ASTRONOMY

Finding a Safe Port

A good watch and a few tables and charts are all that are essential for a survivor of a shipwreck to chart his course to a friendly port.

By MARTHA G. MORROW

➤ SURVIVORS of a shipwreck, adrift on a lonely sea, need not pin all their hopes on a chance ship or plane spotting them. With a good watch, and a few tables and charts anyone lost at sea can chart his course to a safe port. A sailor who has recently joined the service, a soldier slightly bewildered by the mysteries of the transport, or a pilot flying over the endless waves need not live in constant fear of being utterly and completely lost, should an accident occur.

Science is now providing improved and simplified means of using the heavens as a guide in sailing so that even those who have never tried navigation can understand the directions and bring the craft to a safe harbor.

If all the emergency equipment of the lifeboat is swept away in the storm, one of our fighting men—or you—could help guide the boat to a safe harbor. First of all, you must find out approximately where you are amid the vast expanse of ocean, then determine which way to go to reach the nearest land. Fortunate are the survivors who have a watch still keeping accurate time, for then their approximate latitude and longitude can be found without complicated calculations and the course planned accordingly.

Compass Not Essential

A watch and a few charts are all that are required in a simplified method suggested by Dr. Charles H. Smiley, director of Ladd Observatory, Brown University. Although a compass and sextant would be welcome additions, even they are not essential. The sun is used by day to determine the boat's latitude and longitude with the aid of the watch and no angles need be measured or approximated. At night the stars point out the direction in which the course must be steered.

A person's latitude may be determined by timing the interval between sunrise and sunset. On any particular date, the length of the day varies for different latitudes, and simple tables give the information necessary to find the latitude of a place when the time between sunrise and sunset is known. In this manner the latitude of the lifeboat can be determined to within 30 miles if the watch does not gain or lose more than a minute each day—and many inexpensive watches are that good!

Local noon can be found by noting when the sun is highest in the sky, at which time shadows cast by the sun are shortest. Comparison of the time of local noon with Greenwich time would give a fairly accurate value for longitude. Nautical timepieces, such as the chronometer of a ship, are always set on Greenwich time. In other cases the difference between the time shown on the watch and Greenwich time is known. For instance, Eastern War Time, used along the Atlantic coast, is exactly four hours behind Greenwich civil time.

Once the person in distress knows where he is in that wide expanse of water, it is important to determine in which direction he should try to go. Ports in all parts of the world can be shown on a simple water-proof chart, so the lifeboat navigator now has only to select the one which he wishes to reach. His decision is obviously influenced by distance, prevailing winds and weather.

He steers for it by selecting a certain star and observing its direction each night four minutes earlier than on the preceding night. As he travels toward the star, he approaches its substellar point on the earth located close to the port he wishes to find. Again no compass is required for the watch is depended upon for the exact time to observe the star's direction, although a compass would be invaluable in holding the ship's chosen course during the day.

If our shipwrecked friends thought it wise to head for Recife, Brazil, from somewhere in the Atlantic Ocean, they would be fortunate if they knew that a particular star, Rigel (the brightest star in the constellation of Orion) would be directly overhead at Recife at 8:36

ADRIFT—Survivors of a torpedoed ship, set adrift on the broad Atlantic, need to know where they are and which way they are going.

p.m. Eastern War Time, on that particular night. The course to be followed could then be determined by directing the boat toward this star. Exactly 23 hours, 56 minutes later, Rigel would again be over Recife, and the course could be checked and determined for the following day. The path traveled would be a good approximation of a great circle, the shortest possible path to the destination.

All mathematical computations have been done in completing the information which Dr. Smiley includes in his chart of stars to be used in finding ports in the Atlantic and Pacific. Use of these charts is relatively simple for the uninitiated navigator.

Waterproof Leaflet

A leaflet printed on waterproof paper has recently been prepared for use by the Engineer Amphibian Command of the U. S. Army on emergency navigation by Dr. Bart J. Bok of the Harvard Astronomical Laboratory. This brief guide with tables is designed to assist the person whose navigational instruments have been damaged beyond repair and whose charts, almanacs and tables were swept out to sea. It is for use by those with some background in celestial navigation, but would be of great aid to anyone who suddenly finds himself forced to select a course.

An ingenious shadow marker is recommended to determine the sun's altitude. Even a beginner should be able to use this instrument designed by Sanford Cluett of Troy, New York, who incidentally invented the Sanforizing process for pre-shrinking fabrics. A pin is stuck in the center of a nine-inch graduated circle mounted on cardboard or plywood. This is suspended or weighted down so that the 90-degree division on the circle follows a plumb line. The sun's altitude can then be found by noting the position of the shadow of the pin on the graduated scale.

A table of the sun's declination is given in Dr. Bok's pamphlet so that when corrections have been made, the sailor can tell within 10 nautical miles how far he is north or south of the earth's equator.

In northern latitudes, measurement of the altitude of Polaris, the North Star, gives a good approximation for the latitude. For a more accurate value, a slight correction as listed in the pamphlet must be made since Polaris is one degree away from the true north celestial pole.

Apparent local noon may be found by observing the sun shortly before and after noon. If the survivor notes on his watch the exact instant when the afternoon altitude of the sun equals the forenoon value, the time of local apparent noon will be half-way between the two. In this method the altitude in degrees, minutes and seconds does not have to be calculated. The time when the apparent sun was on the meridian differs from civil time (the time shown by a watch) by a small amount known as the equation of time. This ranges from zero to almost seventeen minutes. When allowances have been made for this variation, the position is determined quite accurately.

Working with a committee of the Coast Guard, Dr. Bok has just completed an enlarged and simplified version of the pamphlet on navigation in emergencies. Here the use of the pesky equation of time has been eliminated.

If the survivors are not fortunate enough to have a watch, longitude cannot be determined by celestial observations and must be guessed at. If a map is available, the position of a friendly island can be found and a rough north-south course steered until the desired parallel of latitude is reached. Then the navigator should turn west or east depending on the approximate direction of the island, and stay as nearly as possible on the parallel of latitude of the island until land is sighted. Dr. Bok warns that sailors should not attempt to steer directly for the island as when there is uncertainty about the longitude, they may miss the island and become hopelessly lost.

Charts for Airplane Pilots

Pilot charts for years have been considered as essential lifeboat equipment, but ones designed by the U. S. Hydrographic Office are just being furnished airplane pilots. If the shipwrecked person has some idea of where he is, these waterproof charts show how to take advantage of wind and current in reaching port.

The four charts, when wrapped in oil cloth, make a package measuring 9 by 4½ inches and 1¼ inches thick, which weighs about 1⅛ pounds. They show the north and south Atlantic, and north and south Pacific oceans. On one side of these 26 by 34 inch charts is given the region in winter (the January chart is used for this) and on the reverse, in summer (July chart). Arrows show the direction of the current and wind-roses every five degrees give the relative frequency, force and direction of the wind.

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ENGINEERING

Multiple Parachute Launcher For Delivery of Supplies

➤ QUICKER and more efficient delivery of ammunition and supplies by parachute is provided by an invention of Capt. Harry Wilson, Air Force officer now located at Wright Field. His device is covered by patent No. 2,326,813, rights in which are assigned to the government, without payment of royalties.

Instead of heaving parachute-borne supply packs out one by one, in Capt. Wilson's system they are all shoved out the paratroopers' jumping door together. The parachute on the tail-end pack is jerked out by its static cord. As this parachute opens and the pack's rate of drop is checked, the next pack's static cord, attached to the first pack's lower end, is jerked in turn; and so on for each of the packs in the series. This saves time in launching the collection of all the equipment, and also insures that they will hit the ground closer together.

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