MAREP HYDROGRAPHIC MANUAL
Canadian Power and Sail Squadrons

Please Note: Red font indicates August 2002 updates to this April 1996 document.

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Fisheries and Oceans
Pêches et Océans

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Your file Votre référence

Our file Notre référence

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April 1, 1996

To all members.

The Canadian Hydrographic Service (CHS) is proud to be associated with the Canadian Power and Sail Squadrons (CPS) in the MAREP HYDROGRAPHIC PROGRAMME. I would like to remind you that this programme has always been and still is an important source of information in the up-dating of our charts and publications. I therefore encourage you to send us your MAREPs as you collect them so that they can be reviewed without delay. The MAREP HYDROGRAPHIC PROGRAMME is a very good vehicle in the updating of our products and all CPS and CHS MAREP Officers must make every possible effort to promote it.

On behalf of the Canadian Hydrographic Service, I wish you a very happy and safe boating season.

S.B. MacPhee
Dominion Hydrographer
Canadian Hydrographic Service

Canada

April 1996

TABLE OF CONTENTS

PREFACE

This MAREP Hydrographic Manual has been completely updated and revised by the CPS MAREP Hydrographic Committee, with the assistance of the Canadian Hydrographic Service.

This Manual has been renamed as the MAREP Hydrographic Manual and is intended to be used by all CPS Members involved in the CPS MAREP Hydrographic Programme.

Portions of this Manual have been adapted from the former MAREP Officer's Manual, 1984 and 1986 Editions, which drew heavily from the USPS Co-Operative Charting Manual. At this time we wish to thank both USPS and the National Ocean Service (N.O.S.) for their guidance during the formative years of the CPS MAREP Hydrographic Programme.

It is hoped that this Manual will serve CPS and its Members well as we approach the 21st Century. Charting methods, such as the introduction of Electronic Charts, will continue to evolve, as will the methods of surveying to produce Charts. However, the Mariner will continue to require current information on these Charts to navigate safely, thus there will continue to be a role for the CPS MAREP Hydrographic Programme.

Finally, the CPS MAREP Hydrographic Committee wishes to express its thanks to the Canadian Hydrographic Service and it's Staff at the Regional and National CHS Offices for the guidance, assistance and co-operation which made this Manual possible.

THE MAREP HYDROGRAPHIC PROGRAMME

The word MAREP is a coined word, a short for **MAR**ine Information **REP**orting. The MAREP Hydrographic Programme is a joint effort of Canadian Power and Sail Squadrons (CPS) and the Canadian Hydrographic Service (CHS), a branch of the Federal Government's Department of Fisheries and Oceans.

The Purpose of the programme is to permit CPS and the CHS to carry out an ongoing programme, to ensure the reporting of discrepancies on Charts, to update and to make qualified recommendations towards improving nautical information on Charts and other CHS publications, including Small Craft Guides, Sailing Directions, Tide and Current Tables, etc. It is hoped that CPS Member participation in the MAREP Hydrographic Programme will lead to improved accuracy of the foregoing publications, thus benefiting not only CPS Members but the general boating public, on charted waters throughout Canada.

All CPS members should participate in the MAREP Hydrographic Programme. It is not restricted to big boat owners, experienced navigators or long time members. Every CPS member can find a useful role in this enterprise. Even those without boats can do Marina and Facility checks by automobile, or go as Crew with those who do have boats. By going with an experienced team, much can be learned about the MAREP Hydrographic Programme and boating in general.

The MAREP Hydrographic Programme was instituted in 1971 and is based upon the highly successful USPS/NOS Co-Operative Charting Programme.

The proposal to initiate the programme was introduced to the Governing Board of CPS in 1969 by then D/C Joe Lawson, later a Rear Commander. At the CPS AGM held on November 7, 1970, R/C Norm Gray, a member of the Ottawa Squadron, and also a retired Dominion Hydrographer of CHS, was given the task of producing a programme for CPS.

In 1971, six Districts, Vancouver Island, Quinte, York, Georgian Trent, Atlantic and Pacific Mainland, were presented with the pilot programme. With help from USPS a MAREP Officers Manual was produced, giving instructions on the Programme, and distributed to all MAREP Officers. As an incentive, S/C Ernie Harding, who was responsible for the program in the three Western Districts, made MAREP Award Plaques, to be presented to the top District and best individual each year. The first to receive these were Vancouver Island District and Cdr. Tom Dalzell of Victoria Squadron in 1972.

In 1979 the CHS instituted a new series of awards. They recognized the efforts of all CPS Members in the programme by presenting awards in four categories:

Best Squadron Effort;
Best District Effort;
Most Improved District;
Best Individual Effort.

On October 22, 1983, an official agreement was drawn up and signed by C/C Doug Comber of CPS and Mr. Jim Bruce of the CHS during the CPS AGM. This document outlines the duties and responsibilities of both CPS and the CHS. A framed copy is at CPS Headquarters.

The MAREP Officers Manual was revised and reprinted in 1984. A French translation of the Manual was printed in 1986. These were supplied to all District and Squadron MAREP Hydrographic Officers.

This current Manual was revised in 1996 and should serve the MAREP Hydrographic Programme into the 21st century. Sections dealing with Radar, Loran C, GPS and DGPS are major additions to this Manual.

It is hoped that the MAREP Hydrographic Programme has contributed to greater safety and enjoyment of our Canadian waters by our Members and the boating public. The programme has been an outstanding example of Citizen-Government co-operation.

THE CANADIAN HYDROGRAPHIC SERVICE

History of the CHS

The earliest Sailing Directions were compiled with the help of experienced sea captains. Among the earliest contributors to Canadian Hydrography were the Explorers Cabot, Cartier and Champlain.

The first Hydrographic Surveys in Canada were carried out by the Spanish, French and the British Navy. Admiral Henry Wolsey Bayfield conducted many of the original surveys of the Great Lakes and the Gulf and River St. Lawrence, as well as surveys of the Atlantic Coast. His charts were the foundation on which most subsequent hydrographic surveys were based.

The Georgian Bay Survey was established in 1883 and in 1904, the Canadian Hydrographic Service was created. By 1911, Canada had assumed complete control of its hydrographic survey operations except for surveys of the Newfoundland and Labrador coasts, which became a Canadian responsibility when Newfoundland joined Confederation in 1949.

Structure of the CHS

The CHS is a branch of the Federal Department of Fisheries and Oceans. The CHS uses vessels ranging from oceangoing, multi-purpose research ships to small launches.

The CHS is responsible for charting Canada's 131,650 nautical miles of coastline, the longest of any country in the world.

Hydrographic surveys are conducted from the northern tip of the Canadian Arctic to inland recreational waters.

The Headquarters of the CHS is in Ottawa, with field operations carried out by four Regional Groups, each having its own area of responsibility.

The Atlantic region is based at the Bedford Institute of Oceanography at Dartmouth, Nova Scotia. This office conducts operations covering most of the Gulf of the St. Lawrence, coastal and offshore waters of the Atlantic Provinces, Labrador and the Eastern Arctic.

The Quebec Region is located at the Maurice Lamontagne Institute at Mont Joli, P.Q. Its area of responsibility covers the northern part of the Gulf of St. Lawrence and the St. Lawrence River to the Ontario–Quebec border.

The Central and Arctic Region with Headquarters at the Canada Centre for Inland Waters in Burlington, Ontario, covers the Great Lakes and the St. Lawrence Seaway, as well as other smaller lakes and waterways in Ontario and Manitoba. Central Region is also responsible for Hudson and James Bay, the Athabasca-Mackenzie Waterway and the Arctic.

The Pacific Region of the CHS is located at the Institute of Ocean Sciences at Patricia Bay near Sidney, B.C. Their region covers British Columbia's Inland Lakes, coastal and offshore areas.

Activities of the CHS

The most common and fundamental operation in hydrographic surveying is sounding, that is, measuring water depths and locating them precisely on a Chart. The Hydrographer, therefore, must always keep track of his own position.

The soundings shown on a Chart must be described in terms of vertical datum. This requires the determination of a water level. This level, referred to as the Chart Datum, is the level below which the water surface will seldom fall. Knowledge of water levels is necessary for the accurate compilation of Charts and is used in Coastal Engineering Studies, Resource Planning and to formulate future tidal predictions. Water level gauges are maintained along Canada's coasts and inland waterways to provide a continuing record of water levels.

Hydrographic Surveyors check the positions of fixed and floating Aids to Navigation, the positions of conspicuous natural or man-made landmarks and many more features which appear on charts or are mentioned in Sailing Directions and Small Craft Guides.

The growing number of recreational vessels has created a large demand for charts, not only for small craft routes, but also for harbours and coastal waterways.

There is also a continuing need for revisory surveys to update chart information for the positioning of navigational aids, to check the location of reported shoals, to survey around changes in dock facilities and to resurvey dredged areas.

The CHS publishes approximately 1,450 charts, of which some 172 are Small Craft Charts specifically produced for recreational users.

New information is constantly received from Federal and Provincial Agencies, Commercial users, and pleasure craft operators such as CPS members. In addition, field units in each CHS region conduct annual surveys of charted areas to update the information on the Charts and within Sailing Directions and Small Craft Guides as well as the Tide and Current Tables.

Charts are also continuously updated from Notices to Mariners, which are issued by the Coast Guard, aided by the CHS. These notices show the latest changes in position and characteristics of buoys, lights, radio beacons and similar aids to navigation, or newly discovered dangers to navigation.

Sailing Directions and Small Craft Guides supplement the information on charts. Sailing Directions are books containing detailed information needed for safe navigation and are intended to be used in conjunction with charts. These publications are also updated through Notices to Mariners.

The CHS also publishes Tide and Current Tables for Canadian tidal waters. This information is used in conjunction with the depth information shown on charts.

With on-going changes to our waterways and shorelines the work of the CHS is a never-ending task.

CONDUCTING MAREP HYDROGRAPHIC ACTIVITY

Types of Boats Needed

To cover the geographic areas properly, a large variety of vessels are required. Large vessels for open waters where seaworthiness may be a factor, or when a unit may be out for more than a day; smaller high speed vessels from trailers to cover shallow waters or distant areas not accessible to the larger vessels; stable rowing vessels, dinghies or fishing boats to cross shallow areas impossible for outboard or inboard/outboard vessels. Jet drives; tunnel drive and even airboats may be used as appropriate. Houseboats may serve as headquarters for MAREP Hydrographic activities in areas where marinas or other facilities may not exist. All vessels have a role in the MAREP Hydrographic Programme.

Equipment

Survey connotes measurement and vessels with no measuring equipment can do little more than observe. A good compass with an accurate deviation curve and a calibrated lead line or sounding pole comprise the basic minimum of equipment. To this may be added much additional equipment, such as depth sounders, sextants, Loran C, GPS, Radar, etc.

Skills Required

Boat Handling and Seamanship

Normal boat handling and prudence will suffice for practically all MAREP Hydrographic activity. However, if working in close to wrecks and shoals knowledge of seamanship and boat handling on a level to cope with these problems is necessary on vessels undertaking such operations.

There may be times when it is best to have two vessels operating as a unit during MAREP Hydrographic activities to lend assistance including salvage and towing should the need arise.

It must be remembered, however, that **AT NO TIME SHOULD A VESSEL'S MASTER KNOWINGLY PUT HIS VESSEL OR CREW INTO A DANGEROUS SITUATION.**

Vessel masters are reminded that their vessel is **AT NO TIME COVERED BY INSURANCE POLICIES HELD BY CPS,** even while engaged on District or Squadron sponsored MAREP Hydrographic activities. Vessel masters are expected to ensure complete insurance coverage with their own vessel insurance.

Other Skills

If electronic navigation equipment is available on a vessel, skills to operate and adjust such equipment should be available. Such equipment may provide a very strong back-up of the other data being collected.

Photographic skills and equipment are frequently of considerable use. Photographs may often be used as supporting documentation of items being reported, especially when reports involve landmarks, harbour entrances, etc.

Types of Observations

The observations made are primarily of a measurement type. With suitable equipment, depth, height, length and distance measurements are made easily and accurately.

Direction and angle are more difficult. True direction may be taken with moderate accuracy from a compass whose deviation has been determined. For greater accuracy, methods described in a subsequent section must be employed. Angles between objects may be measured with great accuracy with a sextant.

Meteorological data is of considerable importance when making soundings. Barometric pressure, wind direction, and wind speed all have their effect on the level of the water. When possible these factors should be noted on the MAREP Hydrographic Report Form.

Reporting of Items

What Should Be Reported

Items which should be reported include, but are not limited to:

1. Submerged objects - depths;
2. Obstructions in and above the water;
3. Landmarks;

4. Private aids to navigation*;
5. New Marina Facilities;
6. Navigable channel information, width/depth, etc.;
7. Information affecting Sailing Directions;
8. Suggestions for chart improvements.

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* Information concerning aids off station, lights out, missing aids, etc. should be communicated directly to a Coast Guard Marine Communication and Traffic Service Station, District Marine Base or Regional Office of the Coast Guard. Changes to government aids to navigation will be communicated to the CHS directly from the Coast Guard.

In all cases, the reporting of the existence new items or removal or disappearance of old items is, in itself, useful information. However, in these days of limited manpower, CHS may not be able to send a survey party into the field to locate a new item. The CPS observer should consider going further than just reporting. The item should be located as closely as possible with the available equipment. Methods are given in a later Section for doing this.

If the object is man-made (tower, stack, etc.) it is frequently possible to obtain the Design Engineers plot of the construction which will locate the item with sufficient accuracy. Harbour improvements and water front changes may frequently be found in detail on City Engineers maps, highway department maps, or other agency maps. Such documents accompanying reports provide a valuable confirmation of the report. Recent aerial survey photographs made by Government agencies or by private enterprises are valuable and should be submitted where available. New editions of all these charts and photographs are greatly desired by CHS to retain in file. Privately prepared charts by individuals, yacht clubs, power companies, real estate developers, etc. are also of interest and should be submitted where available. While many of these documents are routinely submitted through appropriate government agencies, a large number fail to reach the CHS office and they are frequently unaware of their existence. It should not be overlooked that marine charts also show a considerable amount of land detail, and new roads, housing developments, etc. are also of interest.

Photographs made from the navigable channel will help in assessing the validity of the suggestion that a new landmark be included on the chart. Similarly, waterside views of marinas, harbour improvements, and similar changes are also desirable.

What Should Not Be Reported

The following are some of the things, which should not be reported:

New structures which are not distinctive or which are difficult to locate because of size or nearness to other structures. Wrecks above high water line on shore. Minor, inconspicuous geographical details of shore lines. Shore lights, unless of particular brilliance or distinctiveness. Shallow water piers unless accurately located. In short, if it does not contribute to safety on the water, or as a means of location, or enhance the usefulness of the chart, it should not be reported. If, however, a general survey of an area is made, such items may be included in the general report.

Government Aids to Navigations, either newly installed or deleted, are not normally reported via the MAREP Hydrographic Programme as the Canadian Coast Guard does this through official channels. However, missing aids, aids in bad condition, lights out, and other such conditions should be communicated by radio and/or telephone to the nearest Coast Guard Marine Communication and Traffic Service Station, District Marine Base or Regional Office.

Summary

The MAREP Hydrographic Programme serves a number of purposes. It furnishes the CHS with new and up-to-date data on many areas they otherwise could not survey. It increases the safety and enjoyment of CPS members and the general public though accurate and current charts and other CHS publications. It provides CPS members with the opportunity to practice the skills they have learned and to learn new skills from other, more experienced members. It provides interesting, enjoyable variations of boating, together with the pride of accomplishment and acheivement. It adds to the prestige of CPS as being a group of trained, skilled and informed boaters.

METHODS AND PROCEDURES FOR MAKING MEASUREMENTS

Introduction

The following sections on methods used in MAREP Hydrographic reporting are intended to give, briefly, some of the types of measurements and observations, together with reasonable criteria for the accuracy needed. Most of the methods are standard techniques used in piloting or navigation and should be known to most CPS members. Many of them are simple enough that the beginner can effectively use them after a few minutes of training.

Chart Reading

It is mandatory that anyone participating in the MAREP Hydrographic Programme be able to read a chart. The earth has, by convention, a grid work on it with reference lines being the Equator and the Greenwich Meridian. Distances on the earth's surface from these two reference lines are measured in degrees, minutes and seconds of arc. A position anywhere on the earth may be precisely described by its angular distance east or west of the Greenwich Meridian and north or south of the Equator. The east-west distance is called longitude and the north-south distance is called latitude. A chart portrays a small section of this grid, reduced in size and distorted in a calculated manner depending on the projection used, because any spherical surface, when flattened, must out of necessity be distorted. One projection used with nautical charts is called a Mercator Projection.

The distortion consists chiefly of an expansion of the length of a unit of north-south arc distance as compared with the same distance east-west. Due to the convergence of the meridians (lines perpendicular to the equator) at the poles, a degree of longitude does not represent the same linear distance at, for example 45 degrees north latitude as it does at the equator.

Due to the distortion provided by the Mercator Projection, it is necessary that distances be taken from the graduated latitude border scale only. The unit of distance measurement used on nautical charts is customarily the nautical mile, which is the length of one minute of arc measured along the meridian, in the latitude of the position. The presently accepted metric value for one minute of arc is 1852 metres.

On the Mackenzie River, aids to navigation are referenced to in Statute Miles rather than the traditional Nautical Mile. Also, some editions of small craft charts may show the distance along a track in Statute Miles. Check the publication that you are using to determine which linear unit of measurement is used.

If the Mercator chart covers a large area the distance must be taken off the latitude scale nearest the area to be measured. The latitude scale will be a variable scale, larger nearer the equator. On small craft charts, however, the area covered is so small that there is virtually no difference between the latitude scale at the top and bottom of the chart, and a distance scale may be printed on the chart.

Bearings

Bearings are directions expressed in angular degrees. They are based on the fact that a circle has 360 degrees, which may be subdivided into minutes and seconds. One degree contains 60 minutes, and one minute contains 60 seconds.

True bearings are based on angular distance from the True North called 000 degrees.

Compass bearings, taken with a compass may also be used. However, a Compass bearing must be corrected for the errors of deviation and variation. When corrected for these errors, they yield True bearings.

The easiest method to obtain a Compass bearing from a small boat is to point the bow directly at the object and read the compass, then correct for deviation and variation.

A hand-bearing compass is especially useful for MAREP Hydrographic activities.

Relative bearings are relative to some other point than north and are commonly relative to the bow of the boat, but may be relative to some fixed object whose position is known. For example, a pile may be determined to lie 48 degrees right from a line between point A and point B when the observer is at point A.

Measurement of Depth

Importance

Depth of water is the most important chart detail to all classes of mariners. Loss of life may be the penalty for failure to maintain a boat in sufficient depth of water to float. Even minor groundings cause great inconvenience and no prudent mariner deliberately takes a vessel of 1.5 metre draft into charted depths of 1 metre. Soft bottoms of sand or silt are unstable and shift because of currents, storms or diversions of flow due to man-made changes. Areas of this nature need to be carefully and periodically surveyed to ascertain whether bottom contours have changed.

Direct Measurement of Depth

The most satisfactory method for measuring depths in relatively shallow water (up to 3.5 to 4.5 metres) is by direct measurement. Sounding poles, which are long poles, marked with painted marks every 10-cm, offer the best and most accurate method of shallow water measurement. The poles should have some sort of large-area shoe attached to the bottom to prevent them from sinking into the mud, and may be jointed for portability.

For depths greater than those where poles can conveniently be used, the lead line may be employed. This is a line of non-shrinking, non-stretching material with a 2 to 6 kg weight on one end. Calibration marks from the bottom of the weight are attached to the line. Most survey lead lines are marked in increments of 0.5 metres. In use, the lead line is dropped vertically and read with the line taut with the weight resting on the bottom. The lead line may generally be used in depths up to 10 metres. Operations from a boat may be facilitated by reading at the rail, subtracting the known distance from the rail to the water surface.

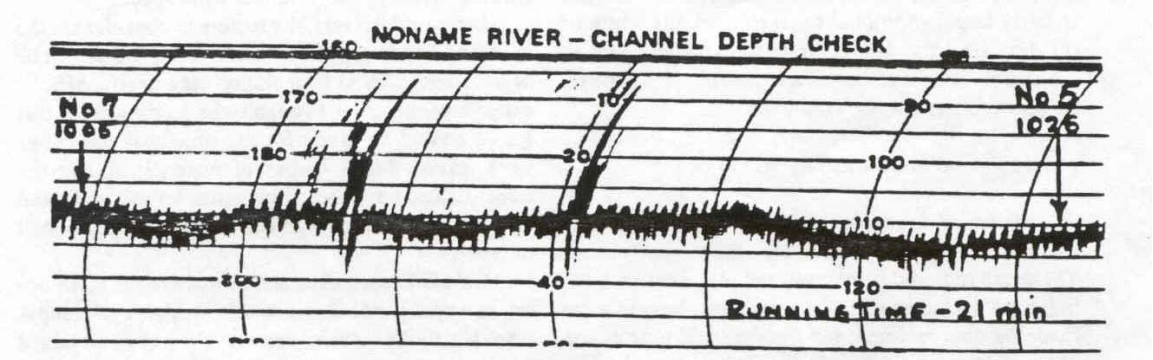
Depth Sounders

A depth sounder serves admirably for quick survey work since it can be used while a vessel is underway at moderate speed. Depth sounders may be of the flasher, videograph, digital or recording graph type. Most installations are calibrated to read the depth of water under the keel or under the transducer. The additional distance to the surface of the water (draft of vessel) must be determined and added to the reading, when engaged in survey work. The depth sounder is unequalled for rapid survey of smaller rivers, streams, channels, etc. High spots thus indicated may be more accurately pole-sounded if deemed desirable.

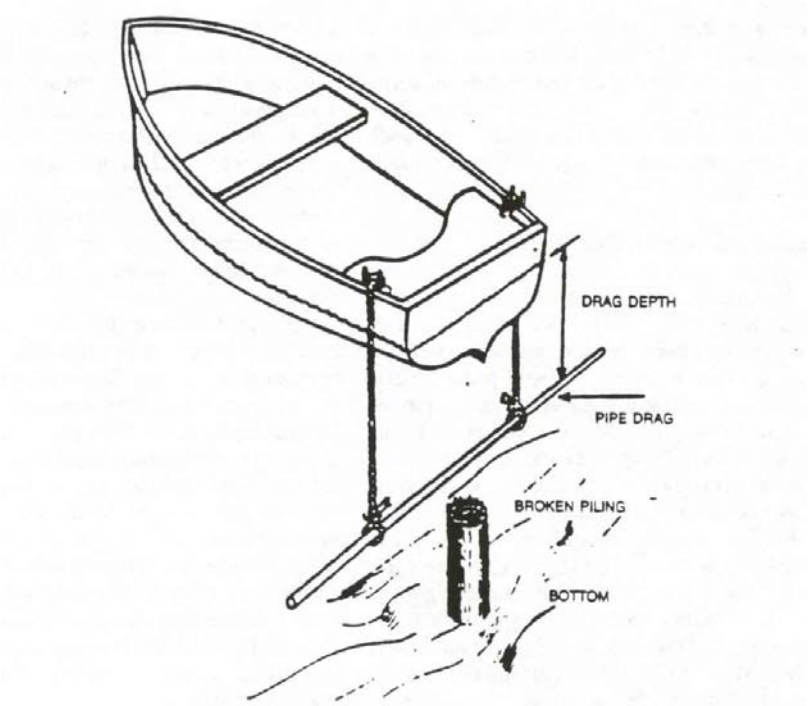
A depth sounder measurement that is desired by the CHS is a "run", at constant throttle between any two aids to navigation. This should be made with a recording graph type, depth sounder. A mark should be made on the graph at the precise time the boat is opposite the first marker, together with the time. At the end of the "run", a mark is made on the graph when the boat is opposite the second marker, together with the time. The boat speed does not have to be known. The recorder graph with proper markings, together with identification of the markers used, and other requisite data pertinent to soundings may be forwarded as a MAREP Hydrographic Report. Regular, periodic surveys of this nature will permit the evaluation of bottom stability.

Drags

Broken off pilings, underwater wreckage, etc., are difficult to survey properly by customary methods. The sharp point of a submerged piling of great hazard may not be touched by a pole, lead line or depth sounder. The only way to determine definitely whether a hazard exists is to drag the area. A metal pipe or weighted stiff wooden pole, ten to twenty feet long, is suspended under one or two rowing boats



DEPTH SOUNDER TRACE BETWEEN TWO KNOWN POINTS



PIPE DRAG

(two for the longer rod) at a definite depth below the surface, the boats are slowly rowed across the suspect area. If the pipe strikes no obstruction at say four feet, it is lowered to five and to six etc. until the obstruction is found or until it is evident that no obstruction exists in the survey area. It is essential that the rowing speed be slow to prevent the drag from streaming back on its suspension and measuring a more shallow depth. If the area to be surveyed is fairly large, additional boats to mark the width of the drag area may be necessary to avoid any gaps in the search grid. For larger areas, a wire drag towed by powerboats may be employed.

Corrections to Measured Depths

Measured depths will be influenced by the state of the tide or the lake level at the time of observation. The depth required is that referred to the datum level indicated on the chart. The correction should not be made on data reported, but the date and time of the observation must be included on the report so that the correction can be made by the CHS. If time is other than standard, i.e. daylight saving, etc., then this must also be noted. Wind may affect the level of the water. For this reason it is of additional assistance to include wind direction, velocity and duration. This information may be obtained from the weather office or Coast Guard station. The observer's best estimate may be better than nothing. A careful perusal of the Beaufort wind scale will assist the observer. It is a common error to overestimate wind speed.

In non-tidal rivers, the factors to consider are the extent of flooding and the wind. All data that will be of assistance should be included. If a nearby official water gauge is available the reading from this gauge should be given for the time that soundings were taken. Many bodies of water, including the Great Lakes, have recording water level gauges and this information is available through a telephone call or a letter.

On the Great Lakes and elsewhere the CHS operates a system of teleannouncing water level gauges from which the current water levels may be obtained 24 hours per day via telephone. The telephone numbers for these teleannouncing gauges may be found within the appropriate Sailing Directions and Small Craft Guides for the localities concerned or by contacting the appropriate CHS regional office.

Inland lakes are affected by rainfall, wind and seiches. The latter is thought to be in part induced by wind and/or atmospheric pressure changes. As in rivers, the best reference to determine datum is a water level gauge operated by the proper authority.

Conditions for Making Soundings

The ideal conditions for sounding is a windless, waveless day. As waves build up it becomes increasingly more difficult to read a sounding pole, lead line or determine the proper depth with a depth sounder. The best that can be done on a rough day is to average the crest and trough readings. If using a lead line or sounding pole, sounding in the lee of a vessel may offer a little protection. In rough weather, when waves exceed one metre, shallow water sounding should be deferred to a more suitable day.

Heights

Vertical Clearances

Vertical clearances of power lines, bridges and other such structures can usually be obtained from the builder of the structure. If unobtainable from such a source, and the observer can safely mount the structure, the height can be determined by means of a weighted line let down to the waters surface. The same additional data as for depths should accompany this measurement.

For overhead wires the **ONLY SAFE METHOD** is triangulation. Triangulation is dealt with elsewhere in this manual. This does not need to be undertaken unless abnormal sag due to destruction of supports has occurred. However, the status of new construction and the location of uncharted items should be reported to the CHS.

Heights of prominent landmarks are useful to the navigator in determining, by vertical angle, the distance off. These heights can most accurately be obtained from the owner or builder. Unless the structure is of such importance as to warrant the effort of good triangulation procedures, it should be passed over.

Distances and Lengths

The only accurate methods normally available to the average charting observer, to measure distances, is by direct measurement or by trilateration. A 30 metre metal tape or a surveyor's chain can be used to measure land distances up to several miles (at the expense of considerable labour), with an accuracy of a few inches. Long lines of this nature require the use of a transit with a good telescope to insure the line will be straight.

Trilateration methods yield very good data for stream widths and distances from shore. Accurate measurements by this method can be accomplished only if an accurate base line can be laid out. This has to be done almost exclusively on land.

More sophisticated equipment may be available to some observers. These include military range finders and laser beam distance meters. If this equipment is available it should be utilized.

True North Lines

In surveying some particularly remote areas, no charted landmarks may be available. In such cases, a true north line of greater accuracy than can be obtained from a boat compass may be desired. Precise instructions for developing such a line can be found in any surveyor's manual. In brief, a transit is set up at a convenient shore spot on a clear evening. When Polaris is visible, the intersection of the cross hairs of the transit's telescope is brought into coincidence with Polaris and the exact Greenwich time of the observation recorded. If the latitude is desired, the vertical angle of the telescope is also recorded. A table in the Nautical Almanac for the current year will permit the calculation of the azimuth of Polaris to an accuracy of 0.1°. From the vertical angle, the latitude can also be determined with an accuracy of 0.1°. If no correction at all is made to the transit observation, the azimuth will be correct to 1.5° or less. This is frequently much better than can be obtained by compass.

Summary

Methods for the determination of depths, heights, lengths and distances have been outlined. These may all be performed with varying levels of accuracy. Increasing the accuracy means increasing the time, effort and skill required to make the measurement. It is up to the observer's judgement as to what accuracy to achieve, and this is based on the hazard involved. If the safety of life and property is at stake, no effort is too great to achieve the greatest possible accuracy. If the hazard is only the inconvenience of grounding on a sand bar some distance out of the navigable channel, it may be sufficient to indicate the presence of the bar and some estimation of its extent and the depths over it.

DETERMINATION OF POSITION

Introduction

This section will consider the major aspects of "locating" an object; that is, finding its position and entering it on the chart at that position. The methods used are primarily those involving intersecting bearings to objects whose position is shown on the chart or by means of horizontal sextant angles taken between three or more objects shown on the chart. Of the two, the latter is more precise. These methods are basically the same as used in piloting where it is desired to determine the position of the vessel. They should be familiar to, and used by, all boatmen. In addition, vessels equipped with Radar (or other means) may fix their position by measuring the distance to two or more charted objects. Celestial navigation (determination of position through observation of the celestial bodies) is not an acceptable means of locating for survey purposes since the accuracy at best is only 0.1 to 0.2 miles, when taken from a boat with ordinary, conventional equipment.

Methods for Locating an Object

Crossed Bearings

As used in this section, a bearing is a direction from one object to another object. True bearings are directions based on geographic north as the reference, and are stated in degrees from north, which is called 000°.

Bearings may also be expressed as either compass or magnetic. Compass bearings are those taken with a compass that may or may not have a deviation correction. Magnetic bearings are those taken with a compass which has either no deviation, or for which the deviation correction has been applied. Both must be converted to true before being plotted. This requires that the appropriate corrections for variation and deviation be made. If the bearings are to be made by means of the fixed boat compass, the chances of error are reduced if the boat is aligned with the object and the compass reading taken. To augment the accuracy of this alignment, the boat should be equipped with a thin bow staff and an auxiliary small staff on the centreline of the boat and located just in front of the windshield. When the two staffs are in line with the desired object, the compass will indicate the compass bearing. An accuracy of between two and five degrees is about the best that can be expected from a small boat compass.

There may be occasions when the action of wind or current makes it difficult to line the boat with the object. The use of a pelorus to make a relative bearing together with a simultaneous compass reading will give a compass bearing. This method is less accurate because of the reading error of both observations.

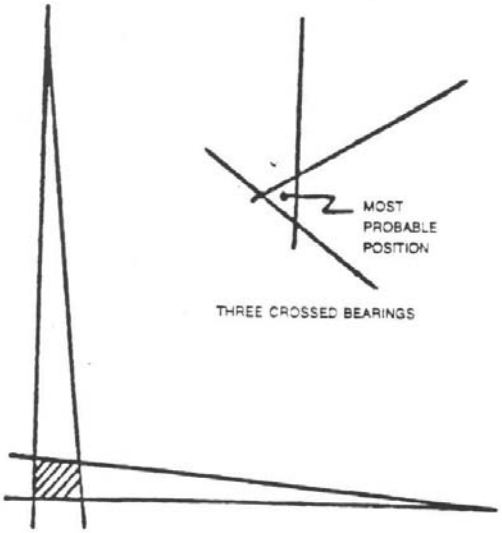
A hand-bearing compass offers an excellent way to make compass bearings. Used from the deck or cockpit, or perhaps the flying bridge, it may be far enough from magnetic disturbances on the boat to require no correction for deviation and in this case, will yield magnetic bearings directly.

Bearings may also be obtained from shore positions using either a hand-bearing compass or a pelorus, which has been accurately aligned to true north. With the stability of solid ground, the error of observation will be considerably less than those made from a boat.

When a bearing is taken from a position, the observer is one end of the bearing line. If other bearings are taken from the same position, the observer is on each of the bearing lines. The only common point on all of the bearing lines taken is their point of intersection. Therefore, with intersecting or crossed bearings, the point of intersection locates the position of the observer. The angle of intersection should be as close to a right angle as possible for the two bearings. For more than two, the angles should be as nearly equal as possible. Oblique intersections deteriorate in accuracy with decreasing angle. It is unusual for three or more bearings to intersect at a single point. More frequently, they form a small polygon. If all observations are equally valid, the most probable point is the geometric centre of the polygon. Whenever possible lines of position (LOP) should be taken on fixed objects. Objects such as floating aids to navigation may not be in their charted positions due to storm action, strong currents, and movements caused by collision, etc.

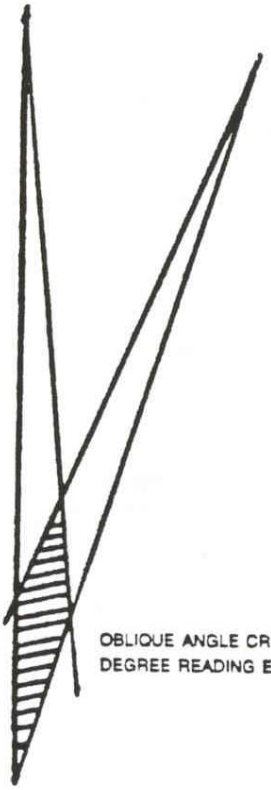
One Bearing and a Distance

If an object of known position is so placed as to permit measuring the distance from it to the object to be located, this distance together with the bearing will accurately locate the object whose position is unknown. If the distance is measured by Surveyor's chain, tape, or wire, the result is of some better quality than crossed bearings. If determined by vertical sextant angle, it is about the same quality as crossed bearings.

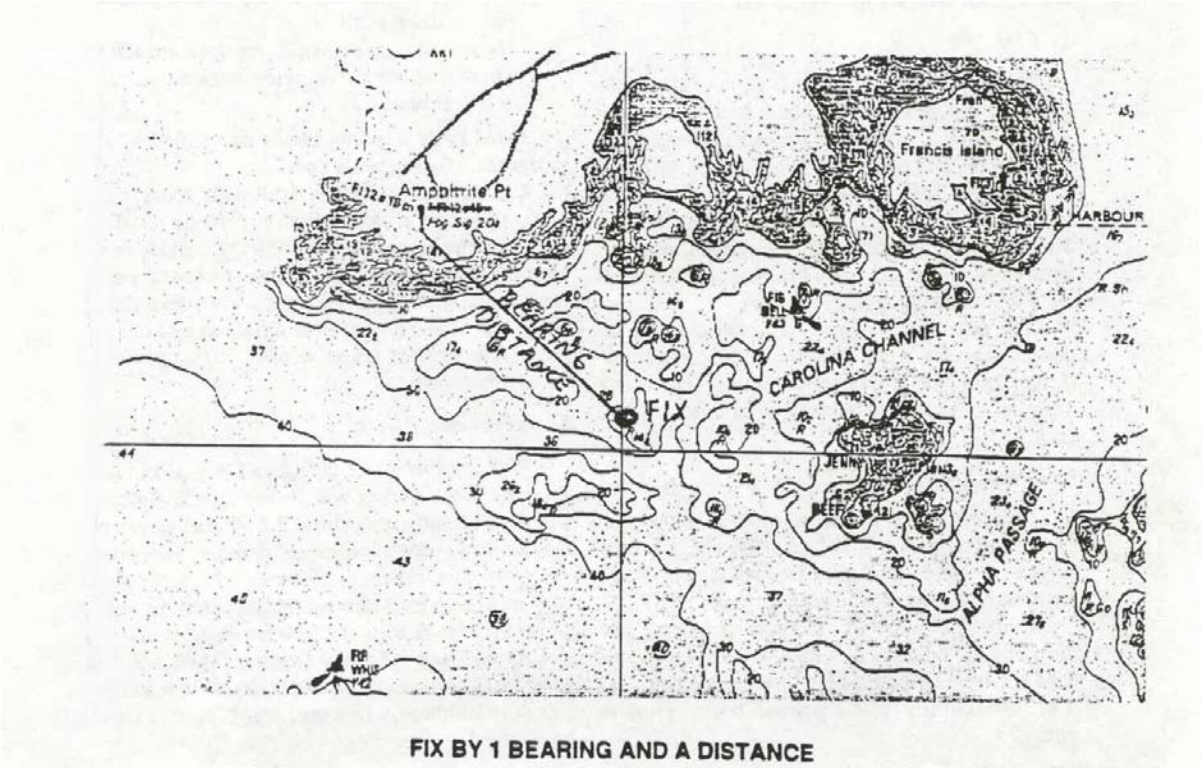


THREE CROSSED BEARINGS

RIGHT ANGLE CROSSED BEARINGS, FIVE DEGREE READING ERROR



OBLIQUE ANGLE CROSSED BEARINGS, FIVE DEGREE READING ERROR



FIX BY 1 BEARING AND A DISTANCE

Electronic Positioning

RADAR

Radar may be used to measure both distance and direction. Radar may be used under almost any condition of visibility such as darkness, rain, fog, etc. However, during a MAREP Hydrographic survey it is essential that the object being reported is sighted visually by an observer, as well as being shown as a radar target, to ensure that the item being reported is indeed the object being observed on the radar screen.

Radar has been found to be very accurate for measuring distance, much more so than if an individual were using a sextant or optical range finder.

Radar fixes may consist of two bearings, a bearing and a distance or two distance measurements.

When a radar target is on shore some problems may be encountered in picking out the exact object on which the bearing and range information is to be obtained.

Due to the narrow width of the radar beam a radar system is more accurate at determining "distance to an object" rather than the "bearing to an object". Therefore, radar should be used in particular if a distance measurement is required.

LORAN C

A major advantage of Loran C is the "repeatability" of positions obtained while using this system. Loran C signals are very stable and a vessel should be able to return to a prior position within 15 to 60 metres (50 to 200 feet).

Loran C can provide a fix accuracy of 0.25 miles. This accuracy is insufficient for plotting observations on large-scale charts when reporting items via the MAREP Hydrographic Programme.

The reliable coverage of a Loran C chain extends at least 600 miles from the farthest transmitter if the signal path is all over sea water. The usable distance is reduced as signals cross over the landmasses.

Land Path Errors

Fixed errors are introduced when the signal path from a station passes over land. The CHS corrects these errors when producing Loran C charts by adjustment of the hyperbolic position lines.

Caution ! ! The conversion to latitude and longitude provided as an option on most receivers does not include accurate land path corrections and may, consequently, give a position several miles in error.

Cycle Selection Error

Loran C derives its accuracy from comparing the phase of the secondary signal against that of the master. The receiver automatically selects the third cycle of the pulse from each station to make this phase comparison; the third cycle is used because it occurs early enough in the groundwave pulse to avoid skywave contamination. Within the reliable coverage described above, errors in cycle selection are very rare, but at longer ranges, the receiver may select the fourth cycle on first acquiring a weak signal, and this will cause an error in the reading of exactly 10 microseconds, moving the position line one mile or more. The likelihood of cycle selection error at long range is increased by:

i. Local radio interference which frequently is encountered in port.
ii. Shielding of the antenna; for example, by dockside buildings.
iii. Icing, or a coating of dirt, on the antenna or antenna coupler.
iv. Precipitation static, which occurs at the onset of snow flurries, rain showers or wet fog.
v. Skywave interference by night, and particularly at dawn and dusk.
(**Note**- Skywave interference does not affect Loran C within the reliable coverage, but only at longer ranges.)

Initial cycle selection should be verified by an independent fix whenever possible.

Cycle selection error is most easily recognized when a position is plotted from hyperbolic position lines in preference to the latitude and longitude conversion provided optionally by some receivers since the position

from any other source, even dead reckoning, can show that the time differences on one or more position lines are in error by 10 or possibly 20 microseconds.

Shore Proximity Errors

Both the strength of the Loran C signal and the accuracy of the reading will change rapidly close to shore, particularly near cliffs. Local reading errors may amount to one microsecond or more. However, the error will not change and once the Loran C readings are known for an inshore passage then they can be used for future transits of that passage.

As with any radio navigation aid there will be some locations, such as close in under cliffs or alongside dock buildings, where the Loran C signal cannot be received.

Loran C is not meant for navigation in harbours or confined waters, nor should Loran C be used in areas where latticed Loran C charts are not available. This information on the restricted areas for Loran C use should be remembered when reporting locations for use with the MAREP Hydrographic Programme.

Global Positioning Satellite Receivers (GPS)

The GPS system is a constellation of satellites that orbit the earth, transmitting precise time and positioning information to anywhere on the globe, 24 hours a day.

The system was developed by the United States Department of Defense to provide continuous, worldwide positioning and navigation data to United States and allied military forces.

A GPS receiver collects data from available satellites and locates the satellites that should be visible at the receiver's location. GPS receivers listen to signals from several satellites at a time. Three satellites are required for two dimension positioning (latitude and longitude only). A minimum of four satellites are required for three dimension positioning (latitude, longitude and elevation).

Due to the fact that the system is so accurate the United States' government has activated Selective Availability (SA) to maintain military effectiveness. As of May 1, 2000, SA was turned off, as a result GPS horizontal position accuracy is 20 metres or better 95% of the time, DGPS is 10 metres or better 95% of the time. Selective Availability inserts random errors into information broadcast by satellites, which reduces the GPS civilian accuracy to approximately 100 metres. For applications that require greater accuracy the effects of SA can be overcome by use of Differential GPS (DGPS). GPS positioning does not provide the necessary accuracy for positioning reported items on large-scale (especially Harbour) charts. It may be accurate enough for positioning on coastal and other smaller scale charts. Verification of positions by sextant angle, compass bearings or other methods is recommended.

Differential GPS (DGPS)

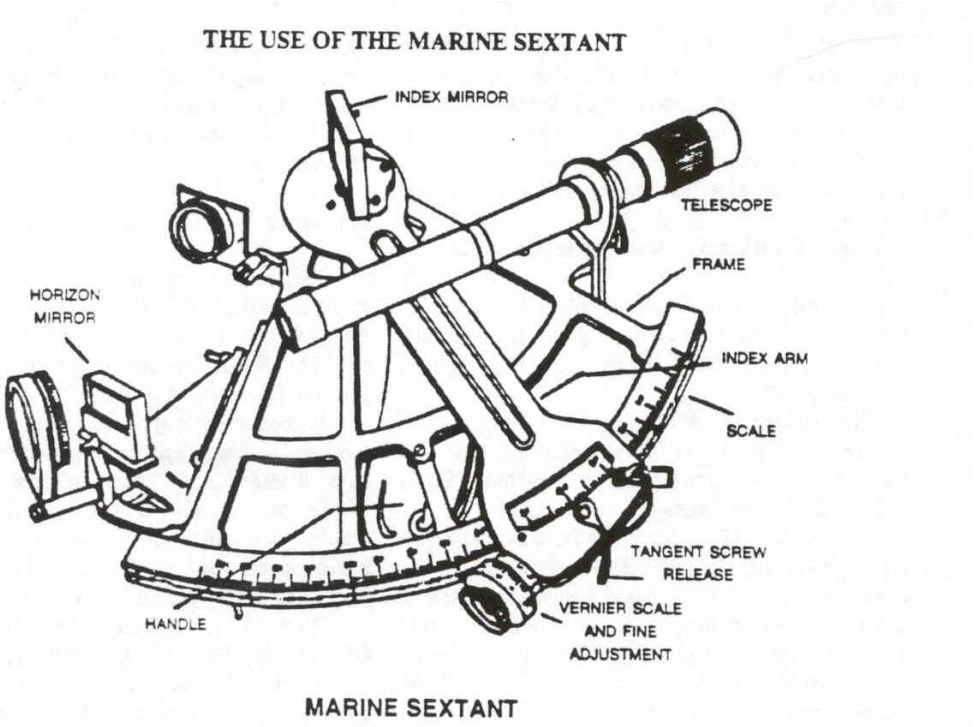
Differential positioning allows a user to overcome the effects of Selective Availability (SA) on GPS signals to produce a highly accurate position fix. This is done by determining the amount of the positioning error and applying it to the position fixes.

In most marine applications, corrections are determined and broadcast from on-shore GPS receiver sites. These sites are usually radio beacons operated by the coast guard. The on-board GPS receiver requires a separate DGPS receiver to receive the broadcast corrections, demodulate them, and send the corrections to the GPS receiver.

With the use of DGPS approximately 95% of GPS position fixes will be within 15 metres of the true position. The accuracy may not be sufficient for plotting items on a chart especially Harbour charts. Verification by sextant angles or compass bearings is recommended.

DGPS should not be used under any circumstances where system failure or inaccuracy could constitute a safety hazard.

Differential corrections are based on the North American Datum 1983 (NAD 83) position of the reference station antenna. Positions obtained using DGPS should be referenced to the NAD 83 co-ordinate system only. Check your charts to see if a conversion factor applies.



Description of the Sextant

The marine sextant is one of the most useful portable precision instruments available to the navigator and charting observer. Its sole function is to measure, with great accuracy, the angle between any two visible objects. This angle is limited to about 120° on an ordinary instrument, but with the addition of a penta prism, it can be extended to about 210°. Plath sextants provide such an attachment specifically for this type of work. Measurements can be made with a precision of between 0.1 and 0.2 minutes of arc. In principle, the instrument works very much like a coincidence range finder on a camera. One object is visible through the clear aperture of the fixed mirror. The other is brought into coincidence by moving the index arm to which is attached a second mirror. The index arm indicates, on a scale, the angle between the two objects. A few salient points on handling should always be kept in mind.

1. Never lay the instrument down unsecured. Always replace it in its box or in a special restraining rack. A fall may bend the frame or break mirrors. A sextant with a bent frame is worthless, since it cannot be repaired.
2. Never bump or allow the instrument to strike objects. The mirror adjustments are sensitive and mirrors are fragile.
3. Never lift the instruments by the index arm. Always lift by the frame and hold by the handle.
4. Always clean the instrument thoroughly with fresh water after using in sea spray. Neglect will cause corrosion of the moving parts and peeling of the mirror surfaces.
5. Do not attempt to make adjustments unless you are familiar with the adjustment locking screws. Attempts to adjust without unlocking may result in broken parts, which may be irreplaceable if the instrument is more than ten years old.

Triangulation Methods using the Sextant

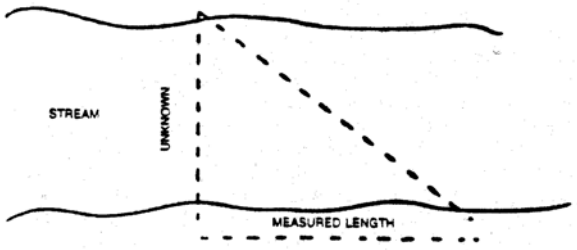
Reference was made in "Methods and Procedures for Making Measurements" to triangulation methods as means of measuring distances. This method involves the layout of a right-angle triangle. One of the two sides forming the right angle will be the side to be determined and the other side is one, which can be accurately measured. If three poles are set up, one at (a) one end of the unknown distance, one at (b) the 90° angle, and one at (c) the end of the known

distance, the second angle can be measured at (c) between (a) and (b). By trigonometric relationships, the distance to be determined is expressed by the following equation:

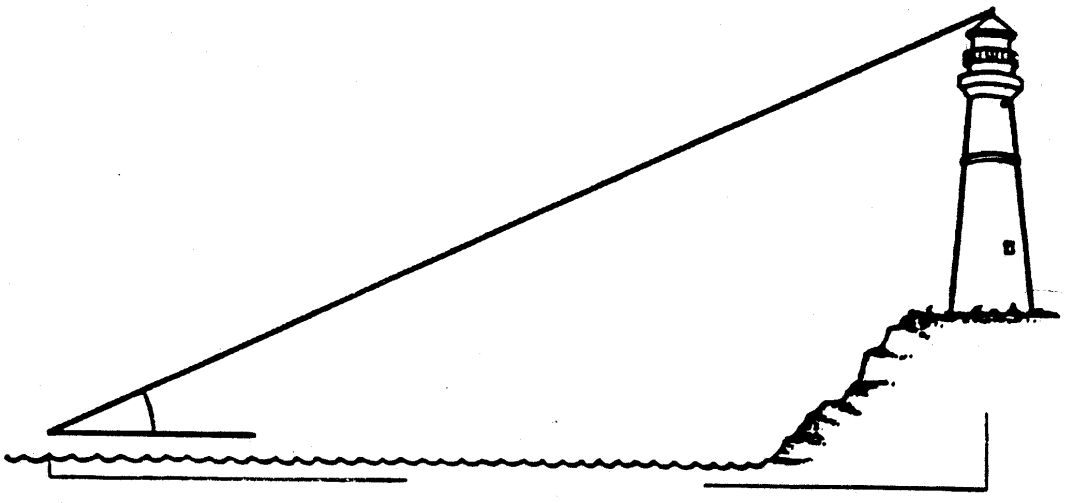
$$ab = bc \times \tan c$$

The values of tan (c) can be obtained from any natural function trigonometry table. If the above triangle is set up so that the angle (c) is exactly forty-five degrees, no calculation is necessary, and ab = bc.

This is a very accurate method when backed up with a good sextant and steel tape. It is vital that angle (b) be precisely 90°. The method is widely used by surveyors for the highest quality work and should be employed whenever applicable.



TRIANGULATION



DISTANCE BY VERTICAL SEXTANT ANGLE

Vertical Sextant Angles

A method derived from that given in "Triangulation Methods" uses some elevated object such as a lighthouse, radio tower, etc. whose height is known, as the measured leg of the triangle. The angle between the water surface and the top of the object of known height is measured and the distance off obtained directly from a Table or calculated by trigonometric means. If this calculation is made, it should be remembered that the known side is now opposite the known angle and the following equation must be used:

distance = known height X cot measured angle

The method is widely used to find the position of a boat, but is lower in accuracy because of the length of the known side is perhaps no more than one to two hundred feet, while the distance off may be several thousand feet. The measured angles are small and any measurement error will result in a fairly large distance error. In addition, since the heights of lighthouses are given from the local tide datum, the state of the tide must be taken into consideration when establishing the height to use in calculations. The method has the merit that all of the measurements are made from the boat and should be used when it is impossible to make any other reliable measurement.

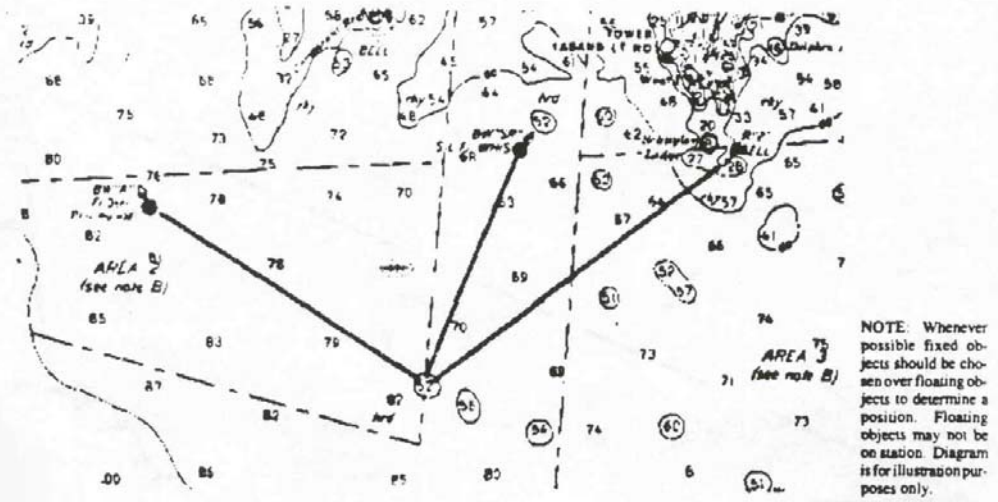
Vertical sextant angles can be used to measure height by observing the angle from a measured distance away from the object. Compute the height using the following equation:

tan (vertical sextant angle) X measured distance = height of object

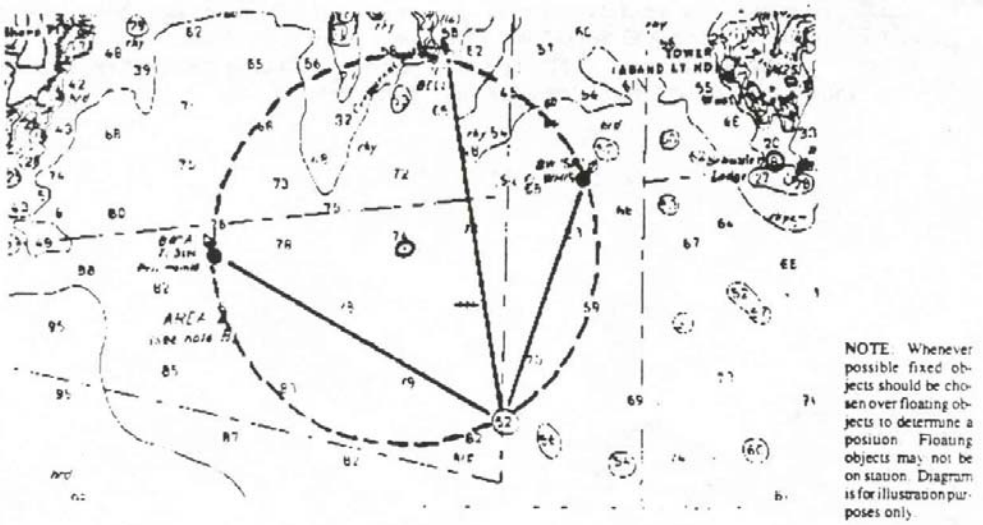
Horizontal Sextant Angles

An extremely powerful field technique is the use of the sextant to obtain horizontal angles between three or more objects that are represented on the chart in use. These can be anything that is sufficiently distinctive to be sighted in the instrument, but it should be remembered that the narrower the object, the more precisely it can be measured. The edge of a building, rather than the flat, broad centre; a support column of a water tank rather than the broad tank on top should be used.

The observer, standing at the point of unknown position, measures the angle between known object A and known object B. The angle between B and C is similarly measured. In choosing the objects to be used, the centre object B should be closer than the other two, or considerably further away. If all three are about the same distance away, there is the danger that all three may lie on the diameter of a circle. If this is the case, the plot will be indeterminate; that is, there will be no single point that can be plotted for the observers' position. If other objects are available, other angles are taken.



LOCATION OF SHOAL BY HORIZONTAL SEXTANT ANGLE



LOCATION OF SAME SHOAL AS PREVIOUS DIAGRAM,
BUT WITH IMPROPER CHOICE OF OBJECTS. LOCATION IS INDETERMINATE.

Then, using a precision three arm protractor with vernier reading to six minutes or less, the angles are set up on the protractor as read on the sextant. Each arm represents a line of position from the observer to one of the known objects. The protractor is then placed on the chart and moved about until each line passes through the charted position of its object. The centre of the protractor will then lie on the observers' position. A small dot can then be made on the chart through a small hole in the centre to indicate the observers' position. The method requires no calculation and is very accurate in normal usage.

Learning to Use the Sextant

Using the sextant properly is a matter of practice and familiarity. A person can be shown how to use the instruments in just a few minutes, but practice is required before they can become proficient in its use.

Summary

Methods have been presented for the determination of the position of a location. At this time the most accurate method available to the CPS member for determining the position of an object is horizontal sextant angles.

Lines of position determined by compass bearings, is one of the most common methods available to CPS members. These can be taken from reading over the compass (not very accurate), using a pelorus in conjunction with the boat's compass, using a hand held compass (more accurate), especially an electronic compass (Datascope) or a pair of binoculars with a built in compass.

Range finders or radar are especially useful for determining a position by distance; remember a radar is better utilized to determine a distance rather that a bearing.

As noted earlier, Loran C is not accurate enough for determining positions for charting purposes, with the exception of small-scale charts. TD readings are preferred to Lat./Long. conversion.

GPS is also not acceptable due to its 20 metre (approx.) accuracy, especially on large-scale charts. It may be used in areas where only small-scale chart coverage is available such as coastal charts.

DGPS is a better system than GPS, having an accuracy of approximately 5 metres, however, for the use in positioning on large-scale (especially harbour) charts positions should be confirmed by other methods such as horizontal sextant angles or compass bearings.

Should electronic methods such as GPS and DGPS methods be employed for determining a position it is essential that the proper horizontal datum, either NAD 27 or NAD 83 be used and/or the proper corrections be made prior to plotting positions. This is particularly important to members who may be using electronic charts. In hazardous or near shore waters visual observations should be made and plotted in addition to the use of electronic charting procedures.

HANDLING AND REPORTING DATA

Introduction

The handling of correspondence and MAREP Hydrographic Reports in connection with the programme is handled entirely by elected officers within CPS at the District and Squadron levels. Direct contact with the CHS at the District level in CPS ensures rapid transmittal of report forms and flow of information in both directions.

Forms Used

CPS MAREP Hydrographic Report Form

The form known as the "CPS Marine Information Report" is printed by the CHS specifically for the CPS MAREP Hydrographic Programme. The basic instructions for the use of this form are provided in detail on the reverse side of this form.

This form is available to District MAREP Hydrographic Officers directly from the appropriate regional CHS office upon request. Squadron MAREP Hydrographic Officers should obtain these forms from their District MAREP Hydrographic Officer.

CPS Marina Information Form

The CPS Marina Information Form was developed by the CPS MAREP Hydrographic Committee. This form is not a stock item, although copies of this form are available from the CPS MAREP Hydrographic Committee in limited supply. District and Squadron MAREP Hydrographic Officers are encouraged to produce this form locally for use in their areas.

The CPS Marina Information Form is valuable when updating information concerning marinas in Small Craft Guides and Sailing Directions, or when reporting the existence of a new marina on a chart. The form should not be used unless reporting a change to one of these publications.

Nautical Publications

To assist the District MAREP Hydrographic Officer in planning and checking the District effort for the year, the CHS will supply, where applicable, Charts, Sailing Directions, Small Craft Guides and Tide and Current Tables etc. These items must be forwarded to the succeeding District MAREP Hydrographic Officer upon the completion of the term of office**. THESE ITEMS ARE NOT ISSUED ON AN ANNUAL BASIS** but **WILL BE REPLACED WHEN NEW PUBLICATIONS BECOME AVAILABLE.** It is the responsibility of the District to keep these publications up to date.

Flow of Forms, Information and Data

CPS Organization

Many members are involved in the MAREP Hydrographic Programme, including District and Squadron MAREP Hydrographic Officers. The CHS will correspond directly with the District MAREP Hydrographic Officers on all matters relating directly to chart and publication corrections and reports.

The MAREP Hydrographic Committee is in the CPS Executive Department, which is headed by the National Executive Officer. The Committee itself is headed by a Chairman who is a Rear Commander. All the District MAREP Hydrographic Officers are members of this Committee. There is a communication link from National to District to Squadron and from the Squadron back upward in which the District MAREP Hydrographic Officers are the most important link.

The District MAREP Hydrographic Officers are also responsible to ensure that the MAREP Hydrographic Programme is active within their District; and that the Squadrons within their District are carrying out effective programmes. In effect, the District MAREP Hydrographic Officer is the co-ordinator for the programme within the District by ensuring liaison between the District and the Squadrons within the District. Squadrons, through the District, are encouraged to work together within the District to benefit the MAREP Hydrographic Programme as a whole.

It is essential that support for the MAREP Hydrographic Programme be shown by Commanders at the National, District and Squadron levels and that MAREP Hydrographic Officers work with their respective Commanders at all levels of the organization.

Source of CPS MAREP Report Forms

These forms, as noted previously, are available from the regional CHS offices and should be ordered by the District MAREP Hydrographic Officer.

Vancouver Island District, Pacific Mainland District and British Columbia Interior District should order their supply of forms from:

Canadian Hydrographic Service,
Institute of Ocean Sciences,
9860 West Saanich Road,
P.O. Box 6000,
Sidney, British Columbia
V8L 4B2.

Mid-Canada and Ontario Districts from:

Canadian Hydrographic Service,
Canada Centre for Inland Waters,
867 Lakeshore Road,
P.O. Box 5050,
Burlington, Ontario
L7R 4A6.

Quebec Districts from:

Canadian Hydrographic Service,
Maurice-Lamontagne Institute,
850 Route de la Mer,
P.O. Box 1000,
Mont-Joli, Quebec
G5H 3Z4.

Atlantic District from:

Canadian Hydrographic Service,
Bedford Institute of Oceanography,
P.O. Box 1006,
Dartmouth, Nova Scotia
B2Y 4A2.

Flow of Forms

When a CPS MAREP Hydrographic Report is completed by a member it may be sent directly to the District MAREP Hydrographic Officer or to the District MAREP Hydrographic Officer via the Squadron MAREP Hydrographic Officer depending upon the procedure in place within the member's Squadron and/or District. A report is **NEVER** sent directly to the CHS by a member or Squadron MAREP Hydrographic Officer. All reports must flow through the District MAREP Hydrographic Officer to the CHS.

The District MAREP Hydrographic Officer verifies the report for the District record and checks the report against the up to date District CHS publication file and then forwards the report to the appropriate CHS regional office. Reports respecting foreign waters are also forwarded to the CHS, which then forwards these reports to the proper foreign agencies.

At the appropriate agency, the reports are examined, and any which require immediate action, are promptly handled via "Notices to Shipping" or "Notices to Mariners". The remainder are filed until the particular publication or area comes up for checking and revision. At that time all reports are evaluated for their importance and desirability of being incorporated into the revised publication. Many reports are issued as corrections to Small Craft Guides or Sailing Directions prior to being placed on the charts.

When a CPS MAREP Hydrographic Report is received at the CHS, an acknowledgement card or letter will be sent stating action taken or planned, for the report will be sent to the originator. If a portion of a current chart was submitted with the report (not a photocopy) the chart will be replaced by the CHS.

FINAL DISPOSITION OF MAREP HYDROGRAPHIC REPORTS

One of the frequently asked questions on the part of CPS members is: "Why did they not use the report that I sent in?" The CHS has to walk a very narrow line between making a publication so complete in detail that it becomes very difficult to read and one so incomplete that it is not informative enough. Publications also have a variety of users.

Commercial shipping requires information pertinent to deep draft vessels. Fishermen wish to know about wrecks, reefs, shallow flats and soundings in tributary waters. The recreational mariner wants to know about anchorages, marine parks, launching ramps and marinas.

Data is received from many sources. The Canadian Hydrographic Service survey units work year round producing and updating surveys. The Department of Public Works submit controlling dimensions for navigable waters under their jurisdiction, the Coast Guard provides information concerning authorized changes to waterways affected by the Navigable Water Protection Act. The Canadian Forces submit information concerning their installations. Shipping interests, fishermen, local harbour authorities and not least of all, CPS members all contribute information concerning nautical publications.

From all of these sources the critical safety and other desirable items to be included in or on CHS publications must be selected. Other items are held for future investigation by CHS survey parties. Reports indicating the need for larger scale charts are filed for survey and chart justification. The CHS prefers to receive too much data to not enough. When an area is fined-combed and much minute detail has been received, they feel much more secure that nothing of any importance has been overlooked.

The CPS observer should never feel that they should quit participating within the MAREP Hydrographic Programme because a particular MAREP Hydrographic Report was not used. Does a fisherman quit for good because of one bad day? Information is often used as a "Notice to Mariners", as a Sailing Directions update or on a New Edition of a chart without the CPS member recognizing the information as being a result of their MAREP Hydrographic Report.

Credit for Work

To stimulate healthy competition and to serve as an incentive to submit MAREP Hydrographic Reports, the CHS has developed a point system to evaluate these reports. Every individual report is considered and each year at the CPS National Conference the CHS presents awards for:

1) The Best District Effort;
2) The Best Squadron Effort;
3) The Most Improved District;
4) The Best Individual Effort.

A representative of the CHS is on hand at the CPS National Conference each year to make the presentations on behalf of the CHS. This representative also attends the MAREP Hydrographic Meeting held during the conference to offer aid and advice concerning the MAREP Hydrographic Programme.

Closing Date for Submittal

All reports must be submitted to the appropriate CHS regional office, by the District MAREP Hydrographic Officer, to arrive by August 31st of each year.

At any time after August 31st in each year the CHS regional office will tabulate all reports received for the prior year, and recommend to the CHS office in Ottawa possible candidates for the CHS awards to be presented at the upcoming CPS National Conference.

The CHS National MAREP Co-ordinator, at the CHS office in Ottawa, will determine the disposition of CHS awards for presentation at the upcoming CPS National Conference based upon the recommendations from the Regional MAREP Co-ordinators, located at the CHS regional offices.

Summary

The CPS-CHS MAREP Hydrographic Programme has been underway and successful since 1971. It has paid big dividends to CHS in a wealth of data at low cost to them; to CPS in prestige to the organization; the members as a productive boating outlet and an opportunity to use skills already learned in CPS classes and to learn new skills.

THE MAREP HYDROGRAPHIC REPORT FORM

MAREP Hydrographic Report Forms are available to the member from the Squadron MAREP Hydrographic Officer; the Squadron MAREP Hydrographic Officer obtains the forms from the District MAREP Hydrographic Officer. The District MAREP Hydrographic Officer will order his supply of MAREP Hydrographic Report Forms from the Regional CHS Office serving his or her region.

There are four regional CHS offices involved with the program. For information on how to contact the CHS office to order MAREP Hydrographic Report Forms and to forward completed forms received from the membership, see this CPS MAREP Hydrographic Manual to check the MAREP Hydrographic Report Form for the address of the regional office.

It should be noted that while MAREP Hydrographic Report Forms are provided to the membership by the Squadron MAREP Hydrographic Officer, it is the duty of the District MAREP Hydrographic Officer to forward completed forms to the CHS. Normal practice is to have the member forward the completed form to the District MAREP Hydrographic Officer. For this reason, it is essential that the name and address of the District MAREP Hydrographic Officer be known to the membership.

In some areas the completed forms may be sent first to the Squadron MAREP Hydrographic Officer who in turn would forward the completed form to the District MAREP Hydrographic Officer. In any event, all MAREP Hydrographic Report Forms must pass through the hands of the District MAREP Hydrographic Officer to be forwarded to the CHS. Regardless of which method is used, the processing of the MAREP Hydrographic Report Form should be as timely as possible; first to get time sensitive items to the CHS (work may be underway by the CHS which may be affected by the report) and second, to keep the observer happy, particularly if he is awaiting a replacement chart, let alone the receipt of the acknowledgement card or letter stating action taken/planned on a report from the CHS.

It is suggested that the MAREP Hydrographic Officers involved in the processing of a report acknowledge receipt of the report at their levels and note the date that the report was forwarded by them to the CHS.

COMPLETING THE MAREP FORM

1. The name, address and phone number of the person reporting is noted in the upper left corner. It is advised that the name of the person reporting be written/typed the same on each report submitted by that individual. Credits are awarded for reports submitted and a report from John Doe, J. Doe or J.E. Doe may appear to be from different reporters. Likewise Squadron and District names should be shown as credit is also awarded to Squadrons and Districts by the CHS.

2. The date and time of observation of the item reported is essential, especially if heights and depths are involved. The CHS can determine with accuracy, charted depths and heights. The reporter should no attempt to reduce the actual depths or heights to datum. This will be done by the CHS.

3. The name and address of the District MAREP Officer should appear in the upper right corner of the MAREP report. In addition the District MAREP Officer should attempt to verify that the information reported is valid, if possible, and/or contact the originator if it appears that sufficient information may be lacking. The District MAREP Officer should also attempt to ensure that the information being provided has not previously been promulgated by "Notice to Mariners". Chart edition dates should be checked at this time also.

4. Everything starts with the chart. It must be the most current and largest scale chart available for the area involved. Current chart edition dates are published on a regular basis in "Notice to Mariners". It is sometimes easier to describe a position by noting the location on a chart. If this is done on the actual latest edition, largest scale chart (not a photocopy) the CHS will provide a replacement chart.

5. Positions should be reported in latitude and longitude as accurately as possible. How a position was obtained, showing bearings, etc. should be shown on a chart patch.

6. Additional information not shown on charts is often published in Sailing Directions and Small Craft Guides; or also applies to these publications. Provide any relevant information at the same time as reporting the charted information on the same MAREP Form.

7. The last section of the form to be completed by the observer is "Additional Information" as noted on the form. All relevant information should appear here.

Members completing the MAREP Form are reminded to read the information on the reverse of the Form for additional information on completion of the Form.

The completed Form should be forwarded to the District MAREP Officer for review and forwarding to the appropriate CHS office. The District MAREP Hydrographic Officer may wish to make a photocopy for his files.

PLANNING THE MAREP HYDROGRAPHIC ACTIVITY

Introduction

It has been the experience of Squadrons which have conducted successful MAREP Hydrographic Programmes that planning a programme is a basic necessity regardless of the method used to collect information to report to the CHS via the MAREP Hydrographic Programme.

Many different approaches appear to be successful, ranging all the way from organized MAREP Hydrographic Cruises to single vessel operations. With really dedicated observers, much useful work may be accomplished by individual vessel crews and, frequently, by single-handed effort.

Planning at the District Level

The District MAREP Hydrographic Officer and the District MAREP Hydrographic Committee (which includes all Squadron MAREP Hydrographic Officers) are the key personnel in the MAREP Hydrographic Programme.

Everything in the District begins with this group when the CHS publication file is received from the CHS by the District MAREP Hydrographic Officer. The committee must then break this material down into blocks of areas to be assigned to or chosen by the various Squadrons in the District.

There will always be some or many new Squadron MAREP Hydrographic Officers each year. As a result one of the first things that must be arranged is a meeting of the District MAREP Hydrographic Committee in order to discuss the general aims and plans for the coming year.

At this time the calendar of events for each Squadron should be consulted to determine if and where the MAREP Hydrographic Programme may fit into the agenda at the Squadron and District levels of CPS, i.e.: cruises, rendezvous, meetings, etc.

It must also be determined whether Squadrons have a pronounced choice of geographic areas for which to accept responsibility for ensuring that MAREP Hydrographic activity is carried out. When area assignments have been reconciled among all Squadrons the main District planning activity is accomplished. It is of vital importance that the geographic areas within the District are the definite responsibility of a Squadron(s), and that the area will be covered.

The District MAREP Hydrographic Officer must liaison with the Squadron MAREP Hydrographic Officers of the District, in order to liaison with them, in order to be aware of the MAREP Hydrographic activity within the District.

Planning at the Squadron Level

Many Squadrons in which the MAREP Hydrographic Programme is a regular yearly activity, make use of continual planning. In some instances, planning for the coming year begins about mid-year of the year preceding: thus permitting continuity of the MAREP Hydrographic Programme from year to year. In this manner the Squadron may make general plans; and alert the membership to those plans so that the membership is aware of certain planned MAREP Hydrographic activities such as dates of planned MAREP Hydrographic Days, MAREP Hydrographic Cruises, etc. but not necessarily where or the exact times.

Specific planning at the individual or vessel level may be done a few weeks prior to the planned MAREP Hydrographic Day or less when it is known who and which vessels wish to participate.

As a preliminary, the Squadron MAREP Hydrographic Officer, in co-operation with members knowledgeable of an area, review the CHS publications for the chosen areas and mark the position of items which they believe should be checked. Often items are known to be non-existent or different by Squadron members but have not been reported as “different” to the CHS. The planned MAREP Hydrographic activity provides members with the opportunity to report these known changes: as well as the unknown changes noted during the MAREP Hydrographic activity.

The geographic areas involved are split into “vessel-sized” pieces. Areas containing launching ramps may be assigned to trailerable vessels. The more distant areas may be assigned to faster vessels; and open water areas may be assigned to larger vessels built for that environment.

After vessel assignments are made, it is the responsibility of the Squadron Commander and the Squadron MAREP Hydrographic Officer to see that the planned MAREP Hydrographic activity is conducted. These Officers should also make it a point to partake in the planned activities so that they have first hand information about the progress of the activity and the MAREP Hydrographic Programme in general.

Squadron MAREP Hydrographic Participation

Reports from the various Districts and Squadrons over the years indicate a variety of feelings about the MAREP Hydrographic Programme. Some Squadrons and Individuals like to partake in this programme while others do not. Thus, it becomes a major task for the Commander and the Squadron MAREP Hydrographic Officer to plan a Squadron activity that will be attractive to a sufficient segment of the membership to be effective. The methods outlines below are all based on effective plans that have been used by successful Squadrons, some on a continuing yearly basis, others to meet a need to cover a given area, and still others tailored around the preferences and capabilities of active individual observers. It would appear gaining enthusiasm for the MAREP Hydrographic Programme is like boasting morale, it must be carefully nursed and built until it becomes self-sustaining. Personal participation by both Squadron and District Commanders and MAREP Hydrographic Officers at both levels is an extremely good generator of enthusiasm.

Group MAREP Hydrographic Cruises (See "Planning a MAREP Cruise"-Page 26)

Group cruises have been highly effective as a means of gaining participation in the MAREP Hydrographic Programme. A group cruise has some of the aspects of a rendezvous, Squadron party, a fish fry or almost any other group function. These group cruises may vary in their nature from long, meticulously planned operations to an almost spontaneous group gathering. All types seem to be successful and the type used must be based on local conditions, the type of people involved, and the types of boats available.

If distances from the Squadron's home location are great this activity almost has to be a trailer boat operation. If the site of the activity is a popular recreational area plans may have to be made in advance.

All vessels involved should make use of up to date CHS publications when on the water. Upon return to port all crews should attend a debriefing, compare their findings and prepare their MAREP Hydrographic Report Form for submission to the Squadron or District MAREP Hydrographic Officer.

Small Group Cruises

Remote area with few shore facilities necessitate a self-sufficient fleet to conduct the MAREP Hydrographic activity and, in this case, perhaps only three to five boats may be all that are necessary to cover the area. Small group cruises are usually comprised of a group of boats all originating from the same marina, club or port, which travel as a small fleet. Cruises of this type are frequently very productive, covering an assigned area.

Single Crew and Individual Efforts

Many boating enthusiasts particularly enjoy exploring off the beaten path and request that such areas be assigned to them. Many of these people are excellent navigators and greatly enjoy doing a thorough and meticulous survey either alone or with one or two similarly inclined companions. Some CPS members derive most of their pleasure from MAREP Hydrographic activities and have equipped their vessels in order to pursue their interest.

Non-Assigned Observations

The original concept of the MAREP Hydrographic Programme was that CPS members in their everyday boating operations would observe discrepancies in their own boating waters and the information portrayed in and on CHS publications; and that by reporting these discrepancies to the CHS, the CHS would benefit from the knowledge of the CPS member "in the field".

CPS members should be alert to hazards while handling a vessel, and if new hazards are found, the hazard should be promptly reported. If each CPS member would make it a practice to carry a CPS MAREP Hydrographic Report Form on board their vessel; and make out a report when a discrepancy is found and submit the report promptly, much timely and useful information would reach the CHS while still fresh.

Shore Observations

To the majority of people, MAREP Hydrographic activity connotes vessels and activity on the water. Many do not realize that a great deal of MAREP Hydrographic activity can be conducted ashore and, indeed, in some situations can be done better ashore. Shore based operations frequently yield greater mobility, the observation platform is more stable, and more and better reference points may be available for the location of objects, even objects in the water. Another aspect is that sometimes an area can be covered more rapidly and efficiently than by vessel. In many cases, co-ordination of activity between a land unit and a water unit effectively enhances the MAREP Hydrographic activity.

Those members whose daily routines take them along the waterfront may from time to time see changes worthy of a CPS MAREP Hydrographic Report. Careful perusal of newspapers and boating magazines for reports of marine constructions authorized, begun and completed will furnish the basis for MAREP Hydrographic Reports.

Success of the Programme

Successful MAREP Hydrographic Programmes occur only when Squadron members are personally interested, enthusiastic and participate actively. In a Squadron, which has enthusiasm, new members see the MAREP Hydrographic reporting Programme as an important function of Squadron life and become interested participants.

The successful Squadron or District is somewhat self-perpetuating and once momentum has been established it seems to continually increase. This results in greater participation, more geographical coverage and an augmented quality and sophistication of observation. A beginning must be made somewhere and if the job can be combined with enough fun to make people want to participate again, a good beginning has been made.

Every CPS member is encouraged to participate in the MAREP Hydrographic Programme, to complete the CPS MAREP Hydrographic Report Form, and to forward the form to the District or Squadron MAREP Hydrographic Officer as appropriate to their Squadron or District when an item is observed necessitating a report. This, in essence, is the basis for the whole program. Many eyes to see, recognize and report promptly.

PLANNING A MAREP CRUISE

1. Divide up the area among participants. Assign areas to teams of two to four people per vessel.

2. Obtain Charts and Sailing Directions (or Small Craft Guides) of the areas to be covered by each team. This ensures that the latest published information is available to all participants.

3. If possible, have two vessels/teams cover each area. This will promote a healthy competition as well as providing a comparison base for each team.

4. Set starting (departure) time and finish (return to base) times. This ensures that all are working under the same conditions concerning weather, tides/currents and sea-state. A de-briefing event (barbecue, etc.) can then be arranged to round out the session.

5. Upon conclusion of the cruise, all reports can be discussed among the crews and later turned over to the MAREP Officer for verification and forwarding to the Hydrographic Services.

6. A token award can be presented to the team submitting the greatest number of reports, or perhaps the best report. Decide how to award this prize prior to the MAREP Cruise.

7. It is essential that one report be submitted from an individual vessel on each reportable item, not one report on one item from each of four crew members, i.e. not four reports on the same item as observed from the vessel by each crew member. To be fair, rotate the credit for observation through the roster of crew members.

8. Inform the Squadron membership of the success of the cruise by reporting results of the day's program in the Squadron Newsletter.

CANADIAN POWER AND SAIL SQUADRONS

MAREP HYDROGRAPHIC PROGRAM
MARINA INFORMATION

Name of Marina _____ Chart # _____
Address _____ Date Rev. _____
_____ Latitude _____
_____Postal Code _____ Longitude _____
Phone # _____FAX # _____ VHF Channel _____

WHICH OF THE FOLLOWING FACILITIES ARE AVAILABLE

Overnight docking			Drinking Water		
Power at the docks			Showers		
Sewage pump out			Laundromat		
Launching Ramp			Ice/Groceries		
Repairs: Hull			Boat Hardware		
	Engine		Bait/Tackle		
Marine Railway:	Capacity tonnes/lbs.		Charts		
Hoist Facility:	Capacity tonnes/lbs.		Propane		
Rentals:	Canoes		Naphtha		
	Boats		Gasoline		
	Houseboats		Diesel Fuel		
Water Taxi			Snack Bar		
Motel Accommodations			Restaurant		
Picnic Area			Dining Room/Licensed		
Camping			Pay Phone		

Limiting depths (Feet/Meters/Fathoms): Approaches _____ Wharves _____ Fuel dock _____

Remarks:

Nearest Town - Name _____ km/miles _____ Facilities: Police _____ Hospital _____ Doctor _____
Dentist _____ Bank(s) _____ Post Office _____ Hotels _____ Motels _____ Liquor/Beer Store _____ Golf/Tennis _____

Note: <u>Complete</u> and <u>attach</u> MAREP Reporting Form with your Name, Address, Squadron, and forward as indicated.

MAREP HYDROGRAPHIC
CANADIAN POWER AND SAIL SQUADRONS MARINE INFORMATION REPORT

SQUADRON _____ **DISTRICT** _____

From: (Please print)

Name _____
Address _____
City _____ Province _____
Postal Code _____ Telephone _____

Send to: DISTRICT MAREP OFFICER

_____
_____
_____
_____

CHART AFFECTED _____ Edition Date _____

Chart Portion Attached: Yes [ ] No [ ] Other Attachments: Yes [ ] No [ ]

PUBLICATION AFFECTED

SAILING DIRECTIONS _____ Edition _____ Page _____ Para _____ Line _____

SMALL CRAFT GUIDE _____ Edition _____ Page _____ Para _____ Line _____

OTHER _____

ITEM REPORTED _____

Date of Observation _____ Time of Observation _____

Methods Used for Positioning_____ Method Used to Measure Depth_____

POSITION: Latitude _____ ° _____ ’ _____” Longitude _____° _____ ’ _____”

DETAILS_____
_____
_____
_____
_____

FOR CANADIAN HYDROGRAPHIC SERVICE USE ONLY

Report Received By _____ Date Received _____

Acknowledgement Card: [ ] Replacement Chart: [ ] Date Sent _____

Latest Chart Edition: Yes [ ] No [ ] Largest Scale: Yes [ ] No [ ] _____

Latest Publication Edition: Yes [ ] No [ ]

ACTION:_____
_____
_____
_____

Revised 1996- Canadian Hydrographic Service

Nautical Charts Protect Lives, Property and the Marine Environment

April 1996

DO NOT use MAREP to report a buoy off station or missing or a light not operating. Report these immediately to the nearest Canadian Coast Guard Office.

HOW TO REPORT

WHEN REPORTING DEPTHS. Use the most accurate means available to you (lead line, setting pole, depth sounder). Always include the exact time and date of the sounding so that it can be corrected for lake stage, tide level, effect of current, etc. Do not try to correct it yourself. When using a depth sounder, be sure to make the proper allowance for the distance between the transducer and the water line. State on the report that you have done this. Report the fact that object may be visible at low water but submerged at high water.

WHEN LOCATING AND REPORTING POSITIONS. Accuracy in reporting positions is vital. Use the best method available to you. If you need help locating a position, seek help from a Squadron Officer. When plotting positions based on bearings, state clearly whether they are True or Magnetic, allowing for deviation if Magnetic, or deviation and variation if True.

PLOTTING POSTIONS. Plot your information on the largest scale chart of the area. Where possible, cut out the pertinent section of the chart to letter size (8 ½" x 11") or fold it accordingly. Include the chart number and the edition and correction dates. Plot your changes clearly and accurately. Show all bearing lines and plotting information. Place explanatory notes or sketches in unused areas of the chart. If you supply a section of the current edition of a chart, you will receive a free replacement chart from the Canadian Hydrographic Service.

ERRORS IN SAILING DIRECTIONS. Report errors and inconsistencies in current editions of Sailing Directions. Vital corrections will be published in Notices to Mariners.

WHAT TO REPORT

SUBMERGED OBJECTS. Report uncharted rocks, submerged obstructions, unmarked or shifted shoals, wrecks, underwater cables and pipelines. Report even the simple fact that you know or think there has been a change.

OBSTRUCTIONS. Report pilings, weirs, overhead cables, piers, and new or misrepresented bridges. Include a sketch if you cannot explain it properly. When reporting the non-existence of an obstruction, state when and by whom it was removed, if known.

CHANNELS. Report new channels and changes to existing channels by local interests. Include controlling depths, widths and location of channel markers. (This information usually obtainable from party who contracted for dredging of new channel.)

LANDMARKS. (Objects sufficiently prominent to be of help to the navigator) Report tall distinctive smokestacks, towers, spires and tanks. Also you may report an isolated building on a hill or promontory, a distinct clump of woods or outcropping of rock, an isolated strip of sandy beach or other easily distinguishable feature. Less prominent landmarks may be reported around small unbuoyed or poorly buoyed harbours and anchorages. Include sketches if possible. It is equally important to report charted landmarks that no longer exist.

MARINE FACILITIES. Report new boatyards and marinas not on current large scale charts as well as discontinued boatyards that are on the charts. Report any glaring discrepancies in listed facilities at a location.

PRIVATE AIDS. Report unlisted daybeacons and privately maintained markers or lights if not shown on charts.

The CANADIAN HYDROGRAPHIC SERVICE includes Headquarters and four Regions:

ATLANTIC REGION
Bedford Institute of Oceanography
P.O. Box 1006
Dartmouth, Nova Scotia
B2Y 4A2

CENTRAL AND ARCTIC REGION
Canada Centre for Inland Waters
P.O. Box 5050, 867 Lakeshore Road
Burlington, Ontario
L7R 4A6

HEADQUARTERS
615 Booth Street
Ottawa, Ontario
K1A 0E6

QUEBEC REGION
Maurice-Lamontagne Institute
P.O. Box 1000, 850 Route de la Mer
Mont-Joli, Quebec
G5H 3Z4

PACIFIC REGION
Institute of Ocean Sciences
P.O. Box 6000, 9860 West Saanich Road
Sidney, British Columbia
V8L 4B2

Always use the latest edition of a chart and keep your charts up-to-date from monthly Notices to Mariners. This will be a key factor in ensuring the success of MAREP and your safety.

www.notmar.com

April 1996

DUTIES OF MAREP HYDROGRAPHIC OFFICERS

Introduction

It is very important that the MAREP Hydrographic Officers at the National, District and Squadron levels have a clear understanding of their duties and responsibilities. If, after taking Office, a MAREP Hydrographic Officer should find that because of a change of circumstances, that he does not have the time to fulfil his obligations to his Office, his resignation should be made forthwith to his Commander so that his Office can be promptly filled by another member. If this is not done, the entire MAREP Hydrographic Programme in that District or Squadron could be "lost" for that year, with possibly serious consequences to both CHS and CPS.

National MAREP Hydrographic Officer

The National MAREP Hydrographic Chairman holds the rank of Rear Commander and is responsible to the National Executive Officer and the Governing Board of CPS.

The responsibilities of this Officer includes:

1. submission of personal MAREP hydrographic reports "to keep a hand in" the programme which will keep this officer in close touch to the "grassroots" of the program;
2. submitting regular reports regarding the MAREP Hydrographic Programme, problems and progress, to the National Executive Officer prior to each Governing Board Meeting;
3. responsibility for the MAREP Hydrographic Program, including promotion of the programme within CPS; and to ensure that District MAREP Hydrographic Officers are promoting the programme within their Districts;
4. sending periodical MAREP Hydrographic Newsletters to all District and Squadron MAREP Hydrographic Officers;
5. being in contact with District MAREP Hydrographic Officers, at least quarterly, by mail, telephone, or fax to show a genuine interest in the success of District MAREP Hydrographic Programmes;
6. submissions of MAREP Hydrographic news and columns to "The Port Hole";
7. ensuring that copies of all letters, communications and requests to District MAREP Hydrographic Officers are also sent to the appropriate District Commander;
8. submitting to CPS Headquarters, a claim for all normal operating expenses, as covered by CPS approved Expense Payments, to be paid out of the MAREP Hydrographic Budget;
9. being responsible for the entertainment and well being of any CHS representative attending the CPS National Conference as a guest of CPS. Expense details are to be discussed prior to the event with the National Executive Officer;
10. having a continuing contact with the nearest CHS regional office and the CHS Ottawa office in order to maintain appropriate liaisons with the CHS concerning the ongoing state of the MAREP Hydrographic Programme;
11. on retiring from Office, to turn over the complete MAREP Hydrographic file to the incoming Chairman.

District MAREP Hydrographic Officer

The District MAREP Hydrographic Chairman shall hold the rank of District Lieutenant. This officer is responsible to and reports to the District Commander, as well as being in close contact with the National MAREP Hydrographic Chairman.

The responsibilities of this Officer include:

1. the submission of personal MAREP Hydrographic Reports;
2. the responsibility for the District MAREP Hydrographic Programme, including ensuring that the Squadrons of the District are operating active MAREP Hydrographic Programmes at the Squadron level;
3. organizing MAREP Hydrographic Cruises, Meetings and Seminars at the District level and to assist Squadron MAREP Hydrographic Officers in planning activities at the Squadron level;
4. writing and submitting MAREP Hydrographic news and articles for any District publication, including providing such information to those publications provided by Squadrons to the membership;
5. providing to the National MAREP Hydrographic Officer, copies of all letters, directives and correspondence to Squadron MAREP Hydrographic Officers;
6. claiming postage and other nominal expenses relative to the District's MAREP Hydrographic Programme from the District;
7. maintaining a regular contact with the nearest regional office of the CHS to:
   a) forward completed MAREP Hydrographic Report Forms,

b) maintain a complete set of current CHS publications for the District,
c) maintain a supply of MAREP Hydrographic Report Forms on hand for distribution to the District Squadrons,
d) send a replacement CPS MAREP Hydrographic Report Form upon receipt of a completed form from a member.

8. submitting reports promptly, upon request, to the National MAREP Hydrographic Officer;
9. submitting a year end report of the District's activities to the National MAREP Hydrographic Officer;
10. arranging meetings of the District MAREP Hydrographic Committee (consisting of the District MAREP Hydrographic Officer and the Squadron MAREP Hydrographic Officers) to plan MAREP Hydrographic activities within the District and Squadrons, hold MAREP Hydrographic Seminars, etc.;
11. sending to the National MAREP Hydrographic Officer any suggestions or ideas that could benefit the National programme;
12. on retiring from Office to turn over the complete MAREP Hydrographic file to the incoming District MAREP Hydrographic Officer and review with that Officer the MAREP Hydrographic Programme.

Squadron MAREP Hydrographic Officer

The Squadron MAREP Hydrographic Officer shall hold the rank of First Lieutenant. This officer is responsible to and reports to the Squadron Commander, as well as being in close contact with the District MAREP Hydrographic Officer.
The responsibilities of this Officer include:

1. the submission of personal MAREP Hydrographic Reports;
2. the responsibility for the operation of the Squadron's MAREP Hydrographic Programme and to encourage participation in the programme;
3. the organization of MAREP Hydrographic Reporting Groups within the Squadron, possibly based on homeports of member's vessels; organizing MAREP Hydrographic Cruises, Meetings and Seminars;
4. writing and submitting MAREP Hydrographic news and articles for Squadron publications;
5. providing the Squadron Commander with copies of any letters or other correspondence to the District MAREP Hydrographic Officer;
6. keeping a supply of MAREP Hydrographic Reporting Forms on hand for Distribution to Squadron members and students;
7. arranging for the MAREP Hydrographic Programme to be addressed in Boating and Advanced Grades classes;
8. making periodic reports to the District MAREP Hydrographic Officer and providing a copy of such report to the Squadron Commander, including a year-end report to the District MAREP Hydrographic Officer;
9. on retiring from Office to turn over the complete MAREP Hydrographic file to the incoming Squadron MAREP Hydrographic Officer and to review with that Officer the Squadron's MAREP Hydrographic Programme.

Summary

At all levels of CPS, a common duty of MAREP Hydrographic Officers is the submission of personal MAREP Hydrographic Reports.

APPENDIX "A"

MAREP HYDROGRAPHIC REPORTING

1. Check what to report, as listed on the back of the MAREP Report Form.

2. Always use the latest edition of a Chart or other Publication.

3. "Notices to Mariners" list current Chart edition dates on a regular basis.

4. "Notices to Mariners" may be used to update Charts.

5. Latitude and Longitude positions should be entered on the MAREP Hydrographic Report in Degrees, Minutes and Seconds: (49°16'24"N, 123°07'45"W).

6. MAREP Hydrographic Reports may be filed concerning Charts, Sailing Directions, Small Craft Guides and Tide and Current Tables or any other CHS Publication.

7. Pictures are required to keep Sailing Directions and Small Craft Guides current. These may be submitted via the MAREP Hydrographic Programme.

8. DO NOT HOLD BACK REPORTS. The CHS may be in the process of publishing a new Chart or other publication of the area concerned.

9. An acknowledgement card or letter stating action planned/taken will be sent by the CHS to the originator of a MAREP Hydrographic Report upon receipt.

10. A replacement Chart will be sent IF you forward a section of a CURRENT Chart with your report. NO replacement Charts are sent if your Chart is not a CURRENT edition. Photocopies of the affected Chart may be sent with a report but NO replacement Chart will be sent.

11. A boat is not required to participate in the programme. Many reports are obtained while a member is walking, driving, snowmobiling or reading a newspaper.

12. The CHS provides awards at the CPS Annual Conference for the best Squadron effort, best District effort, most improved District and the best individual effort of a member (This last award cannot be won two years in a row by the same member). The CHS Ottawa Office determines the winners for the above awards.

13. Reports received by the CHS after August 31st are credited to the succeeding year's MAREP Hydrographic Programme.

14. Reports should be sent to the District MAREP Officer who then forwards the reports to the Regional CHS Office at the address stated on the MAREP Hydrographic Form.

15. Changes to Marina information contained in Small Craft Guides/Sailing Directions can be reported on the CPS MAREP Hydrographic Programme Marina Information Form. This form should be attached to a regular MAREP Report Form.

APPENDIX "B"

LIST OF ITEMS TO INVESTIGATE

Report those items that no longer exist, as well as items that should be changed or added to the Charts. Refer to Chart # 1, Symbols and Abbreviations for a complete list of Chart features.

Aids to Navigation	Report discrepancies. Check "Notices to Mariners for changes
Aeronautical Lights	Evaluate from seaward and report existence of new lights or discontinuance of established lights
Airports and Airstrips	Report new and discontinued
Anchorages	Normal and Emergency
Bridges	New, discontinued, under construction, or in ruins. Report location, type, lights, clearances, both vertical and horizontal
Cables (Areas)	Over or under navigable waters. Give location, type of clearances and completion status
Channels	Report new or revised channels, depths/widths
Chart Inspection	Check for printing errors, buoy colours, numbers, depths, spelling, etc.
Coast Guard Stations	New, discontinued, or changes
Sailing Directions/Small Craft Guides	Compare existing conditions against written descriptions
Cribs/Water Intakes	Visible or submerged. Size, construction type. If submerged, state depth over structure
Dams	Type, positions, lights, etc.
Dikes and Levees	Type, height and extent
Dolphins/Pilings	Visible or submerged
Duckblinds	Temporary or permanent
Dumping Grounds/Spoil Areas	Extent of same
Fish Havens	Obstruction, artificial fish havens
Fish Trap Areas	Show limits of area covered
Fish Stakes	Visible or submerged (outside of trap areas)
Ferries	Type, route, docking facilities, cables
Groins	Visible, submerged or ruins
Jetties/Breakwaters	Visible, submerged or ruins
Landmarks	New, destroyed or obscured. Check from seaward
Log Boom Areas	Extent, areas, navigational hazard
Magnetic Variations	Report observed magnetic anomalies (unexplained wild variations in compass readings)
Marina/Marine Facilities	New, discontinued or changed
Marine Construction	Wharves, docks, piers, dredging
Marine Railways	New or discontinued, capabilities
Obstructions	Visible, submerged, depth, other details
Piers/Docks	New, extended, or ruins. Visible/submerged
Platforms (all types)	Type, markings, lights, hazards
Pipelines	Overhead or submerged. Indicate clearance
Ramps	Type, surface
Rocks	Visible or submerged. Single or cluster
Ruins	Size and type of construction, hazards
Sewers	Size and type of construction, depth over
Shoals	Visible or submerged, Depth
Towers	Radio, Television, Microwave, Colours, Lights, Heights
Wrecks	Visible or submerged