instructors Paul Lacroix and Henrik Christensen was attended by 16 hydrographers, 9 electronics technologists, one cartographer and a pod of 10 ISAH's. Feedback from the attendees and those who audited portions of the course indicate that it was very successful.

Our ISAH system continues to gain international acceptance. The Port of Singapore ISAH data acquisition (HYDAS) and data processing (HYDPS) systems are, in the words of the client, "excellent" while the first ISAH shipment to Japan occurred in February 1991. Our representative in Japan, Toyo Corporation, continue their excellent efforts to introduce and support the ISAH technology in Japan.

Andy Albers has been busy completing upgrades to four Pacific Region ISAH units, producing the ISAH for Asia Air Survey (Japan) and will have the first Bedford Institute-ISAH unit delivered to BIO prior to the end of March. Based on the advanced hardware set delivered to the Port of Singapore, the BIO-ISAH will meet the offshore positioning requirements previously handled by the BIONAV system. Also working on the BIO-ISAH, Henrick, has written the drivers to log data onto helical scan, 2 GByte, 8 mm tape cartridge is now putting the finishing touches on that system colour graphics displays and ethernet features.

Tom Ireton and Dan Young, Quester Tangent Systems Analysis, have finished the manual entry function for the ISAH HYDPS (our hydrographic field data processing system currently running on a SUN SPARC) which permits data entry directly into the automated processing system, by the hydrographer, from field book and manual scaling of soundings or by using a digitizing table of echograms and tidal records.

On the real-time ISAH systems, Robin Tamasi has recently completed a versatile manual position entry function allowing the field hydrographer to readily enter fixes by manual entry of sextant angles, bearings, and/or ranges. Robin completed the 'Semi-Automatic' Range-Bearing software which is now being used by CHS on the Esquimalt Harbour Survey.

CHA News / Nouvelles de l'ACH

Pacific Branch
After a quiet fall, the branch leapt back into action during the winter with a Branch General Meeting on December 14. During that meeting a new slate of officers was elected.

Vice-President	Carol Nowak
Secretary-Treasurer	Willie Rapatz
Executive Members	Ron Bell
	Ken Halcro
	Paul LaCroix
Past Vice-President	George Eaton

Lunch time speakers included Quester Tangent's Paul LaCroix, describing a recent trip to Singapore and Bill Hinds from Institute Electronics, discussing developments in satellite communications. The annual CHA/CISM sponsored "Beer, Bun and Bellowing Bash" held in November, could be termed a benefit for the retired Rapatz and Bolton "alliance".

The 1991 H20 Curling Bonspiel was another success with the team of Dave Paton, Chris Jang, Dennis Richardson and Deborah Tubman winning. Special thanks to our sponsors (listed below) for all of the bonspiel prizes:

IOS Staff Assoc.	Fog and Suds Rest.
CHA Pacific Branch	Spinmakers Pub
Terra Surveys Ltd.	Aanderra Instruments Ltd.
PSAC Local 20076	McLeods
Quester Tangent	Cutting Bench
Island Blue Print	Panagopoulos Pizza
Glen Meadows	Marina Pizza
Sidney Hotel	Graeme Richardson
C.I.S.M.	Sidney Sight and Sound
Oak and Barrel Rest.	Dunsmuir Lodge
Slegg Lumber	Pedan's R.V.

Another general meeting was held February 27 to review the budget and discuss the coming year's activities.

As an ongoing CHA commitment to CIDA, Mike Woods is to instruct a hydrography course in Jamaica this coming summer. Recently retired, Willie Rapatz will also be involved as a co-ordinator. Unfortunately, since the course will be in the summer, Woods will have to endure tropical heat and not enjoy a tourist's reprieve from our west coast winter rains.

Pacific Branch is as fertile as ever with the following producing offspring:

Gerry Kidson	-	a girl, Laura;
Dave Prince	-	a boy, Terry David;
Ernie Sargent	-	the 3rd boy, Colin; and
Patti Dew	-	a dog, Kaslo, not to be confused with New Denver nor an offspring.

Capt. Vancouver Branch
John Deane, one of our very active senior members, was forced to slow down when he broke his wrist recently. This did not deter him from flying to Cornwall the following day for a C-Tech Board Meeting. He celebrated his 80th birthday and among the congratulations was a card from "Barbara and George". We wish our electronic wizard a complete recovery.

Another "Golden Oldie", Gordon Murray and his wife Charlotte had an extended holiday in Australia and South Africa, where they visited more than fifty of Murray's nephews, nieces and babies. Return via London completed the "Around the World" flight over the Pole.

We shall let you off this time, Gord, but do not miss anymore C.H.A. Meetings!

Our V.P. George Pugach has just completed his first year in private practice as a Hydrographic and Engineering Survey Consultant working mostly in the Vancouver lower mainland area.

Although we hear that there is no direct relationship between hours worked versus income when self-employed, we are sure that there are many non-monetary benefits (too windy for soundings? How about taking the rest of the day off to windsurf?) Hey George???

On the down side of things, we are struggling to keep our membership numbers up. Seems everyone is very busy doing what they do best in Vancouver - work hard but play harder! But seriously, the executive is giving a special effort to make meetings more interesting in the hope of attracting old and new members alike.

Prairie Schooner Branch
At the Branch General Meeting in January, the 1991 Executive members were elected as follows:

Vice-President	Frank Colton
Secretary-Treasurer	Ken Simpson
Executive Member	Ian Tilmouth

Both Frank and Ken stood for re-election for the same posts they had occupied in 1990. The general meeting for 1991 will be held in mid-January 1992.

We are glad to report that the Branch membership had a very busy and successful year in 1990. However a consequence of this was that Branch activities in 1990 suffered from a corresponding lack of available warm bodies.

A couple of social gatherings in the early part of 1991 were planned at the general meeting. A luncheon meeting in Calgary on 25 April at the Rose & Crown Pub and a night meeting during the CISM conference on 8 May in Calgary were arranged. All visiting CHA members, and particularly those attending the CISM conference, were invited to attend.

As an incentive to the Branch membership to pay outstanding dues, those who paid before April were given a CHA lapel pin.

Special thanks was extended to Exploratech Service and Nortech Surveys (Canada), through Frank Colton and Ken Simpson respectively, for sponsoring the mail outs of the Lighthouse magazine in 1990.

In alphabetical order here are some of the activities some of the Branch membership were involved in during 1990.

Henry Ayers and Glen Godlonton were extensively involved in promoting the Ashtech line of GPS receivers for EDO Canada.

Andrew Brebner moved to Yellowknife as Star Tech's new General Manager for the Arctic Region.

John Brigden continued to commute to Papua New Guinea throughout 1990.

Peter Button moved to Ottawa as Intera's Manager of Airborne Acquisition.

Bruce Calderbank continued working overseas in Gabon, the North Sea and the Gulf of Mexico providing survey and navigation quality control services. Bruce became a Fellow of the Royal Institution of Chartered Surveyors in October.

Tim Crago became the President of Nortech Surveys.

Frank Colton spent a lot of the year in West Africa and the North Sea. During brief stints in Calgary Frank set up his company and office.

Brian Cutting continued working in Canada and overseas, and opened a new office for Nortech Surveys in Idaho.

Patrick Eddy was extensively involved in Canmar's operations in the Chukchi Sea.

Karl Friesen became a partner in Underhill and Underhill during 1990 and was the Manager of Field Operations specializing in land claim surveys.

Rene Grande worked in the Gulf of Mexico and was writing navigation software during 1990.

Glenn Harvey continued navigation processing for Haliburton Geophysical Services and at the end of the year was preparing to move over to McElhanney.

Lorraine Hortness became an Alberta Land Surveyor, the fourth female to do so in Alberta.

Bob Ireland continued managing land seismic surveys for Challenger Surveys in Alberta and British Columbia as well as working overseas for Challenger Surveys.

Gerard Lachapelle, as well as teaching at the University of Calgary, was developing a Loran C calibration package using DGPS for land applications.

Tom Lockhart continued to market internationally the services provided by Challenger Surveys throughout 1990.

Jim MacKenzie left his teaching position at SIAST Palliser Campus and became Manager of Property Mapping and Information Systems for EMR in Regina.

Donald Roberts joined Wimpol in Houston.

Ken Simpson became the Manager Marine Services for Nortech Surveys and travelled extensively in the U.S. and Canada.

Hugh Stewart transferred from Superintendent Northern Logistics in Tuktoyuktuk to Senior Strategic Planner in Calgary for Gulf Canada. Family life in Calgary is now a pleasant surprise.

Rae Sutherland spent the year mobilizing for the 1990 Beaufort season only to have the whole operation shut down for environmental concerns shortly after start up.

David Thomson worked in Canada and overseas for Challenger Surveys on a variety of projects throughout 1990.

Central Branch

Central Branch elections took place in November 1990 and the new executive stands as follows:

Vice-President	Sean Hinds
Secretary-Treasurer	Terese Herron
Executive Members	Jim Berry
	John Dixon
	Al Koudys
	Ken McMillan
	Brian Power
	Keith Weaver
	Sam Weller

Many thanks to the outgoing executive who put in a lot of effort for an exciting year. A special thanks to our foreign correspondent Commander Larry Robbins RNZN whose efforts to enhance contact with distant international members is appreciated.

Our membership committee reports that Central Branch finished 1990 with 39 In-house Members, 38 Out-house Members and Krupp Atlas of New Jersey as a Sustaining Member. Late 1990 and early 1991 saw a number of new members join the ranks and they are as follows:

Bill Clarke of Clarke Matthews Ltd. in Windsor Ont.;
David Flavin, also of Clarke Matthews Ltd.;
Stephen Kilty from Dighem Surveys Inc. in Mississauga;
Riaz Farooqui from Ontario Hydro; and
Steve Drummond who is a student at Ryerson Polytech and worked with the CHS Revisory Survey in 1990.

Over the past winter Central Branch hosted one lunch time seminar featuring Mr. Henk Don, Manager of Diving Operations at CCIW. Henk was co-coordinator on the recent survey of the 1812 warships "Hamilton" and "Scourge" by remote vehicle "Jason".

An evening meeting was hosted by Keith Weaver featuring a financial seminar presented by the Laurentian Financial Corporation. Another meeting hosted by Brian Power featured a talk by Captain Elko Merk on his experiences piloting on the Great Lakes.

Brian Power also hosted an evening meeting on April 30 and our guest speaker was Commander Hamdan bin Othman of the Royal Malaysian Navy. Commander Hamdan has recently completed a three year term in command of the Royal Malaysian Navy survey ship "KD Mutiara" and is now head of the Cartographic Division of their Hydrographic Department. Hamdan spoke to us about the history of hydrography in Malaysia and their recent progress in surveying and chart production.

All evening seminars were preceded by a meeting and finished with free beer and pizza. A sincere thanks to our generous hosts.

The Central Branch AGM held in November 1990 at the Mimico Cruising Club was a resounding success. We had a turn-out of 40 people for cocktails, a buffet supper and an interesting talk and slides on the development of the Toronto Harbourfront. Special thanks to the sponsors for this event: McQuest Marine; ROMOR Equipment Ltd.; and the Canadian Hydrographic Service.

Talk of a recession has prompted three members to expand their family allowance cheques; congratulations to all:

Bruce and JoAnne Richards are proud parents with their first baby. Laura arrived on February 1, and weighed in at 7lbs 4oz. Coming from a family of boys it is a refreshing experience for Bruce.

Richard and Joan Padmore are proud parents again. A baby girl, Clare, arrived February 11 and weighed in at 7lbs. 5oz. She will have lots of attention from her sisters Jennifer and Kathryn.

Helen Fuchs-Trapp and husband Brian are also parents again. Markus arrived March 7 at 9lbs. 3oz and will join his sister Heidi in a happy household.

The 20th Annual H2O Bonspiel was held at the Grimsby Curling Club Feb. 10 1990 with 48 curlers in attendance. A great time was had by all. Each and every curler recieved a prize but the big trophy went to the team of Karen Ralph, Todd Breedon, Brett Evans, Colleen Kennedy and Don Kennedy. Coming in a close second was Bob Covey, Lyn Roth, Peter Morden and Barb Montani.

We would like to thank all the generous sponsors:
- J.M. Ellis, Metcalfe, Ontario;
- Surnav Corporation, Nepean, Ontario;
- Terra Surveys Ltd., Ottawa, Ontario;
- R.C. Marine Electronics Ltd., Dartmouth, Nova Scotia;
- Adam Promotions, Toronto, Ontario;
- Canadian Hydrographic Service, Burlington, Ontario;
- Norman Wade Company Ltd., Hamilton, Ontario;
- Klien Associates Inc., Salem, New Hampshire;
- Canadian Hydrographic Association, Burlington, Ont.; and
- Leica Canada Ltd., Willowdale, Ontario.

A note of thanks also goes out to the organizers: Ron Solvanson, Boyd Thorson and Brian Power for the numerous tasks nessecary to make the day the success it was.

During a recent meeting we thanked Boyd Thorson on behalf of the membership for the many hours Boyd has contributed to our branch over the years. Boyd has left Central an Arctic region of the CHS to work at CHS headquarters in Ottawa. We wish him well and our loss will no doubt be Ottawa Branch's gain.

Section du Québec

Au cours du dernier semestre, les efforts du conseil d'administration de la Section du Québec ont porté essentiellement pour devenir dépositaire autorisé des publications du service hydrographique du Canada. Nous avons aussi fait connaître l'hydrographie au grand public en participant à des expositions et en présentant différents projets pour nous aider à promouvoir l'hydrographie. Finalement nous avons établi un calendrier potentiel d'activités pour l'année.

A l'assemblée générale tenue le 1er décembre 1990, l'exécutif élu pour l'année 1991 se compose de:

Vice-président:	Bernard Labrecque
Secrétaire-trésorier:	Pierre Pagé
Conseilers:	Yvon Boulanger
	Sylvain Guimont
	Richard Sanfaçon
	Winfried Von Minden

Suivant cette assemblée générale nous avons été entretenue par Monsieur Denis Hains, directeur du service hydrographique du Canada, région du Québec, sur la modernisation de réseau permanent d'enregistreurs de niveaux d'eaux qu'il gère afin de répondre aux besoins actuels sans cesse croissants et de plus en plus exigeants.

Grâce au programme de développement de l'emploi (PDE) d'Emploi et Immigration Canada, l'agent administratif Martin Massé s'est occupé principalement de la comptabilité, de la confection d'un pamphlet publicitaire et d'un plan de marketing pour le magasin de vente de publications marines dont la section du Québec a ouvert en décembre dernier. Nous avons à nouveau fait une demande au PDE pour nous aider à maintenir et développer notre commerce naissant. Cette demande a été acceptée et notre agent administratif s'est vu offrir un autre contrat jusqu'à l'automne prochain.

Dans le cadre du Conseil des loisirs scientifiques, la section du Québec a été présente avec son kiosque au centre d'achat le Carrefour de Rimouski du 25 au 27 octobre 1990 pour faire connaître l'hydrographie au public en général. Lors de la semaine de la géomatique à Québec, nous avons prêté des affiches de notre kiosque aux étudiants de l'université Laval, du 21 au 23 février, pour leur stand d'exposition. Cela a été notre contribution à montrer la place de l'hydrographie au sein de la géomatique.

Le 17 octobre, la section du Québec a convié ses membres à une soirée-conférence dont le sujet portait sur l'interaction des vagues avec le fond meuble en zones côtières et sur la plate-forme continentale. La conférencière était le Docteur Barbara Karakiewicz de l'I.N.R.S.-Océanologie de Rimouski.

Une autre conférence traitant de l'évolution des transports maritimes et des grands voiliers s'est tenue le 6 mars et a été présentée par monsieur Winfried Von Minden, professeur de l'Institut maritime du Québec à Rimouski.

International Members

Membership in the Canadian Hydrographic Association is not limited to Canadian residents but is available to anyone who is interested in maintaining a link with hydrography in Canada. People who live or work in other countries or who are not conveniently located to existing CHA Branches may become International Members with the same rights and privileges as other members.

As authorized under the CHA by-laws, Central Branch administers the International membership. Under this arrangement we endeavour to ensure that all International Members receive the same level of service. International Members may, however, request the Branch of their choice.

The cost of International Membership per year is $30.00 (Canadian) or the equivalent in Sterling or U.S. currency. This includes a personal Membership Certificate suitable for framing along with annual update seals, and two editions of Lighthouse annually.

Each International Member also receives the Central Branch NewsLetter. This helps our far-flung members keep in touch between issues of our journal and also offers a forum for members to share views and concerns.

Commander Larry Robbins of the Royal New Zealand Navy (RNZN) is foreign correspondent for the NewsLetter and writes to Central Branch with items of particular interest to International Members. Comander Robbins is presently on assignment in Hove, UK, as on-site representative for the RNZN working with Racal Marine Sytems and contributes good in-depth columns with news of our International Members. Drop snippets of news to him at: 12b Bedford Towers, Kings Road, Brighton, BN1 2JG, United Kingdom, or FAX: 0273-773789, c/o Racal Marine Systems.

We would like to welcome our new International Members:

Matthew John Smith of Racal Marine Electronics, U.K.;
Ian Habens of Racal Marine Electronics, U.K.;
George Betts of AT&T, U.S.;
Wayne Ross of Ross Laboratories, U.S.;
Stelios Mertikas of Greece; and
George Sellers of ARCO Oil & Gas, U.S.

News of note:
Dr. Stelios Mertikas is on short assigment at Erindale College in Toronto.

Mr. George Goldsteen has finished his studies in Sydney Australia and will return to his post as lecturer at the Australian Maritime College in Australia.

Ian Bartholemew has returned to the U.K. after completing his term as Chief Hydrographer of Fiji during the transition of this post to the Fiji government.

Printemps 1991

Lighthouse

Revue de l'Association canadienne d'hydrographie
Journal of the Canadian Hydrographic Association

Originalement à l'hiver 1969, **LIGHTHOUSE** était le journal de l'Association canadienne des hydrographes (ACH). Il représentait un moyen pour stimuler les discussions entre les Sections de l'ACH. De par les années, **LIGHTHOUSE** est devenue la revue hydrographique nationale du Canada. Elle reste fidèle à son but original de fournir une source d'information technique, historique et sociale à ceux qui s'intéressent à l'hydrographie au Canada. Son tirage a augmenté pour inclure au-delà de 1000 membres, compagnies et organisations hydrographiques au Canada et dans le monde entier.

Tarifs publicitaires 1991

EMPLACEMENTS
L'approbation et l'emplacement de l'annonce sont à la discrétion de l'éditeur. Cependant, toute demande d'emplacement spécifique sera considérée si une prime de 25 $ est ajoutée à la demande de parution.

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L'annonce publicitaire doit être un prêt à photographier ou sur film négatif (les couleurs supplémentaires doivent être sur film négatif) et être fournie aux dates de tombée. La préparation de copie couleur, à fond perdu et de photos sera chargée au tarif de l'imprimeur plus 10 %. Les épreuves devraient être fournies avec tous les suppléments.

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Télécopieur: (416) 336-4819

Spring 1991

Lighthouse

Journal of the Canadian Hydrographic Association
Revue de l'Association canadienne d'hydrographie

LIGHTHOUSE originally began as an internal newsletter of the Canadian Hydrographers' Association (CHA) in the winter of 1969. It was conceived as a means of stimulating discussion between the branches of CHA. Over the years, **LIGHTHOUSE** has become Canada's national hydrographic journal. It still remains faithful to the original goal of providing a mix of technical, historical and social information of interest to those associated with hydrography in Canada. But its circulation has expanded to include over 1,000 individuals, companies and hydrographic organizations in Canada and around the world!

Solutions to Surveying Problems

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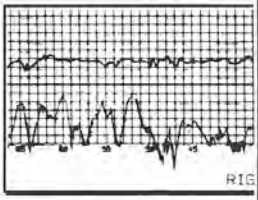

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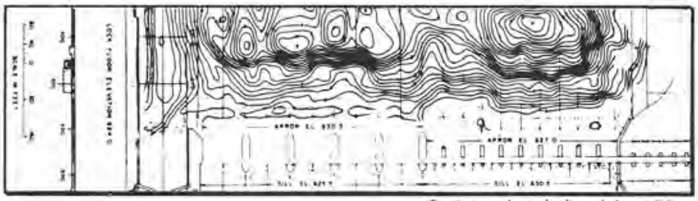

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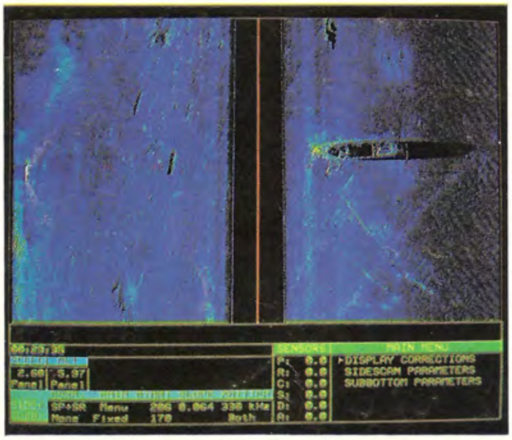

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