S

saddle, *n.* A low part of the sea floor resembling in shape a saddle, in a ridge or between contiguous seamounts.

safety lanes. Specified sea lanes designated for use by submarines and surface ships in transit to prevent attack by friendly forces. They may be called SUBMARINE SAFETY LANES when designated for use by submarines in transit.

safe water mark. See under IALA MARITIME BUOYAGE SYSTEM.

SafetyNET. The INMARSAT broadcast service for MARITIME SAFETY INFORMATION (MSI).

sailing, *n.* A method of solving the various problems involving course, distance, difference of latitude, difference of longitude, and departure. The various methods are collectively spoken of as the sailings. Plane sailing considers the earth as a plane. Traverse sailing applies the principles of plane sailing to determine the equivalent course and distance made good by a craft following a track consisting of a series of rhumb lines. Any of the sailings which considers the spherical or spheroidal shape of the earth is called spherical sailing. Middle-latitude sailing is a method of converting departure into difference of longitude, or vice versa, by assuming that such a course is steered at the middle or mean latitude; if the course is 090° or 270° true, it is called parallel sailing. Mercator sailing applies when the various elements are considered in their relation on a Mercator chart. Meridian sailing is used when the course is 000° or 180° true. Rhumb-line sailing is used when a rhumb line is involved; great-circle sailing when a great circle track is involved. Composite sailing is a modification of great circle sailing used when it is desired to limit the highest latitude. The expression current sailing is occasionally used to refer to the process of allowing for current in determining the predicted course made good, or of determining the effect of a current on the direction of motion of a vessel.

sailing chart. See under CHART CLASSIFICATION BY SCALE.

sailing directions. 1. A descriptive book for the use of mariners, containing detailed information of coastal waters, harbor facilities, etc. of an area. For waters of the United States and its possessions, they are published by the National Ocean Survey and are called UNITED STATES COAST PILOTS. Sailing directions, as well as light lists, provide the information that cannot be shown graphically on the nautical chart and that is not readily available elsewhere. See also UNITED STATES COAST PILOT.

St. Elmo's fire. A luminous discharge of electricity from pointed objects such as the masts and arms of ships, lightning rods, steeples, etc. occurring when there is a considerable atmospheric difference in potential. Also called CORPOSANT, CORONA DISCHARGE.

St. Hilaire method. Establishing a line position from observation of the altitude of a celestial body by using an assumed position, the difference between the observed and computed altitudes, and the azimuth. The method was devised by Marcq St. Hilaire, a French naval officer, in 1874. See also SUMNER METHOD, LONGITUDE METHOD, HIGH ALTITUDE METHOD. Also see ALTITUDE INTERCEPT METHOD.

sallying ship. Producing rolling motion of a ship by having the crew run in unison from to side. This is usually done to help float a ship which is aground or to assist it to make way when it is beset by ice.

salt marsh. A flat coastal area flooded by most high tides, characterized by various species of marsh grasses and animal life.

salt-water wedge. The intrusion of a tidal estuary by sea water in the form of a wedge underneath the less dense fresh water.

same name. A name the same as that possessed by something else, as declination has the same name as latitude if both are north or both south. They are of CONTRARY NAME if one is north and the other south.

sand, *n.* Sediment consisting of small but distinguishable separate grains between 0.0625 and 2.0 millimeters in diameter. It is called very fine sand if the grains are between 0.0625 and 0.125 millimeter in diameter, fine sand between 0.125 and 0.25 millimeter, medium sand if between 0.25 and 0.50 millimeters, coarse sand if between 0.50 and 1.0 millimeters, and very coarse sand if between 1.0 and 2.0 millimeters. See also MUD, STONES, ROCK definition 2.

sand dune. See DUNE.

sandstorm, *n.* A strong wind carrying sand through the air, the diameter of most of the particles ranging from 0.08 to 1.0 millimeter. In contrast to a DUST STORM, the sand particles are mostly confined to the lowest 10 feet, and rarely rise more than 50 feet above the ground.

sandwave, *n.* A large wavelike sea-floor sediment feature in very shallow water and composed of sand. The wavelength may reach 100 meters, the amplitude is about 0.5 meter. Also called MEGARIPPLE.

Santa Ana. A strong, dust-laden foehn occurring in Southern California near the mouth of the Santa Ana pass and river.

Sargasso Sea. The west central region of the subtropical gyre of the North Atlantic Ocean. It is bounded by the North Atlantic, Canary, Atlantic North Equatorial, and Antilles Currents, and the Gulf Stream. It is characterized by the absence of well-marked currents and by large quantities of drifting Sargassum, or gulfweed.

sargasso weed. See SARGASSUM.

sargassum, *n.* A genus of brown algae characterized by a bushy form, a substantial holdfast when attached, and a yellowish brown, greenish yellow, or orange color. Species of the group have a large variety of forms and are widely distributed in warm seas as attached and free floating plants. Two species (S. *fluitans* and *S. matans)* make up 99 percent of the macroscopic vegetation in the Sargasso Sea. Also called SARGASSO WEED, GULFWEED.

Saros, *n.* A period of 223 synodic months corresponding approximately to 19 eclipse years or 18.03 Julian years, and is a cycle in which solar and lunar eclipses repeat themselves under approximately the same conditions.

sastrugi, *(sing. sastruga), n., pl.* Sharp, irregular ridges formed on a snow surface by wind erosion and deposition. On mobile floating ice, the ridges are parallel to the direction of the prevailing wind at the time they were formed.

satellite, *n.* 1. A body, natural or manmade, that orbits about another body, the primary body. The moon is a satellite of the earth, the primary body. 2. As defined by the International Telecommunication Union (ITU), a body which revolves around another body of preponderant mass and which has a motion primarily and permanently determined by the force of attraction of that other body. See also ACTIVE SATELLITE, EARTH SATELLITE, EQUATORIAL SATELLITE, GEODETIC SATELLITE, NAVIGATION SATELLITE, PASSIVE SATELLITE, POLAR SATELLITE, SNYCHRONOUS SATELLITE, TWENTY-FOUR HOUR SATELLITE.

satellite geodesy. The discipline which employs observations of an earth satellite to extract geodetic information.

satellite triangulation. The determination of the angular relationships between two or more stations by the simultaneous observation of an earth satellite from these stations.

satellite triangulation stations. Triangulation stations whose angular positions relative to one another are determined by the simultaneous observations of an earth satellite from two or more of them.

saturable system. A term used to describe a navigation system whose use is limited to a single user or a limited number of users on a time-shared basis.

saturation, *n.* Complete impregnation under given conditions, such as the condition that exists in the atmosphere when no additional water vapor can added at the prevailing temperature without condensation or supersaturation occurring.

Saturn, *n.* The navigational planet whose orbit lies outside that of Jupiter.

santanna, *n.* A plain with low vegetation, especially in the sub-tropical latitudes.

S-band. A radio-frequency band of 1,550 to 5,200 megahertz. See also FREQUENCY, FREQUENCY BAND.

scalar, *adj.* Having magnitude only.

scalar, *n.* Any physical quantity whose field can be described by a single numerical value at each point in space. A scalar quantity is distinguished from a VECTOR quantity by the fact that scalar quantity possesses only magnitude, where as, a vector quantity possesses both magnitude and direction.

scale, *n.* 1. A series of marks or graduations at definite intervals. A linear scale is a scale graduated at uniform intervals; a logarithmic scale is graduated in the logarithms of uniformly-spaced consecutive numbers. 2. The ratio between the linear dimensions of chart, map drawing, etc. and the actual dimensions. See also CONVERSION SCALE, BAR SCALE, REPRESENTATIVE FRACTION, SMALL SCALE, LARGE SCALE.

scale error. See CALIBRATION ERROR.

scan, *v., t.* In the use of radar, to search or investigate an area or space by varying the direction of the radar antenna and thus the beam. Normally scanning is done by continuous rotation of the antenna.

scanner, *n.* 1. A unit of a radar set consisting of the antenna and drive assembly for rotating the antenna. 2. A computerized electronic device which digitizes printed images.

scarf cloud. A thin cirrus-like cloud sometimes observed above a developing cumulus. See also CAP CLOUD.

scarp, *n.* See ESCARPMENT.

scatter reflections. Reflections from portions of the ionosphere having different virtual height which mutually interfere and cause rapid fading.

Schuler frequency. The natural frequency of simple pendulum with a length equal to the earth's radius. The corresponding period is 84 minutes.

Schuler loop. The portion of the inertial navigator in which the instrumental local vertical is established.

Schuler tuned. The condition wherein gyroscopic devices should be insensitive to applied accelerations. M. Schuler determined that if gyroscopic devices were not to be affected by the motions of the craft in which installed, the devices should have a natural period of oscillation of about 84.4 minutes. This period is equal to the product of 2π and the square root of the quotient: radius of the earth divided by the acceleration of gravity.

scintillation, *n.* Twinkling; emission of sparks or quick flashes; shimmer.

scope, *n.* Short for RADARSCOPE.

scoria *(pl. scoriae), n.* Volcanic rock fragments usually of basic composition, characterized by marked vesicularity, dark color, high density and a partly crystalline structure. Scoria is a constituent of certain marine sediments.

scouring basin. A basin containing impounded water which is released at about low water in order to maintain the desired depth in the entrance channel by scouring the bottom. Also called SLUICING POND.

screen, *n.* The chemically coated inside surface of the large end of a cathode-ray tube which becomes luminous when struck by an electron beam.

scud, *n.* Shreds or small detached masses of cloud moving rapidly before the wind, often below a layer of lighter clouds. See also FRACTO.

scud, *v., i.* To run before a storm.

sea, *n.* 1. A body of salt water more or less confined by continuous land or chains of islands and forming a distinct region. 2. A body of water nearly or completely surrounded by land, especially if very large or composed of salt water. Sometimes called INLAND SEA. See also LAKE. 3. Ocean areas in general, including major indentations in the coast line, such as gulfs. See also CLOSED SEA, OPEN SEA, HIGH SEA. 4. Waves generated or sustained by winds within their fetch as opposed to SWELL. 5. The character of a water surface, particularly the height, length (period), and direction of travel of waves generated locally. A smooth sea has waves no higher than ripples or small wavelets. A short sea has short, irregular, and broken waves. A confused sea has a highly disturbed surface without a single, well-defined direction of travel, as when waves from different directions meet following a sudden shift in the direction of the wind. A cross sea is a series of waves imposed across the prevailing waves. A sea may be designated as head, beam, quartering, or following. See also SWELL definition 1.

Sea Area. A defined area under the Global Maritime Distress and Safety System (GMDSS) which regulates certain safety and communication equipment necessary according to the area of the ship's operations. Sea Area A-1 is within coverage of VHF coast radio stations (25-30 miles) providing digital selective calling. Sea Area A-2 is within range of the medium frequency coast radio stations (to approximately 300 miles). Sea Area A-3 is within the footprint of the geostationary INMARSAT communications satellites, covering the rest of the open seas except the poles. Sea Area A-4 covers the rest of the earth, chiefly the polar areas. The areas do not overlap.

sea-air temperature difference correction. A correction due to a difference in the temperature of the sea and air, particularly the sextant altitude correction caused by abnormal terrestrial refraction occurring when there is a nonstandard density lapse rate in the atmosphere due to a difference in the temperature of the water and air at the surface.

sea anchor. An object towed by a vessel, usually a small one, to keep the vessel end-on to a heavy sea or surf or to reduce the drift. Also called DRAG, DROGUE.

seabeach, *n.* See under BEACH.

seaboard, *n.* The region of land bordering the sea. The terms SEABOARD, COAST, and LITTORAL have nearly the same meanings. SEABOARD is a general term used somewhat loosely to indicate a rather extensive region bordering the sea. COAST is the region of indefinite width that extends from the sea inland to the first major change in terrain features. LITTORAL applies more specifically to the various parts of a region bordering the sea, including the coast, foreshore, backshore, beach, etc.

sea breeze. A breeze blowing from the sea to adjacent land. It usually blows by day, when the land is warmer than the sea, and alternates with a LAND BREEZE, which blows in the opposite direction by night. See also ONSHORE WIND.

sea buoy. The outermost buoy marking the entrance to a channel or harbor.

seachannel, *n.* On the sea floor, a continuously sloping, elongated depression commonly found in fans or plains and usually bordered by levees on one or two sides.

sea clutter. See SEA RETURN.

seacoast, *n.* See COAST.

sea fog. A type of advection fog formed when air that has been lying over a warm water surface is transported over colder water, resulting in cooling of the lower layer of air below its dew point. See also HAAR.

sea gate. 1. A gate which serves to protect a harbor tidal basin from the sea, such as one of a pair of supplementary gates at the entrance to a tidal basin exposed to the sea. 2. A movable gate which protects the main deck of a ferry from waves and sea spray.

seagirt, *adj.* Surrounded by sea. Also called SEA BOUND.

sea ice. Any form of ice found at sea which has originated from the freezing of sea water.

sea-ice nomenclature. See WMO SEA-ICE NOMENCLATURE.

sea kindliness. A measure of the ease of motion of a vessel in heavy seas, particularly in regard to rolling, pitching, and shipping water. It is not to be confused with seaworthiness which implies that the vessel is able to sustain heavy rolling, pitching, etc., without structural damage or impaired stability.

sea level. Height of the surface of the sea at any time.

sea manners. Understood by seamen to mean consideration for the other vessel and the exercise of good judgment under certain condition when vessels meet.

seamark, *n.* See MARK, *n.*, definition 1.

sea mile. An approximate mean value of the nautical mile equal to 6,080 feet; the length of a minute of arc along the meridian at latitude 48°.

sea mist. See STEAM FOG.

seamount, *n.* On the sea floor, an elevation rising generally more than 1,000 meters and of limited extent across the summit.

sea quadrant. See BACKSTAFF.

search and rescue chart. A chart designed primarily for directing and conducting search and rescue operations.

search and rescue radar transponder (SART). An electronic device which transmits a homing signal on the radar frequency used by rescue ships and aircraft.

sea reach. The reach of a channel entering a harbor from seaward.

sea return. Clutter on the radarscope which is the result of the radar signal being reflected from the sea, especially near the ship. Also called SEA CLUTTER. See also CLUTTER.

sea room. Space in which to maneuver without danger of grounding or colliding.

seashore, *n.* A loose term referring to the general area in close proximity to the sea.

season, *n*. 1. One of the four principal divisions of the year: spring, summer, autumn, and winter. 2. An indefinite part of the year, such as the rainy season.

seasonal current. An ocean current which changes in speed or direction due to seasonal winds.

sea-temperature difference correction. A correction due to a difference in the temperature of the sea and air, particularly the sextant altitude correction caused by abnormal terrestrial refraction occurring when there is a nonstandard density lapse rate in the atmosphere due to a difference in the temperature of the water and air at the surface.

seaward, *adj*. In a direction away from the land; toward the sea.

seaward, *adv*. Away from the land; toward the sea.

seaward boundary. Limits of any area or zone offshore from the mean low, or mean lower low water line and established by an act of the U.S. Congress.

seaway, *n*. 1. A moderately rough sea. Used chiefly in the expression in a seaway. 2. The sea as a route of travel from one place to another; a shipping lane.

secant, *n*. 1. The ratio of the hypotenuse of a plane right triangle to the side adjacent to one of the acute angles of the triangle, equal to 1/cos. The expression NATURAL SECANT is sometimes used to distinguish the secant from its logarithm (called LOGARITHMIC SECANT). 2. A line that intersects another, especially a straight line intersecting a curve at two or more points.

secant conic chart. See CONIC CHART WITH TWO STANDARD PARALLELS.

secant conic map projection. See CONIC MAP PROJECTION WITH TWO STANDARD PARALLELS.

second, *n*. 1. The base unit of time in the International System of Units (SI). In 1967 the second was defined by the Thirteenth General Conference on Weights and Measures as the duration of 9,192,631,770 periods of the radiation corresponding to the transition between two hyperfine levels of the ground state of the cesium-133 atom. This value was established to agree as closely as possible with the ephemeris second. Also called ATOMIC SECOND. See also ATOMIC TIME. 2. A sixtieth part of a minute in either time or arc.

secondary, *n*. A small low pressure area accompanying a large or primary one. The secondary often grows at the expense of the primary, eventually replacing it.

secondary circle. See SECONDARY GREAT CIRCLE.

secondary control tide station. A tide station at which continuous observations have been made over a minimum period of 1 year but less than a 19-year Metonic cycle. The series is reduced by comparison with simultaneous observations from a primary control tide station. This station provides for a 365-day harmonic analysis including the seasonal fluctuation of sea level. See also PRIMARY CONTROL TIDE STATION; SUBORDINATE TIDE STATION, definition 1; TERTIARY TIDE STATION; TIDE STATION.

secondary great circle. A great circle perpendicular to a primary great circle, as a meridian. Also called SECONDARY CIRCLE.

secondary light. A major light, other than a primary seacoast light, established at harbor entrances and other locations where high intensity and reliability are required. See also MINOR LIGHT.

secondary phase factor correction. A correction for additional time (or phase delay) for transmission of a low frequency signal over an all seawater path when the signal transit time is based on the free-space velocity. The Loran C lattices as tabulated in tables or overprinted on the nautical chart normally include compensation for secondary phase factor. See also ADDITIONAL SECONDARY PHASE FACTOR CORRECTION.

secondary radar. 1. Radar in which the target is fitted with a transponder and in which the target retransmits automatically on the interrogating frequency, or a different frequency. The response may be coded. See also PRIMARY RADAR, RACON, RAMARK. 2. As defined by the International Telecommunication Union (ITU), a radiodetermination system based on the comparison of reference signals with radio signals re-transmitted from the position to be determined.

secondary radiation. See RERADIATION, definition 2.

secondary station. In a radionavigation system, the station of a chain whose emissions are made with reference to the emissions of a master station without being triggered by the emissions of such station, as in Loran C. See also SLAVE STATION.

secondary tide station. See as SECONDARY CONTROL TIDE STATION.

second reduction. See PHASE REDUCTION.

second-trace echo. A radar echo received from a target after the following pulse has been transmitted. Second-trace echoes are unusual except under abnormal atmospheric conditions, or conditions under which super-refraction is present, and are received from targets at actual ranges greater than the radar range scale setting. They may be recognized through changes in their position on the radarscope on changing the pulse repetition rate; their hazy, streaky or distorted shape; and their erratic movements on plotting. Also called MULTIPLE-TRACE ECHO.

second-year ice. Old ice which has survived only one summer's melt. Because it is thicker and less dense than first-year ice, it stands higher out of the water. In contrast to multi-year ice, summer melting produces a regular pattern of numerous small puddles. Bare patches and puddles are usually greenish-blue.

sector, *n*. 1. Part of a circle bounded by two radii and an arc. See also RED SECTOR. 2. Something resembling the sector of a circle, as a warm sector between the warm and cold fronts of a cyclone.

sector display. A radar display in which a high persistence screen is excited only when the radar beam is within a narrow sector which can be selected at will.

sector light. A light having sectors of different colors or the same color in specific sectors separated by dark sectors.

sector scanning. In the use of radar, the process of scanning within a sector as opposed to scanning around the horizon.

secular, *adj*. Of or pertaining to a long period of time.

secular aberration. See under ABERRATION, definition 1.

secular error. That error in the reading of an instrument due to secular change within the materials of the instrument.

secular perturbations. Perturbations of the orbit of a planet or satellite that continue to act in one direction without limit, in contrast to periodic perturbations which change direction in a regular manner.

secular terms. In the mathematical expression of the orbit of a satellite, terms which are proportional to time, resulting in secular perturbations. See also PERIODIC TERMS.

secular trend. See APPARENT SECULAR TREND.

seiche, *n*. A stationary wave usually caused by strong winds and/or changes in barometric pressure. It is usually found in lakes and semi-enclosed bodies of water. It may also be found in areas of the open ocean. See also STANDING WAVE.

Seismic sea wave. See as TSUNAMI.

selective fading. 1. Fading of the skywave in which the carrier and various sideband frequencies fade at different rates, causing audio-frequency distortion. 2. Fading that affects the different frequencies within a specified band unequally. 3. Fading in which the variation in the received signal strength is not the same for all frequencies in the frequency band of the received signal. See also FADING.

selectivity, *n*. 1. The characteristic of a radio receiver which enables it to differentiate between the desired signal and those of other frequencies. 2. The ability of a receiver to reject transmissions other than the one to which tuned. 3. The degree to which a radio receiver can accept the signals of one station while rejecting those of stations on adjacent channels. See also SENSITIVITY.

selenographic, *adj*. Of or pertaining to the physical geography of the moon.

semaphore, *n*. A device using visual signals, usually bodies of defined shapes or positions or both, by which information can be transmitted.

semi-. A prefix meaning half.

semicircle, *n*. Half of a circle. See also DANGEROUS SEMICIRCLE, LESS DANGEROUS SEMICIRCLE, NAVIGABLE SEMICIRCLE.

semicircular deviation. Deviation which changes sign (E or W) approximately each 180° change of heading.

semidiameter, *n*. 1. Half the angle at the observer subtended by the visible disk of a celestial body. Sextant altitudes of the sun and moon should be corrected for semidiameter unless the center is observed. 2. The radius of a circle or sphere.

semidiameter correction. A correction due to semidiameter, particularly that sextant altitude correction, when applied to the observation of the upper or lower limb of a celestial body, determines the altitude of the center of that body.

semidiurnal, *adj*. Having a period or cycle of approximately one-half of a day. The predominating type of tide throughout the world is semidiurnal, with two high waters and two low waters each tidal day. The

tidal current is said to be semidiurnal when there are two flood and two ebb periods each tidal day. A semidiurnal constituent has two maxima and minima each constituent day. See also TYPE OF TIDE.

semidiurnal current. Tidal current in which tidal day current cycle consists of two flood currents and two ebb currents, separated by slack water; or two changes in direction, 360° of a rotary current. This is the most common type of tidal current throughout the world.

semidiurnal tide. See under TYPE OF TIDE, SEMIDIURNAL, *adj*.

semilogarithmic coordinate paper. Paper ruled with two sets of mutually-perpendicular parallel lines, one set being spaced according to the logarithms of consecutive numbers, and the other set uniformly spaced.

semimajor axis. One-half of the longest diameter of an ellipse.

semiminor axis. One-half of the shortest diameter of an ellipse.

semi-reflecting mirror. See DICHROIC MIRROR.

sense, *n*. The solution of the 180° ambiguity present in some radio direction finding systems.

sense antenna. An antenna used to resolve a 180° ambiguity in a directional antenna.

sense finding. The process of eliminating 180° ambiguity from the bearing indication some types of radio direction finder.

sensibility, *n*. The ability of a magnetic compass card to align itself with the magnetic meridian after deflection.

sensible horizon. The circle of the celestial sphere formed by the intersection of the celestial sphere and a plane through any point, such as the eye of an observer, and perpendicular to the zenith-nadir line. See also HORIZON.

sensitive axis. 1. The axis Of an accelerometer along which specific acceleration is measured. 2. See also INPUT AXIS.

sensitivity, *n*. The minimum input signal required to produce a specified output signal from a radio or similar device, having a specific signal-to-noise ratio. See also SELECTIVITY.

sensitivity time control. An electronic circuit designed to reduce automatically the sensitivity of the radar receiver to nearby targets. Also called SWEPT GAIN, ANTI-CLUTTER GAIN CONTROL, ANTI-CLUTTER SEA.

separation line. A line separating the traffic lanes in which ships are proceeding in opposite or nearly opposite directions, or separating a traffic lane from the adjacent inshore traffic zone. See also ROUTING SYSTEM, SEPARATION ZONE.

separation zone. A defined zone which separates traffic lanes in which ships are proceeding in opposite directions, or which separates traffic lanes from the adjacent inshore traffic zone. See also ROUTING SYSTEM, SEPARATION LINE.

September equinox. See AUTUMNAL EQUINOX.

sequenced radiobeacon. One of a group of marine radiobeacons in the same geographical area, except those operating continuously, that transmit on a single frequency. Each radiobeacon transmits for 1 minute of each period in sequence with other beacons of the group. If less than six radiobeacons are assigned to a group, one or more of the beacons may transmit during two 1-minute periods.

sequence of current. The order of occurrence of the four tidal current strengths of a day, with special reference as to whether the greater flood immediately precedes or follows the greater ebb.

sequence of tide. The order in which the four tides of a day occur, with special reference as to whether the higher high water immediately precedes or follows the lower low water.

service area. The area within which a navigational aid is of use. This may be divided into primary and secondary service areas having different degrees of accuracy.

service area diagram. See RELIABILITY DIAGRAM.

service period. The number of days that an automatic light or buoy is expected to operate without requiring recharging.

set, *n*. The direction towards which a current flows.

set, *v*., *i*. Of a celestial body, to cross the visible horizon while descending. The opposite is RISE.

set, *v*., *t*. To establish, as to set a course.

set screw. A screw for locking a movable part of an instrument or device.

setting a buoy. The act of placing a buoy on station in the water.

settled, *adj*. Pertaining to weather, devoid of storms for a considerable period. See also UNSETTLED.

seven-eighths rule. A rule of thumb which states that the approximate distance to an object broad on the beam equals 7/8 of the distance traveled by a craft while the relative bearing (right or left) changes from 30° or 60° or from 120° to 150°, neglecting current and wind.

seven seas. Figuratively, all the waters or oceans of the world. Applied generally to the seven oceans - Arctic, Antarctic, North Atlantic, South Atlantic, North Pacific, South Pacific, and Indian.

seven-tenths rule. A rule of thumb which states that the approximate distance to an object broad on the beam equals 7/10 of the distance traveled by a craft while the relative bearing (right or left) changes from 22.5° to 45° or from 135° to 157.5°, neglecting current and wind.

seven-thirds rule. A rule of thumb which states that the approximate distance to an object broad on the beam equals 7/3 of the distance traveled by a craft while the relative bearing (right or left) changes from 22.5° to 26.5°, 67.5° to 90°, 90° to 112.5°, or 153.5° to 157.5°, neglecting current and wind.

sexagesimal system. A system of notation by increments of 60°, such as the division of the circle into 360°, each degree into 60 minutes, and each minute into 60 seconds.

sextant, *n*. A double-reflecting instrument for measuring angles, primarily altitudes of celestial bodies. As originally used, the term applied only to instruments having an arc of 60°, a sixth of a circle, from which the instrument derived its name. Such an instrument had a range of 120°. In modern practice the term applies to a similar instrument, regardless of its range, very few modern instruments being sextants in the original sense. Thus, an octant, having a range of 90°; a quintant, having a range of 144°; and a quadrant, having a range of 180°, may be called sextants. A marine sextant is designed primarily for marine navigation. See also MARINE SEXTANT.

sextant adjustment. The process of checking the accuracy of a sextant and removing or reducing its error.

sextant altitude. Altitude as indicated by a sextant or similar instrument, before corrections are applied. See also OBSERVED ALTITUDE, APPARENT ALTITUDE.

sextant altitude correction. Any of several corrections applied to a sextant altitude in the process of converting it to observed altitude. See also ACCELERATION CORRECTION, AIR TEMPERATURE CORRECTION, AUGMENTATION CORRECTION, BAROMETRIC PRESSURE CORRECTION, CORIOLIS CORRECTION, DEFLECTION OF THE VERTICAL CORRECTION, DIP CORRECTION, HEIGHT OF EYE CORRECTION, INDEX CORRECTION, INSTRUMENT CORRECTION, IRRADIATION CORRECTION, PARALLAX CORRECTION, PERSONAL CORRECTION, REFRACTION CORRECTION, SEA-AIR TEMPERATURE DIFFERENCE CORRECTION, SEMI-DIAMETER CORRECTION, TIDE CORRECTION, TILT CORRECTION, WAVE HEIGHT CORRECTION.

sextant chart. See CIRCLE SHEET.

sextant error. The error in reading a sextant, due either to lack of proper adjustment or imperfection of manufacture. See CALIBRATION ERROR, CENTERING ERROR, COLLIMATION ERROR, ERROR OF PERPENDICULARITY, GRADUATION ERROR, INDEX ERROR, INSTRUMENT ERROR, PRISMATIC ERROR, SHADE ERROR, SIDE ERROR, VERNIER ERROR.

shade, *n*. See SHADE GLASS.

shaded relief. A cartographic technique that provides an apparent three-dimensional configuration of the terrain on maps and charts by the use of graded shadows that would be cast if light were shining from the northwest. Shaded relief is usually used in combination with contours.

shade error. The error of an optical instrument due to refraction in the shade glasses. If this effect is due to lack of parallelism of the faces it is usually called PRISMATIC ERROR.

shade glass. A darkened transparent glass that can be moved into the line of sight of an optical instrument, such as a sextant, to reduce the intensity of light reaching the eye. Also called SHADE.

shadow, *n*. 1. Darkness in a region, caused by an obstruction between the source of light and the region. By extension, the term is applied to similar condition when any form of radiant energy is cut off by an obstruction, as in a radar shadow. The darkest part of a shadow in which light is completely cut off is called the UMBRA; the lighter part surrounding the umbra in which the light is only partly cut off is called the PENUMBRA. 2. A region of diminished rainfall on the

lee side of a mountain or mountain range, where the rainfall is noticeably less than on the windward side. Usually called RAIN SHADOW.

shadow bands. See CREPUSCULAR RAYS.

shadow bar. A rod or bar used to cast a shadow, such as on the sighting assembly of an astro compass.

shadow pin. A small rod or pin used to cast a shadow on an instrument, such as a magnetic compass or sun compass, to determine the direction of the luminary; a GNOMON.

shadow region. A region shielded from radar signals because of an intervening obstruction or absorbing medium. This region appears as an area void of targets on a radar display such as a plan position indicator. The phenomenon is called RADAR SHADOW. See also SHADOW SECTOR, BLIND SECTOR.

shadow sector. A sector on the radarscope in which the appearance of radar echoes is improbable because of an obstruction near the antenna. While both blind and shadow sectors have the same basic cause, blind sectors generally occur within the larger angles subtended by the obstruction. See also SHADOW REGION.

shallow, *adj*. Having little depth; shoal.

shallow, *n*. An area where the depth of water is relatively slight.

shallow water constituent. A short-period harmonic term introduced into the formula of tidal (or tidal current) constituents to take account of the change in the form of a tide wave resulting from shallow water conditions. Shallow water constituents include the overtides and compound tides.

shallow water wave. A wave is classified as a shallow water wave whenever the ratio of the depth (the vertical distance of the still water level from the bottom) to the wave length (the horizontal distance between crests) is less than 0.04. Tidal waves are shallow water waves.

shamal, *n.* A northwesterly wind blowing over Iraq and the Persian Gulf, in summer, often strong during the day, but decreasing during the night.

sharki, *n*. A southeasterly wind which sometimes blows in the Persian Gulf.

shearing, *n.* An area of pack ice is subject to shear when the ice motion varies significantly in the direction normal to the motion, subjecting the ice to rotational forces. These forces may result in phenomena similar to a FLAW.

sheet line. See NEATLINE.

shelf, *n.* A zone adjacent to a continent, or around an island, that extends from the low water line to a depth at which there is usually a marked increase of slope towards oceanic depths.

shelf valley. A valley on the shelf, generally the shoreward extension of a canyon.

shield, *n*. A metal housing around an electrical or magnetic element to eliminate or reduce the effect of its electric or magnetic field, or to reduce the effect of an exterior field on the element.

shielding factor. The ratio of the strength of the magnetic field at a compass to the strength if there were no disturbing material nearby; usually expressed as a decimal. Because of the metal of a vessel, the strength of the earth's magnetic field is reduced somewhat at a compass location aboard ship. The shielding factor is one minus the percentage of reduction.

shimmer, *v., i.* To appear tremulous or wavering due to varying atmospheric refraction in the line of sight.

shingle, *n.* See under STONES.

ship, *n.* Originally a sailing vessel with three or more masts, square-rigged on all. The term is now generally applied to any large, ocean-going vessel, except submarines which are called boats regardless of size.

ship earth station (SES). An INMARSAT satellite system installed aboard a vessel.

ship error. The error in radio direction finder bearings due to reradiation of radio waves by the metal of the ship.

ship motions. Surge is the bodily motion of a ship forward and backward along the longitudinal axis, caused by the force of the sea acting alternately on the bow and stern; heave is the oscillatory rise and fall due to the entire hull being lifted by the force of the sea; sway is the side-to-side bodily motion, independent of rolling caused by uniform pressure being exerted all along one side of the hull; yaw is the oscillation about a vertical axis approximately through the center of gravity of the vessel; roll is the oscillation about the longitudinal axis; and pitch is oscillation about the transverse axis, due to the bow and stern being raised or lowered on passing through successive crests and troughs of waves.

shipping lane. An established route traversed by ocean shipping.

ship's emergency transmitter. As defined by the International Telecommunication Union (ITU) a ship's transmitter to be used exclusively on a distress frequency for distress, urgency or safety purposes.

ship's head. Heading of a vessel.

ship simulator. A computerized system which uses video projection techniques to simulate navigational and shiphandling situations. A full capability system includes a completely equipped ship's bridge and can duplicate almost any aspect of ship operation; partial systems focus on a particular function, such as radar collision avoidance or nighttime navigation.

Ships' Routing. A publication of the International Maritime Organization (IMO) which describes the general provisions of ships' routing, traffic separation schemes, deep water routes and areas to be avoided, which have been adopted by IMO. All details of routing systems are promulgated through Notices to Mariners and Sailing Directions and are depicted on charts.

ship weather routing. A procedure whereby an optimum route is developed based on the forecasts of weather and seas and the ship's characteristics for a particular transit. Within specified limits of weather and sea conditions, ship weather routing seeks maximum safety and crew comfort, minimum fuel consumption, minimum time underway, or any desired combination of these factors.

shoal, *adj*. Shallow.

shoal, *n*. An offshore hazard to navigation on which there is a depth of 16 fathoms or 30 meters or less, composed of unconsolidated material. See also REEF.

shoal, *v., i.* To become less deep.

shoal, *v., t.* To cause to become less deep.

shoal patches. Individual and scattered elevations of the bottom, with depths of 16 fathoms (or 30 meters) or less, but composed of any material except rock or coral.

shoal water. Shallow water; water over a shoal.

shoot, *v., t.* To observe the altitude of (a celestial body).

shooting star. See METEOR.

shore, *n.* That part of the land in immediate contact with a body of water including the area between high and low water lines. The term SHORE is usually used with reference to the body of water and COAST with reference to the land, as the east coast of the United States is part of the western shore of Atlantic Ocean. The term SHORE usually refers to a narrow strip of land in immediate contact with any body of water, while COAST refers to a general region in proximity to the sea. A shore bordering the sea may be called a SEASHORE. See also FORESHORE, BACKSHORE.

shoreface, *n*. The narrow zone seaward from the low tide shoreline, permanently covered by water, over which the beach sands and gravels actively oscillate with changing wave conditions.

shore lead. A lead between pack ice and the shore or between pack ice and an ice front.

shoreline, *n*. The intersection of the land with the water surface. The shoreline shown on charts represents the line of contact between the land and a selected water elevation.

shore polynya. See under POLYNYA.

short period perturbations. Periodic perturbations in the orbit of a planet or satellite which execute one complete periodic variation in the time of one orbital period or less.

short range systems. Radionavigation systems limited in their positioning capability to coastal regions, or those systems limited to making landfall. See also MEDIUM RANGE SYSTEMS, LONG RANGE SYSTEMS.

short sea. A sea in which the waves are short, irregular, and broken.

short wave. A radio wave shorter than those of the standard broadcast band. See also WAVE, definition 2.

shower, *n.* Precipitation from a convective cloud. Showers are characterized by the suddenness with which they start and stop, by the rapid changes of intensity, and usually by rapid changes in the appearance of the sky. In weather observing practice, showers are always reported in terms of the basic type of precipitation that is falling, i.e., rain showers, snow showers, sleet showers.

shuga, *n*. An accumulation of spongy white ice lumps, a few centimeters across, the lumps are formed from grease ice or slush and sometimes from anchor ice rising to the surface.

side echo. The effect on a radar display by a side lobe of a radar antenna. See also ECHO.

side error. The error in the reading of a sextant due to nonperpendicularity of horizon glass to the frame.

side lights. Running lights placed on the sides of a vessel, green to starboard and red to port, showing an unbroken light over an arc of the horizon from dead ahead to 22.5° abaft the beam.

side lobe. Any lobe of the radiation pattern of a directional antenna other than the main or lobe.

sidereal, *adj*. Of or pertaining to the stars, though SIDEREAL generally refers to the stars and TROPICAL to the vernal equinox, sidereal time and the sidereal day are based upon position of the vernal equinox relative the meridian. The SIDEREAL YEAR is based on the stars.

sidereal day. See under SIDEREAL TIME.

sidereal hour angle. Angular distance west of the vernal equinox; the arc of the celestial equator or the angle at the celestial pole between the hour circle of the vernal equinox and the hour circle of a point on the celestial sphere, measured westward from the hour circle of the equinox through 360°. Angular distance east of the vernal equinox, through 24 hours, is RIGHT ASCENSION.

sidereal month. The average period of revolution of the moon with respect to the stars, a period of 27 days, 7 hours, 43 minutes, 11.5 seconds.

sidereal noon. See under SIDEREAL TIME.

sidereal period. 1. The length of time required for one revolution of a celestial body about a primary, with respect to the stars. 2. The interval between two successive returns of an artificial earth satellite in orbit to the same geocentric right ascension.

sidereal time. Time defined by the daily rotation of the earth with respect to the vernal equinox of the first point of Aries. Sidereal time is numerically measured by the hour angle of the equinox, which represents the position of the equinox in the daily rotation. The period of one rotation of the equinox in hour angle, between two successive upper meridian transits, is a sidereal day. It is divided into 24 sidereal hours, reckoned at upper transit which is known as sidereal noon. The true equinox is at the intersection of the true celestial equator of date with the ecliptic of date; the time measured by its daily rotation is apparent sidereal time. The position of the equinox is affected by the nutation of the axis of rotation of the earth, and the nutation consequently introduces irregular periodic inequities into the apparent sidereal time and the length of the sidereal day. The time measured by the motion of the mean equinox of date, affected only by the secular inequalities due to the precession of the axis, is mean sidereal time. The maximum difference between apparent mean sidereal times is only a little over a second and its greatest daily change is a little more than a hundredth of a second. Because of its variable rate, apparent sidereal time is used by astronomers only as a measure of epoch; it is not used for time interval. Mean sidereal time is deduced from apparent sidereal time by applying the equation of equinoxes.

sidereal year. The period of one apparent rotation of the earth around the sun, with relation to a fixed point, or a distant star devoid of proper motion, being 365 days, 6 hours, 9 days and 9.5 seconds in 1900, and increasing at a rate of rate of 0.0001 second annually. Because of the precession of the equinoxes this is about 20 minutes longer than a tropical year.

sight, *n*. Observation of the altitude, and sometimes also the azimuth, of a celestial body for a line of position; or the data obtained by such observation. An observation of a celestial body made by facing 180° from the azimuth of the body is called a back sight. See also NOON SIGHT, TIME SIGHT.

sighting vane. See VANE, definition 2.

sight reduction. The process of deriving from a sight the information needed for establishing a line of position.

sight reduction tables. Tables for performing sight reduction, particularly those for comparison with the observed altitude of a celestial body to determine the altitude difference for establishing a line of position.

Sight Reduction Tables for Air Navigation. See *PUB. NO. 249.*

Sight Reduction Tables for Marine Navigation. See *PUB. NO. 229*.

signal, *n*. 1. As applied to electronics, any transmitted electrical impulse 2. That which conveys intelligence in any form of communication, such as a time signal or a distress signal.

signal-to-noise ratio. The ratio of the magnitude of the signal to that of the noise, often expressed in decibels.

signature, *n*. The graphic record of the magnetic or acoustic properties of a vessel.

sign conventions. See as GEOGRAPHIC SIGN CONVENTIONS.

significant digits. Those digits of a number which have a significance, zeros at the left and sometimes those at the right being excluded.

sikussak, *n*. Very old ice trapped in fjords. Sikussak resembles glacier ice, since it is formed partly from snow.

sill, *n*. On the sea floor, the low part of a gap or saddle separating basins. See also DOCK SILL.

sill depth. The depth over a sill.

silt, *n*. See under MUD.

similar decimals. Decimals having the same number of decimal places, as 3.141 and 0.789. Decimals can be made similar by adding the appropriate number of zeros. For example, 0.789 can be made similar to 3.1416 by stating it as 0.7890. See also REPEATING DECIMAL, SIGNIFICANT DIGITS.

simple conic chart. A chart on a simple conic projection.

simple conic map projection. A conic map projection in which the surface of a sphere or spheroid, such as the earth, is conceived as developed on a tangent cone, which is then spread out to form a plane.

simple harmonic motion. The projection of uniform circular motion on a diameter of the circle of such motion. The combination of two or more simple harmonic motions results in COMPOUND HARMONIC MOTION.

simultaneous altitudes. Altitudes of two or more celestial bodies observed at the same time.

simultaneous observations (of a satellite). Observations of a satellite that are made from two or more distinct points or tracking stations at exactly the same time.

sine, *n*. The ratio of the side opposite an angle of a plane right triangle to the hypotenuse. The expression NATURAL SINE is used to distinguish the sine from its logarithm (called LOGARITHMIC SINE).

sine curve. Characteristic simple wave pattern; a curve which represents the plotted values of sines of angles, with the sine as the ordinate and the angle as the abscissa. The curve starts at 0 amplitude at the origin, increases to a maximum at 90°, decreases to 0 at 180°, increases negatively to a maximum negative amplitude at 270°, and returns to 0 at 360°, to repeat the cycle. Also called SINUSOID.

sine wave. A simple wave in the form of curve.

single astronomic station datum orientation. Orientation of a geodetic datum by accepting the astronomically determined coordinates of the origin and the azimuth to one other station without any correction.

single-axis normal distribution. A one-time normal distribution along an axis perpendicular to a line of position. Two single-axis normal distributions may be used to establish the error ellipse and the corresponding circle of equivalent probability when the error distribution is two-dimensional or bivariate.

single-degree-of-freedom gyro. A gyroscope, the spin axis of which is free to rotate about one of the orthogonal axes, the spin axis not being counted. See also DEGREE-FREEDOM, RATE GYRO.

single-flashing light. See under FLASHING LIGHT.

single interpolation. Interpolation with only one argument or variable.

single-occulting light. See under OCCULTING LIGHT.

single-sideband transmission. A method of transmission in which the frequencies produced by the process of modulation on one side of the carrier are transmitted and those on the other side are suppressed. The carrier frequency may either be transmitted or suppressed. With this method, less power is required for the effective signal at the receiver, a narrower frequency band can be used, and the signal is less subject to manmade interference or selective fading.

single station range light. A directional light bound by other sectors of different characteristic which define its margins with small angular uncertainty. Most commonly the bounding sectors are of different colors (red and green).

sinking, *n*. An apparent lowering of distant terrestrial objects by abnormal atmospheric refraction. Because of sinking, objects normally visible near the horizon sometimes disappear below the horizon. The opposite is LOOMING.

sinusoid, *n*. See SINE CURVE.

sinusoidal, *adj*. Of or pertaining to a sine wave or sinusoid.

siren, *n*. A sound signal emitter using the periodic escape of compressed air through a rotary shutter.

sirocco, *n*. A warm wind of the Mediterranean area, either a foehn or a hot southerly wind in advance of a low pressure area moving from the Sahara or Arabian deserts. Called LEVECHE in Spain.

skeleton tower. A tower, usually of steel and often used for navigation aids, constructed of open legs with various horizontal and diagonal bracing members.

skip distance. The least distance from a transmitting antenna at which a skywave can normally be received at a given frequency.

skip zone. The area between the outer limit of reception of groundwaves and the inner limit of reception of skywaves, where no signal is received.

sky diagram. A diagram of the heavens, indicating the apparent position of various celestial bodies with reference to the horizon system of coordinates.

skylight, *n*. Thin places in the ice canopy, usually less than 1 meter thick and appearing from below as relatively light, translucent patches in dark surroundings. The under-surface of a skylight is normally flat, but may have ice keels below. Skylights are called large if big enough for a submarine to attempt to surface through them, or small if not.

sky map. The pattern on the underside of extensive cloud areas, created by the varying amounts of light reflected from the earth's surface. Snow surfaces produce a white glare (SNOW BLINK) and ice surfaces produce a yellowish-white glare (ICE BLINK). Bare land reflects relatively little light (LAND SKY) and open water even less (WATER SKY).

skywave, *n*. A radio wave that is propagated by way of the ionosphere. Also called IONOSPHERIC WAVE.

skywave correction. The correction to be applied to the time difference reading of signals received via the ionosphere to convert it to the equivalent groundwave reading. The correction for a particular place is established on the basis of an average height of the ionosphere.

skywave error. See IONOSPHERIC ERROR.

skywave transmission delay. The amount by which the time of transit from transmitter to receiver of a pulse carried by skywaves reflected once from the E-layer exceeds the time of transit of the same pulse carried by groundwaves.

slack water. The state of a tidal current when its speed is near zero, especially the moment when a reversing current changes direction and its speed is zero. The term is also applied to the entire period of low speed near the time of turning of the current when it is too weak to be of any practical importance in navigation. The relation of the time of slack water to the tidal phases varies in different localities. For standing tidal waves, slack water occurs near the times of high and low water, while for progressive tidal waves, slack water occurs midway between high and low water.

slant range. The line-of-sight distance between two points not at the same elevation.

slave, *n*. Short for SLAVE STATION.

slaved gyro magnetic compass. A directional gyro compass with an input from a flux valve to keep the gyro oriented to magnetic north.

slave station. In a radionavigation system, the station of a chain whose emissions are made with reference to the emissions of a master station, its emissions being triggered by the emissions of the master station. See also SECONDARY STATION.

sleet, *n*. See under ICE PELLETS; colloquially some parts of the United States, precipitation the form of a mixture of rain and snow.

slewing, *n*. In ice navigation, the act of forcing a ship through ice by pushing apart adjoining ice floes.

slick, *n*. A smooth area of water, such as one caused by the sweep of a vessel's stern during a turn, or by a film of oil on the water.

slime, *n*. Soft, fine, oozy mud or other substance of similar consistency.

slip, *n*. 1. A berthing space between two piers. Also called DOCK. 2. The difference between the distance a propeller would travel longitudinally in one revolution if operating in a solid and the distance it travels through a fluid.

slope, *n*. On the sea floor, the slope seaward from the shelf edge to the beginning of a continental or insular rise or the point where there is a general reduction in slope.

slot radiator. A slot in the wall of a slotted wave guide antenna which acts as a radiating element.

slotted guide antenna. See SLOTTED WAVE GUIDE ANTENNA.

slotted wave guide antenna. An antenna consisting of a metallic waveguide in the walls of which are cut one or more slot radiators.

slough (sloo), *n*. A minor marshland or tidal waterway which usually connects other tidal areas; often more or less equivalent to a bayou occasionally applied to the sea level portion of a creek on the U.S. West Coast.

slow-sweep racon. See under SWEPT-FREQUENCY RACON.

slue, *n*. A slough or swamp.

sluice, *n*. A floodgate. sluicing pond. See SCOURING BASIN.

slush, *n*. Snow which is saturated and mixed with water on land or ice surfaces, or which is viscous floating mass in water after a heavy snow fall.

small area plotting sheet. For a relatively small area, a good approximation of a Mercator position plotting sheet, constructed by the navigator by either of two methods based upon graphical solution of the secant of the latitude which approximates the expansion. A partially completed small area plotting sheet printed in advance for later rapid completion according to requirements is called UNIVERSAL PLOTTING SHEET.

small circle. The intersection of a sphere and plane which does not pass through its center.

small diurnal range. The difference in height between mean lower high water and mean higher low water. Applicable only when the type of tide is either semidiurnal or mixed. See also TROPIC RANGES.

small floe. See under FLOE.

small fracture. See under FRACTURE.

small hail. See under ICE PELLETS.

small iceberg. For reports to the International Ice Patrol, an iceberg that extends 4 to 50 feet (1 to 15 meters) above the sea surface and which has a length of 20 to 200 feet (6 to 60 meters). See also MEDIUM ICEBERG, LARGE ICEBERG.

small ice cake. A flat piece of ice less than 2 meters across.

small ice field. See under ICE FIELD.

small scale. A scale involving a relatively large reduction in size. A small-scale chart usually covers a large area. The opposite is LARGE SCALE, which covers a small area. See also REPRESENTATIVE FRACTlON.

small-scale chart. See under CHART. See also SMALL SCALE.

small tropic range. The difference in height between tropic lower high water and tropic higher low water. Applicable only when the type of tide is either semidiurnal or mixed. See also MEAN TROPIC RANGE, GREAT TROPIC RANGE.

smell the bottom. See FEEL THE BOTTOM.

smog, *n*. Originally a natural fog contaminated by industrial pollutants, or a mixture of smoke and fog. Today, smog is a common term applied to visible air pollution with or without fog.

smoke, *n*. Small particles of carbon and other solid matter, resulting from incomplete combustion, suspended in the air. When it settles, it is called SOOT.

smokes, *n., pl*. Dense white haze and dust clouds common in the dry season on the Guinea coast of Africa, particularly at the approach of the harmattan.

smooth sea. Sea with waves no higher than ripples or small wavelets.

snow, *n*. 1. Frozen precipitation consisting of translucent or white ice crystals which fall either separately or in loose clusters called snowflakes. Very fine, simple crystals, or minute branched, star-like snowflakes are called snow grains. Snow pellets are white, opaque, roundish grains which are crisp and easily compressible, and may rebound or burst when striking a hard surface. Snow is called brown, red, or yellow when it is colored by the presence of brown dust, red dust or algae, or pine or cypress pollen, respectively. See also BLOWING SNOW, DRIFTING SNOW. 2. The speckled background on the plan position indicator or video display due to electrical noise.

snow barchan. See under SNOWDRIFT.

snow blink. A white glare on the underside of extensive cloud areas, created by light reflected from snow-covered surfaces. Snow blink is brighter than the yellowish-white glare of ICE BLINK. Clouds above bare land or open water have no glare. See also LAND SKY, WATER SKY, SKY MAP.

snowdrift, *n.* An accumulation of wind-blown snow deposited in the lee of obstructions or heaped by wind eddies. A crescent-shaped snowdrift, with ends pointing downwind, is called a SNOW BARCHAN.

snowflake, *n.* A loose cluster if ice crystals, or rarely, a single crystal.

snow flurry. A popular term for SNOW SHOWER, particularly of a very light and brief nature.

snow grains. Frozen precipitation consisting of very fine, single crystals, or of minute, branched star-like snowflakes. Snow grains are the solid equivalent of drizzle. Also called GRANULAR SNOW.

snow pellets. Frozen precipitation consisting of small, white, opaque, roundish grains of snowlike structure which are crisp and easily compressible, and may rebound or burst when striking a hard surface. Also called SOFT HAIL, GRAUPEL. See also SMALL HAIL.

snow storm. See under STORM, definition 2.

soft hail. See SNOW PELLETS.

soft iron. Iron or steel which is easily magnetized by induction, but loses its magnetism when the magnetic field is removed. The opposite is HARD IRON.

solar, *adj*. Of or pertaining to the sun.

solar day. 1. The duration of one rotation of the earth on its axis, with respect to the sun. This may be either a mean solar day, or an apparent solar day, as the reference is the mean or apparent sun, respectively. 2. The duration of one apparent rotation of the sun.

solar eclipse. An eclipse of the sun. When the moon passes between the sun and the earth, the sun appears eclipsed to an observer in the moon's shadow. A solar eclipse is partial if the sun is partly obscured; total if the entire surface is obscured, or annular if a thin ring of the sun's surface appears around the obscuring body.

solar flare. A bright eruption from the sun's chromosphere. Solar flares may appear within minutes and fade within an hour.

solar noon. Twelve o'clock solar time, or the instant the sun is over the upper branch of the reference meridian. Solar noon may be classified as mean if the mean sun is the reference, or as apparent if the apparent sun is the reference. It may be further classified according to the reference meridian, either the local or Greenwich meridian or additionally in the case of mean noon, a designated zone meridian. Standard, daylight saving or summer noon are variations of zone noon. Local apparent noon may also be called high noon.

solar-radiation pressure. A cause of perturbations of high flying artificial satellites of large diameter. The greater part is directly from the sun, a minor part is from the earth, which is usually divided into direct (reflected) and indirect terrestrial (radiated) radiation pressures.

solar system. The sun and other celestial bodies within its gravitational influence, including planets, planetoids, satellites, comets, and meteors.

solar tide. 1. The part of the tide that is due to the tide-producing force of the sun. See also LUNAR TIDE. 2. The observed tide in areas where the solar tide is dominant. This condition provides for phase repetition at about the same time each solar day.

solar time. Time based upon the rotation of the earth relative to the sun. Solar time may be classified as mean if the mean sun is the reference; or as apparent if the apparent sun is the reference. The difference between mean and apparent time is called EQUATION OF TIME. Solar time may be further classified according to the reference meridian, either the local or Greenwich meridian or additionally in the case of mean time, a designated zone meridian. Standard and daylight saving or summer time are variations of zone time. Time may also be designated according to the timepiece, as chronometer time or watch time, the time indicated by these instruments.

solar year. See TROPICAL YEAR.

solid color buoy. A buoy which is painted only one color above the water line.

solitary wave. A wave of translation consisting of a single crest rising above the undisturbed water level, without any accompanying trough, in contrast with a WAVE TRAIN. The rate of advance of a solitary wave depends upon the depth of water.

solstice, *n.* 1. One of the two points of the ecliptic farthest from the celestial equator; one of the two points on the celestial sphere occupied by the sun at maximum declination. That in the Northern Hemisphere is called the summer solstice and that in the Southern Hemisphere the winter solstice. Also called SOLSTITIAL POINT. 2. That instant at which the sun reaches one of the solstices about June 21 (summer solstice) or December 22 (winter solstice).

solstitial colure. The great circle of the celestial sphere through the celestial poles and the solstices.

solstitial point. One of the two points on the ecliptic at the greatest distance from the celestial equator. Also called SOLSTICE.

solstitial tides. Tides occurring near the times of the solstices. The tropic range may be expected to be especially large at these times.

Somali Current. See EAST AFRICA COASTAL CURRENT.

sonar, *n.* A system which determines distance and/or direction of an underwater object by measuring the interval of time between transmission of an underwater sonic or ultrasonic signal and the return of its echo. The name sonar is derived from the words sound navigation and ranging. See also ECHO RANGING.

sonic, *adj*. Of, or pertaining to, the speed of sound.

sonic depth finder. A direct-reading instrument which determines the depth of water by measuring the time interval between the emission of a sound and the return of its echo from the bottom. A similar instrument utilizing signals above audible range is called an ULTRASONIC DEPTH FINDER. Both instruments are also called ECHO SOUNDERS.

sonic frequency. See AUDIO FREQUENCY.

sonic navigation. Navigation by means of sound waves whether or not they are within the audible range. Also called ACOUSTIC NAVIGATION.

sonne, *n.* A German forerunner of the CONSOL navigation system.

sonobuoy, *n.* A buoy with equipment for automatically transmitting a radio signal when triggered by an underwater sound signal.

sound, *n.* 1. A relatively long arm of the sea or ocean forming a channel between an island and a mainland or connecting two larger bodies of water, as a sea and the ocean, or two parts of the same body but usually wider and more extensive than a strait. The term has been applied to many features which do not fit the accepted definition. Many are very large bodies of water such as Mississippi Sound and Prince William Sound, others are mere salt water ponds or small passages between islands. 2. A vibratory disturbance in air or some other elastic medium, capable of being heard by the human ear, and generally of a frequency between about 20 and 20,000 cycles per second.

sound, *v., i.* To measure the depth of the water.

sound, *v., t.* For a whale or other large sea mammal to dive for an extended period of time.

sound buoy. A buoy equipped with a gong, bell, whistle, or horn.

sounding, *n.* Measured or charted depth of water, or the measurement of such depth. A minimum sounding chosen for a vessel of specific draft in a given area to indicate the limit of safe navigation is called a danger sounding. See also ECHO SOUNDING, LINE OF SOUNDINGS.

sounding datum. Short for CHART SOUNDING DATUM.

sounding lead. See under LEAD.

sounding machine. An instrument for measuring depth of water, consisting essentially of a reel of wire to one end of which is attached a weight which carries a device for recording the depth. A crank or motor is provided for reeling in the wire.

sounding sextant. See HYDROGRAPHIC SEXTANT.

sound signal. A sound transmitted in order to convey information.

sound signal station. An attended station whose function is to operate a sound signal.

sound wave. An audio-frequency wave in any material medium, in which vibration is in the direction of travel, resulting in alternate compression and rarefaction of the medium, or, by extension, a similar wave outside the audible range.

south, *n.* The direction 180° from north. See also CARDINAL POINT.

South Atlantic Current. An eastward flowing current of the South Atlantic Ocean that is continuous with the northern edge of the WEST WIND DRIFT. It appears to originate mainly from the Brazil Current and partly from the northernmost flow of the West Wind Drift west of longitude 40°W. The current is under the influence of the prevailing westerly trade winds; the constancy and speed increase from the northern boundary to about latitude 40°S, where the current converges with the West Wind Drift. The mean speed varies from about 0.5 to 0.7 knot.

southbound node. See DESCENDING NODE.

Southeast Drift Current. See AZORES CURRENT.

southeaster, sou'easter, *n.* A southeasterly wind, particularly a strong wind or gale.

south equatorial current. See ATLANTIC SOUTH EQUATORIAL CURRENT, PACIFIC SOUTH EQUATORIAL CURRENT, INDIAN SOUTH EQUATORIAL CURRENT.

south frigid zone. That part of the earth south of the Antarctic Circle.

south geographical pole. The geographical pole in the Southern Hemisphere, at lat. 90°S.

south geomagnetic pole. The geomagnetic pole in the Southern Hemisphere. This term should not be confused with SOUTH MAGNETIC POLE. See also GEOMAGNETIC POLE.

South Indian Current. An eastward flowing current of the Indian Ocean that is continuous with the northern edge of the WEST WIND DRIFT.

southing, *n*. The distance a craft makes good to the south. The opposite is NORTHING.

south magnetic pole. The magnetic pole in the Southern Hemisphere. This term should not be confused with SOUTH GEOMAGNETIC POLE. See also GEOMAGNETIC POLE.

South Pacific Current. An eastward flowing current of the South Pacific Ocean that is continuous with the northern edge of the WEST WIND DRIFT.

south polar circle. See ANTARCTIC CIRCLE.

South Pole. 1. The south geographical pole. See also MAGNETIC POLE, GEOMAGNETIC POLE. 2. The south-seeking end of a magnet. See also BLUE MAGNETISM.

south temperate zone. The part of the earth between the Tropic of Capricorn and the Antarctic Circle.

southwester, sou'wester, *n*. A southwest wind, particularly a strong wind or gale.

southwest monsoon. See under MONSOON.

space coordinates. A three-dimensional system of Cartesian coordinates by which a point is located by three magnitudes indicating distance from three planes which intersect at a point.

spacecraft, *n*. Devices, manned and unmanned which are designed to be placed into an orbit about the earth or into a trajectory to another celestial body.

space motion. Motion of a celestial body through space. The component perpendicular to the line of sight is called proper motion and that component in the direction of the line of sight is called radial motion.

space-polar coordinates. A system of coordinates by which a point on the surface of a sphere is located in space by (1) its distance from a fixed point at the center, called the POLE; (2) the COLATITUDE or angle between the POLAR AXIS (a reference line through the pole) and the RADIUS VECTOR (a straight line connecting the pole and the point); and (3) the LONGITUDE or angle between a reference plane through the polar axis and a plane through the radius vector and polar axis. See also POLAR COORDINATES, SPHERICAL COORDINATES.

space wave. See DIRECT WAVE, definition 2.

spar buoy. A buoy in the shape of a spar, or tapered pole, floating nearly vertically. See also SPINDLE BUOY.

special mark. See under IALA MARITIME BUOYAGE SYSTEM.

Special Notice To Mariners. These notices contain important information of interest to all mariners such as cautions on the use of foreign charts; warning on use of floating aids; use of the Automated Mutual-Assistance Vessel Rescue (AMVER) system; rules, regulations, and proclamations issued by foreign governments; oil pollution regulations, etc. *Special Notice to Mariners* is published annually in *Notice to Mariners No. 1* by the Defense Mapping Agency Hydrographic/Topographic Center.

special purpose buoy. A buoy used to indicate a special meaning to the mariner and having no lateral significance, such as one used to mark a quarantine or anchorage area.

Special Warnings. Messages originated by the U.S. government which promulgate official warning of dangers to navigation, generally involving political situations. They remain active until canceled, and are published in *Notice to Mariners No. 1* issued by DMAHTC.

species of constituent. A classification depending upon the period of a constituent. The principal species are semidiurnal, diurnal, and long period.

species sanctuary. A sanctuary established for the conservation of marine life. See also MARINE SANCTUARY.

specific humidity. See HUMIDITY.

spectral, *adj*. Of or pertaining to a spectrum.

spectroscope, *n*. An optical instrument for forming spectra, very useful in studying the characteristics of celestial bodies.

spectrum *(pl. spectra)*, *n*. 1. A series of images formed when a beam of radiant energy is separated into its various wavelength components. 2. The entire range of electromagnetic radiation, or any part of it used for a specific purpose, such as the radio spectrum (10 kilohertz to 300 gigahertz).

specular reflection. Reflection without diffusion in accordance with the laws of optical reflection, such as in a mirror. Also called REGULAR REFLECTION, MIRROR REFLECTION.

speculum, *n*. An optical instrument reflector of polished metal or of glass with a film of metal.

speed, *n*. Rate of motion. The terms SPEED and VELOCITY are often used interchangeably but SPEED is a scalar, having magnitude only while VELOCITY is a vector quantity, having both magnitude and direction. Rate of motion in a straight line is called linear speed, while change of direction per unit time is called angular velocity. Subsonic, sonic, and supersonic refer to speeds respectively less than, equal to, greater than the speed of sound in standard air at sea level. Transonic speeds are those in the range in which flow patterns change from subsonic to supersonic, or vice versa.

speed circle. A circle having a radius equal to a given speed and drawn about a specified center. The expression is used chiefly in connection with relative movement problems.

speed-course-latitude error. See SPEED ERROR.

speed error. An error in both pendulous and nonpendulous type gyrocompasses resulting from movement of the gyrocompass in other than an east-west direction. The error is westerly if any component of the ship's course is north, and easterly if south. Its magnitude is proportional to the course, speed, and latitude of the ship. Sometimes called SPEED-COURSE-LATITUDE ERROR.

speed line. A line of position approximately perpendicular to the course line, thus providing a check on the speed of advance. See also COURSE LINE.

speed made good. The speed estimated by dividing the distance between the last fix and an EP by the time between the fix and the EP.

speed of advance. 1. The speed intended to be made good along the track. 2. The average speed in knots which must be maintained during a passage to arrive at a destination at an appointed time.

speed of relative movement. Speed relative to a reference point, usually itself in motion.

speed over ground. The vessel's actual speed, determined by dividing the distance between successive fixes by the time between the fixes.

speed triangle. See under VECTOR DIAGRAM.

spending beach. In a wave basin, the beach on which the entering waves spend themselves, except for the small remainder entering the inner harbor.

sphere, *n*. 1. A curved surface all points of which are equidistant from a fixed point within, called the center. The celestial sphere is an imaginary sphere of infinite radius concentric with the earth, on which all celestial bodies except the earth are imagined to be projected. The celestial sphere as it appears to an observer at the equator, where celestial bodies appear to rise vertically above the horizon, is called a right sphere; at the pole, where bodies appear to move parallel to the horizon, it is called a parallel sphere; between the equator and pole, where bodies appear to rise obliquely to the horizon, it is called an oblique sphere. Half a sphere is called a HEMISPHERE. 2. A body or the space bounded by a spherical surface. For most practical problems of navigation, the earth is considered a sphere, called the terrestrial sphere.

spherical, *adj*. Of or pertaining to a sphere.

spherical aberration. See under ABERRATION, definition 2.

spherical angle. The angle between two intersecting great circles.

spherical buoy. A buoy of which the upper part of the body (above the waterline), or the larger part of the superstructure, is spherical.

spherical coordinates. A system of coordinates defining a point on a sphere or spheroid by its angular distances from a primary great circle and from a reference secondary great circle, as latitude and longitude. See also CELESTIAL COORDINATES, POLAR COORDINATES.

spherical excess. The amount by which the sum of the three angles of a spherical triangle exceeds 180°.

spherical harmonics. Trigonometric terms of an infinite series used to approximate a two- or three-dimensional function of locations on or above the earth.

spherical sailing. Any of the sailings which solve the problems of course, distance, difference of latitude, difference of longitude, and departure by considering the spherical or spheroidal shape of the earth.

spherical triangle. A closed figure having arcs of three great circles as sides.

spherical wave. A wave with a spherical wave front.

spheroid, *n*. An ellipsoid; a figure resembling a sphere. Also called ELLIPSOID or ELLIPSOID OF REVOLUTION, from the fact that it can be formed by revolving an ellipse about one of its axes. If the shorter axis is used as the axis of revolution, an oblate spheroid results, and if the longer axis is used, a prolate spheroid results. The earth is approximately an oblate spheroid.

spheroidal excess. The amount by which the sum of the three angles on the surface of a spheroid exceeds 180°.

spheroid of reference. See REFERENCE ELLIPSOID.

spin axis. The axis of rotation of a gyroscope.

spindle buoy. A buoy having a spindle-like shape floating nearly vertically. See also SPAR BUOY.

spire, *n*. A pointed structure extending above a building, often charted with the symbol of a position circle. The spire is seldom less than two-thirds of the entire height of the structure, and its tines are rarely broken by stages or other features.

spirit compass. A magnetic compass of which the bowl mounting the compass card is filled with a solution of alcohol and water.

spit, *n*. A small tongue of land or a long narrow shoal (usually sand) extending from the shore into a body of water. Generally the tongue of land continues in a long narrow shoal for some distance from the shore.

Spitzbergen Atlantic Current. An ocean current flowing northward and westward from a point south of Spitzbergen, and gradually merging with the EAST GREENLAND CURRENT in the Greenland Sea. The Spitzbergen Atlantic Current is the continuation of the northwestern branch of the NORWAY CURRENT. Also called SPITZBERGEN CURRENT.

Spitzbergen Current. See SPITZBERGEN ATLANTIC CURRENT.

split fix. A fix by horizontal sextant angles obtained by measuring two angles between four charted features, with no common center object observed.

split-second timer. A watch with two sweep second hands which can be started and stopped together with one push button.

spoil area. Area for the purpose of disposing dredged material, usually near dredged channels. Spoil areas are usually a hazard to navigation and navigators should avoid crossing these areas. Spoil areas are shown on nautical charts. See also DISPOSAL AREA, DUMPING GROUND DUMP SITE. Also called SPOIL GROUND.

spoil ground. See SPOIL AREA.

spoil ground buoy. A buoy which marks a spoil ground.

spoil ground mark. A navigation mark indicating an area used for deposition of dredge spoil.

sporadic E-ionization. Ionization that appears at E-layer heights, is more noticeable toward the polar regions, and is caused by particle radiation from the sun. It may occur at any time of day. A sporadic E-layer sometimes breaks away from the normal E-layer and exhibits especially erratic characteristics.

spot elevation. A point on a map or chart where height above a specified datum is noted, usually by a dot and the height value.

spot-size error. The distortion of the radar return on the radarscope caused by the diameter of the electron beam which displays the returns on the scope and the lateral radiation across the scope of part of the glow produced when the electron beam strikes the phosphorescent coating of the cathode-ray tube. See also PULSE-DURATION ERROR.

spring, *n*. The season in the Northern Hemisphere which begins astronomically at the vernal equinox and ends at the summer solstice. In the Southern Hemisphere the limits are the autumnal equinox and the winter solstice.

spring high water. See under SPRING TIDES.

spring low water. See under SPRING TIDES.

spring range. See under SPRING TIDES.

spring tidal currents. Tidal currents of increased speed occurring semimonthly as the result of the moon being new or full. See also SPRING TIDES.

spring tides. Tides of increased range occurring semimonthly as the result of the moon being new or full. The spring range of tide is the average semidiurnal range occurring at the time of spring tides and is most conveniently computed from the harmonic constants. It is larger than the mean range where the type of tide is either semidiurnal or mixed, and is of no practical significance where the type of tide is diurnal. The average height of the high waters of the spring tides is called spring high water or mean high water springs and the average height of the corresponding low waters is called spring low water or mean low water springs. See also SPRING TIDAL CURRENTS.

spur, *n*. A terrestrial or bathymetric feature consisting of a subordinate elevation, ridge, or rise projecting outward from a larger feature.

spurious disk. The round image of perceptible diameter of a star as seen through a telescope, due to diffraction of light in the telescope.

spurious emission. Emission on a frequency or frequencies which are outside the necessary band, the level of which may be reduced without affecting the corresponding transmission of information. Spurious emissions include harmonic emissions, parasitic emissions and intermodulation products, but exclude emissions in the immediate vicinity of the necessary band, which are a result of the modulation process for the transmission of information.

squall, *n*. A wind of considerable intensity caused by atmospheric instability. It forms and dissipates relatively quickly, and is often accompanied by thunder, lightning, and precipitation, when it may be called a thundersquall. An arched squall is one relatively high in the center, tapering off on both sides. A bull's eye squall is one formed in fair weather, characteristic of the ocean off the coast of South Africa. See also GUST, LINE SQUALL, SQUALL LINE, WHITE SQUALL.

squall cloud. A small eddy cloud sometimes formed below the leading edge of a thunderstorm cloud, between the upward and downward currents.

squall line. A non-frontal line or narrow band of active thunderstorms (with or without squalls); a mature instability line.

squally, *adj*. Having or threatening numerous squalls.

squamish, *n*. A strong and often violent wind occurring in many of the fjords of British Columbia. Squamishes occur in those fjords oriented in a northeast-southwest or east-west direction where cold polar air can be funneled westward. They are notable in Jervis, Toba, and Bute inlets and in Dean Channel and Portland Canal. Squamishes lose their strength when free of the confining fjords and are not noticeable 15 to 20 miles offshore.

square, *n*. 1. A four-sided geometrical figure with all sides equal and all angles 90°; a rectangle or right-angled parallelogram with sides of equal length. 2. The second power of a quantity.

square meter. The derived unit of area in the International System of Units.

squat, *n*. For a vessel underway, the bodily sinkage and change of trim which are caused by the pressure distribution on the hull due to the relative motion of water and hull. The effect begins to increase significantly at depth-to-draft ratios less than 2.5. It increases rapidly with speed and is augmented in narrow channels.

stability, *n*. The state or property of resisting change or of tending to return to original conditions after being disturbed. The opposite is INSTABILITY.

stabilization of radarscope display. Orientation of the radar display to some reference direction. A radarscope display is said to be STABILIZED IN AZIMUTH when the orientation of the display is

fixed to an unchanging reference (usually north). The NORTH UP orientation is an example. A radarscope display is said to be UNSTABILIZED IN AZIMUTH when the orientation of the display changes with changes in own ship's heading. The HEAD UP orientation is an example. A radarscope display is said to be DOUBLY STABILIZED or to have DOUBLE STABILIZATION when the basic orientation of the display is fixed to an unchanging reference (usually north) but the radarscope is rotated to keep own ship's heading or heading flasher up on the radarscope.

stabilized in azimuth. See under STABILIZATION OF RADARSCOPE DISPLAY.

stabilized platform. A gimbal-mounted platform, usually containing gyros and accelerometers, the purpose of which is to maintain a desired orientation in inertial space independent of craft motion. Also called STABLE PLATFORM.

stable platform. See STABILIZED PLATFORM.

stack, *n*. A label on a nautical chart which indicates a tall smokestack or chimney. The term is used when the stack is more prominent as a landmark than the accompanying buildings.

stadimeter, *n*. An instrument for determining the distance to an object of known height by measuring the vertical angle subtended by the object. The instrument is graduated directly in distance. See also RANGE FINDER.

stand, *n*. The state of the tide at high or low water when there is no sensible change in the height of the tide. The water level is stationary at high and low water for only an instant, but the change in level near these times is so slow that it is not usually perceptible. In general, the duration of the apparent stand will depend upon the range of tide, being longer for a small range than for a large range, but where there is a tendency for a double tide the stand may last for several hours, even with a large range of tide. It may be called high water stand if it occurs at the time of high water, and low water stand if it occurs at low water. Sometimes called PLATFORM TIDE.

standard, *n*. 1. Something established by custom, agreement, or authority as a basis for comparison. 2. A physical embodiment of a unit. In general it is not independent of physical conditions, and it is a true embodiment of the unit only under specified conditions.

standard acceleration of gravity. The value adopted in the International Service of Weights and Measures for the standard acceleration due to gravity is 980.665 centimeters per second, per second. See also WEIGHT.

standard atmosphere. 1. A unit accepted temporarily for use with the International System of Units; 1 standard atmosphere is equal to 101,325 pascals. 2. A hypothetical vertical distribution of atmospheric temperature, pressure, and density which is taken to be representative of the atmosphere for various purposes.

standard chronometer. See CHRONOMETER.

standard circle sheet. See CIRCLE SHEET.

standard compass. A magnetic compass designated as the standard for a vessel. It is normally located in a favorable position with respect to magnetic influences.

standard deviation. A measure of the dispersion of random errors about the mean value. If a large number of measurements or observations of the same quantity are made, the standard deviation is the square root of the sum of the squares of deviations from the mean value divided by the number of observations less one. The square of the standard deviation is called the VARIANCE. Also called RMS ERROR. See also ROOT MEAN SQUARE ERROR.

standard error. See under STANDARD DEVIATION.

standard meridian. 1. The meridian used for reckoning standard time. Throughout most of the world the standard meridians are those whose longitudes are exactly divisible by 15°. The DAYLIGHT SAVING MERIDIAN is usually 15° east of the standard meridian. 2. A meridian of a map projection, along which the scale is as stated.

standard noon. Twelve o'clock standard time, or the instant the mean sun is over the upper branch of the standard meridian. DAYLIGHT SAVING or SUMMER NOON usually occurs 1 hour later than standard noon.

standard parallel. 1. A parallel of latitude which is used as a control line in the computation of a map projection. 2. A parallel of latitude on a map or chart along which the scale is as stated for that map or chart.

standard propagation. The propagation of radio waves over a smooth spherical earth of uniform electrical characteristics, under conditions of standard refraction in the atmosphere.

standard radio atmosphere. An atmosphere having the standard refractive modulus gradient.

standard radio horizon. The radio horizon corresponding to propagation through the standard radio atmosphere.

standard refraction. The refraction which would occur in a standard atmosphere.

standard refractive modulus gradient. The uniform variation of refractive modulus with height above the earth's surface which is regarded as a standard for comparison. The gradient considered as normal has a value of 0.12M unit per meter. The M unit is the unit in terms of which the refractive modulus is expressed.

standard station. Use of this term is discouraged. See REFERENCE STATION.

standard tactical diameter. A prescribed tactical diameter used by different types of vessels, or by vessels of the same formation in maneuvers.

standard time. The legally established time for a given zone. The United States and its possessions are, by law, divided into eight time zones. The limits of each time zone are defined by the Secretary of Transportation in Part 71, Title 49 of the *Code of Federal Regulations*. The standard time within each zone is the local mean time at the standard meridian that passes approximately through the center of the zone. Since the standard meridians are the same as those used with ZONE TIME, standard time conforms generally with the zone time for a given area. The standard time zone boundary may vary considerably from the zone time limits (71/2° in longitude on each side of the standard meridian) to conform to political or geographic boundaries or both. The standard times used in various countries and places are tabulated in the *Air Almanac* and the *Nautical Almanac* and are displayed on Chart 76, *Standard Time Zone Chart of the World*.

standard type buoy. The general classification of lighted and unlighted buoys in U.S. waters built to modern (1962) specifications.

standby lamp. A lamp brought into service in the event of failure of the lamp in regular service.

standby light. A permanently installed navigation light used in the event of failure of the main light; it is usually of lesser intensity.

standing floe. A separate floe standing vertically or inclined and enclosed by rather smooth ice.

standing wave. See STATIONARY WAVE.

stand on. To proceed on the same course.

standpipe, *n*. A label on a nautical chart which indicates a tall cylindrical structure in a waterworks system.

star, *n*. A large self-luminous celestial body. Stars are generally at such great distances from the earth that they appear to the eye to be fixed in space relative to each other. Comets, meteors, and nebulae may also be self-luminous, but are much smaller. Two stars appearing close together are called a double star, an optical double star if they appear close because they are in nearly the same line of sight but differ greatly in distance from the observer, a physical double star if in nearly the same line of sight and at approximately the same distance from the observer. A system of two stars that revolve about their common center of mass is called a binary star. A group of three or more stars so close together that they appear as a single star is called a multiple star. A group of stars physically close together is called a star cluster. A variable star changes in magnitude. A star which suddenly becomes many times brighter than previously, and then gradually fades, is called a nova. The brightest planet appearing in the western sky during evening twilight is called evening star, and the brightest one appearing in the eastern sky during morning twilight is called morning star. A shooting star or meteor is a solid particle too small to be seen until it enters the earth's atmosphere, when it is heated to incandescence by friction of the air. See also GALAXY, MILKY WAY.

starboard, *n*. The right side of a craft, facing forward. The opposite is PORT.

starboard hand buoy. A buoy which is to be left to the starboard side when approaching from seaward or in the general direction of buoyage, or in the direction established by the appropriate authority.

star chain. A radionavigation transmitting system comprised of a master station about which three (or more) slave (secondary) stations are more or less symmetrically located.

star chart. A representation, on a flat surface, of the celestial sphere or a part of it, showing the positions of the stars and sometimes other features of the celestial sphere.

star cloud. A large number of stars close together, forming a congested part of a galaxy.

star cluster. A group of stars physically close together. See also MULTIPLE STAR.

star finder. A device to facilitate the identification of stars. Sometimes called a STAR IDENTIFIER. See also PLANISPHERE.

Star Finder and Identifier (No. 2102-D). A circular star finder and identifier formerly published by the U.S. Navy Hydrographic Office and later by the U.S. Naval Oceanographic Office. It consists of a white opaque base with an azimuthal equidistant projection of most of the celestial sphere on each side, one side having the north celestial pole at the center and the other side having the south celestial pole at the center, and a series of transparent templates, at 10° intervals of latitude, each template having a family of altitude and azimuth curves.

star globe. A small globe representing the celestial sphere, on which the apparent positions of the stars are indicated. It is usually provided with graduated arcs and a suitable mount for determining the approximate altitude and azimuth of the stars, to serve as a star finder. Star globes are more commonly used by the British than by Americans. Also called CELESTIAL GLOBE.

star identifier. See STAR FINDER.

Star Sight Reduction and Identification Table. See under STAR SIGHT REDUCTION TABLES FOR 42 STARS.

Star Sight Reduction Tables for 42 Stars. A sight reduction table which provides for the reduction of 42 selected stars by the assumed altitude method. Of the 42 stars included in the table, 21 are above the observer's horizon at any time and are so tabulated in each column for integral values of latitude and altitude. This large number of star tabulations is particularly useful when clouds make identification difficult or obscure stars. Since the tabulations are for a given epoch, provision is made for precession and nutation corrections.

star telescope. An accessory of the marine navigational sextant designed primarily for star observations. It has a large object glass to give a greater field of view and increased illumination. It is an erect telescope, i.e., the object viewed is seen erect as opposed to the inverting telescope in which the object viewed is inverted. The latter type telescope requires one less lens than the erect telescope, consequently for the same size object glass, it has greater illumination. The telescope may be used for all observations.

static, *adj*. Having a fixed, nonvarying condition.

static, *n*. 1. Radio wave interference caused by natural electrical disturbances in the atmosphere, or the electromagnetic phenomena capable of causing such interference 2. Noise heard in a radio receiver caused by electrical disturbances in the atmosphere, such as lightning, northern lights, etc.

station, *n*. 1. The authorized location of an aid to navigation. 2. One or more transmitters or receivers, or a combination of transmitters and receivers, including the accessory equipment necessary at one location, for carrying on a radiocommunication service.

stationary front. A front which is stationary or nearly so. A front which is moving at a speed less than about 5 knots is generally considered to be stationary. In synoptic chart analysis, a stationary front is one that has not moved appreciably from its position on the last previous synoptic chart (3 or 6 hours before). Also called QUASI-STATIONARY FRONT.

stationary orbit. An equatorial orbit in which the satellite revolves about the primary at the angular rate at which the primary rotates on its axis. From the primary, the satellite appears to be stationary over a point on the primary's equator. See also GEOSTATIONARY SATELLITE.

stationary wave. A wave that oscillates without progressing. One-half of such a wave may be illustrated by the oscillation of the water in a pan that has been tilted. Near the axis, which is called the node or nodal line, there is no vertical rise and fall of the water. The ends of the wave are called loops and at these places the vertical rise and fall is at a maximum. The current is maximum near the node and minimum at the loops. The period of a stationary wave depends upon the length and depth of the body of water. A stationary wave may be resolved into two progressive waves of equal amplitude and equal speeds moving in opposite directions. Also called STANDING WAVE.

stationary wave theory. An assumption that the basic tidal movement in the open ocean consists of a system of stationary wave oscillations, any progressive wave movement being of secondary importance except as the tide advances into tributary waters. The continental masses divide the sea into irregular basins, which, although not completely enclosed, are capable of sustaining oscillations which are more or less independent. The tide-producing force consists principally of two parts, a semidiurnal force with a period approximating the half-day and a diurnal force with a period of a whole day. Insofar as the free period of oscillation of any part of the ocean, as determined by its dimensions and depth, is in accord with the semidiurnal or diurnal tide producing forces, there will he built up corresponding oscillations of considerable amplitude which will be manifested in the rise and fall of the tide. The diurnal oscillations, superimposed upon the semidiurnal oscillations, cause the inequalities in the heights of the two high and the two low waters of each day. Although the tidal movement as a whole is somewhat complicated by the overlapping of oscillating areas, the theory is consistent with observational data.

station buoy. An unlighted buoy established in the vicinity of a lightship or an important lighted buoy as a reference point in case the lightship or buoy should be dragged off station. Also called WATCH BUOY.

station error. See DEFLECTION OF THE VERTICAL.

statistical error. See RANDOM ERROR.

U.S. Survey mile. A unit of distance equal to 5,280 feet. This mile is generally used on land, and is sometimes called LAND MILE. It is commonly used to express navigational distances by navigators of river and lake vessels, particularly those navigating the Great Lakes.

steady bearing. A bearing line to another vessel or object, which does not change over time. An approaching or closing craft is said to be on a steady bearing if the compass bearing does not change and risk of collision therefore exists. Also called CONSTANT BEARING, DECREASING RANGE (CBDR).

steam fog. Fog formed when water vapor is added to air which is much colder than the source of the vapor. It may be formed when very cold air drifts across relatively warm water. At temperatures below about-20°F, ice particles or droxtals may be formed in the air producing a type of ice fog known as frost smoke. See also ARCTIC SEA SMOKE, FROST SMOKE. Also called ARCTIC SMOKE, SEA MIST, STEAM MIST, WATER SMOKE, ARCTIC SEA SMOKE, FROST SMOKE.

steam mist. See STEAM FOG.

steep-to, *adj*. Precipitous. The term is applied particularly to a shore, bank, or shoal that descends steeply to the sea.

steerage way, *n*. The condition wherein a ship has sufficient way on to respond to rudder movements to maintain a desired course.

steering compass. A compass by which a craft is steered, generally meaning the magnetic compass at the helm. See STEERING REPEATER.

steering repeater. A compass repeater by which a craft is steered. Sometimes loosely called a STEERING COMPASS.

stellar, *adj*. Of or pertaining to stars.

stellar observation. See CELESTIAL OBSERVATION.

stellar parallax. See HELIOCENTRIC PARALLAX.

stem, *v., t*. To make headway against a current.

steradian, *n*. The supplementary unit of solid angle in the International System of Units, which, having its vertex in the center of a sphere, cuts off an area on the surface of the sphere equal to that of a square with sides of length equal to the radius of the sphere.

stereographic, *adj*. Of or pertaining to stereography, the art of representing the forms of solid bodies on a plane.

stereographic chart. A chart on the stereographic map projection.

stereographic map projection. A perspective, conformal, azimuthal map projection in which points on the surface of a sphere or spheroid, such as the earth, are conceived as projected by radial lines from any point on the surface to a plane tangent to the antipode of the point of projection. Circles project as circles except for great circles through the point of tangency, which project as straight lines. The

principal navigational use of the projection is for charts of the polar regions. Also called AZIMUTHAL ORTHOMORPHIC MAP PROJECTION.

sternboard, *n*. Making way through the water in a direction opposite to the heading. Also called STERNWAY, though the term STERNBOARD is sometimes used to refer to the beginning of motion astern and STERNWAY is used as the vessel picks up speed. Motion in the forward direction is called HEADWAY.

stern light. A running light placed on the centerline of a vessel showing a continuous white light from dead astern to 67.5° to either side.

sternway, *n*. Making way through the water in a direction opposite to the heading. Motion in the forward direction is called HEADWAY. See also STERNBOARD.

stilling well. See FLOAT WELL.

still water level. The level that the sea surface would assume in the absence of wind waves not to be confused with MEAN SEA LEVEL or HALF TIDE LEVEL.

stippling, *n*. Graduation of shading by numerous separate dots or marks. Shallow areas on charts, for instance, are sometimes indicated by numerous dots decreasing in density as the depth increases.

stones, *n., pl*. A general term for rock fragments ranging in size from 2 to 256 millimeters. An individual water-rounded stone is called a cobble if between 64 to 256 millimeters (size of clenched fist to size of man's head), a pebble if between 4 and 64 millimeters (size of small pea to size of clenched fist), and gravel if between 2 and 4 millimeters (thickness of standard pencil lead to size of small pea). An aggregate of stones ranging from 16 to 256 millimeters is called shingle. See also MUD; SAND; ROCK, definition 2.

stooping, *n*. Apparent decrease in the vertical dimension of an object near the horizon, due to large inequality of atmospheric refraction in the line of sight to the top and bottom of the object. The opposite is TOWERING.

stop watch. A watch that can be started, stopped, and reset at will, to indicate elapsed time.

storm, *n*. 1. Wind of force 10 (48 to 55 knots or 55 to 63 miles per hour) on the Beaufort wind scale. See also VIOLENT STORM. 2. Any disturbed state of the atmosphere implying severe weather. In synoptic meteorology, a storm is a complete individual disturbance identified on synoptic charts as a complex of pressure, wind, clouds, precipitation, etc., or identified by such means as radar. Thus, storms range in scale from tornadoes and thunderstorms, through tropical cyclones, to widespread extra tropical cyclones. From a local and special interest viewpoint, a storm is a transient occurrence identified by its most destructive or spectacular aspect. Examples are rain storms, wind storms, hail storms, snow storms, etc. Notable special cases are blizzards, ice storms, sandstorms, and dust storms. 3. A term once used by seamen for what is now called VIOLENT STORM on the Beaufort wind scale.

storm center. The area of lowest atmospheric pressure of a cyclone. This is a more general expression than EYE OF THE STORM, which refers only to the center of a well-developed tropical cyclone, in which there is a tendency of the skies to clear.

storm surge. Increase or decrease in sea level by strong winds such as those accompanying a hurricane or other intense storm. Reduced atmospheric pressure often contributes to the decrease in height during hurricanes. It is potentially catastrophic, especially in deltaic regions with onshore winds at the time of high water and extreme wind wave heights. Also called STORM TIDE, STORM WAVE, TIDAL WAVE.

storm tide. See STORM SURGE.

storm track. The horizontal component of the path followed or expected to be followed by a storm CENTER.

storm wave. See STORM SURGE.

straight angle. An angle of 180°.

strait, *n.* A relatively narrow waterway connecting two larger bodies of water.

strand, *n.* See BEACH.

strand, *v., t.* & *i.* To run hard aground. The term STRAND usually refers to a serious grounding, while the term GROUND refers to any grounding, however slight.

stranded ice. Ice which has been floating and has been deposited on the shore by retreating high water.

stranding, *n*. The grounding of a vessel so that it is not easily refloated; a serious grounding.

strapped-down inertial navigation equipment. Inertial navigation equipment in which a stable platform and gimbal system are not utilized. The inertial devices are attached or strapped directly to the carrier. A computer utilizing gyro information resolves accelerations sensed along the carrier axes and refers these accelerations to an inertial frame of reference. Also called GIMBALLESS INERTIAL NAVIGATION EQUIPMENT. See also INERTIAL NAVIGATION.

stratiform, *adj*. Descriptive of clouds of extensive horizontal development, as contrasted to the vertically developed CUMULIFORM types. See also CIRRIFORM.

stratocumulus, *n*. A principal cloud type (cloud genus), predominantly stratiform, in the form of a gray and/or whitish layer or patch, which nearly always has dark parts and is non-fibrous (except for virga). Its elements are tessellated, rounded, roll-shaped, etc.; they may or may not be merged, and usually are arranged in orderly groups, lines or undulations, giving the appearance of a simple (or occasionally a cross-pattern) wave system. These elements are generally flat-topped, smooth and large; observed at an angle of more than 30° above the horizon, the individual stratocumulus element subtends an angle of greater than 5°. Stratocumulus is composed of small water droplets, sometimes accompanied by larger droplets, soft hail, and (rarely) by snowflakes. When the cloud is not very thick, the diffraction phenomena corona and irisation appear. Precipitation rarely occurs with stratocumulus. Stratocumulus frequently forms in clear air. It may also form from the rising of stratus, and by the convective or undulatory transformation of stratus, or nimbostratus, with or without change of height. Since stratocumulus may be transformed directly from or into altocumulus, stratus, and nimbostratus, all transitional stages may be observed. When the base of stratocumulus is rendered diffuse by precipitation, the cloud becomes nimbostratus. See also STRATIFORM, CLOUD CLASSIFICATION.

stratosphere, *n*. The atmospheric shell extending upward from the tropopause to the height where the temperature begins to increase in the 20- to 25-kilometer region.

stratus, *n*. A low cloud (mean upper level below 6,500 ft.) in a uniform layer, resembling fog but not resting on the surface.

stray line. Ungraduated portion of line connected with a current pole used in taking current observations The stray line is usually about 100 feet long and permits the pole to acquire the velocity of the current at some distance from the disturbed waters in the immediate vicinity of the observing vessel before the current velocity is read from the graduated portion of the current line.

stream, *v., t.* To place overboard and tow, as to stream a log or stream a sea anchor.

stream current. A relatively narrow, deep, fast-moving ocean current. The opposite is DRIFT CURRENT.

streamline, *n*. The path followed by a particle of fluid flowing past an obstruction. The term generally excludes the path of a particle in an eddy current.

streamline flow. Fluid motion in which the fluid moves uniformly without eddies or turbulence. If it moves in thin layers, it is called laminar flow. The opposite is TURBULENT FLOW.

stream the log. To throw the log overboard and secure it in place for taking readings.

strength of current. Phase of tidal current in which the speed is a maximum; also the speed at this time.

strength of ebb. See EBB STRENGTH.

strength of ebb interval. See EBB INTERVAL. See also LUNICURRENT INTERVAL.

strength of flood. See FLOOD STRENGTH.

strength of flood interval. See FLOOD INTERVAL. See also LUNICURRENT INTERVAL.

strip, *n*. A long narrow area of pack ice, about 1 kilometer or less in width, usually composed of small fragments detached from the main mass of ice, and run together under the influence of wind, swell, or current.

stripes, *n*. In navigation terminology, stripes are vertically arranged areas of color, such as the red and white stripes on a safe-water buoy. Horizontal areas are called bands.

strong breeze. Wind of force 6 (22 to 27 knots or 25 to 31 miles per hour) on the Beaufort wind scale.

strong fix. A fix determined from horizontal sextant angles between objects so situated as to give very accurate results.

strong gale. Wind of force 9 (41 to 47 knots or 47 to 54 miles per hour) on the Beaufort wind scale See also GALE.

sub-. A prefix meaning under, less, or marginal. The opposite is SUPER-.

Subarctic Current. See ALEUTIAN CURRENT.

subastral point. See SUBSTELLAR POINT.

sublimation, *n*. The transition of a substance directly from the solid state to the vapor state, or vice versa, without passing through the intermediate liquid state. See also CONDENSATION, EVAPORATION, FUSION.

sublunar point. The geographical position of the moon; the point on the earth at which the moon is in the zenith.

submarine bell. See under BELL.

submarine cable. A submarine conductor or fiber-optic conduit for electric current or communications.

submarine havens. Specified sea areas for submarine operations established by the submarine commander in which no friendly ASW attack may be launched. Compare with MOVING HAVENS, which are designed to prevent collisions.

submarine relief. Variations in elevation of the sea bed, or their representation by depth contours, hypsometric tints, or soundings.

submarine safety lanes. See SAFETY LANES.

submarine site. The site of a structure when located below the surface of the water.

submerge, *v., i*. To descend below the surface The opposite is SURFACE. See also DIVE.

submerged, *adj*. & *adv*. 1. Under water. The opposite is UNCOVERED. See also AWASH. 2. Having descended below the surface. The opposite is SURFACED.

submerged breakwater. A breakwater with its top below the still water level. When this structure is struck by a wave, part of the wave energy is reflected seaward. The remaining energy is largely dissipated in a breaker, transmitted shoreward as a multiple crest system, or as a simple wave system.

submerged lands. Lands covered by water at any stage of the tide, as distinguished from tidelands which are attached to the mainland or an island and cover and uncover with the tide. Tidelands presuppose a highwater line as the upper boundary; submerged lands do not.

submerged production well. An oil or gas well that is a seabed installation only, i.e., the installation does not include a permanent production platform. See also WELLHEAD.

submerged rock. A rock covered at the chart sounding datum and considered to be potentially dangerous to navigation. See also BARE ROCK, ROCK AWASH.

submerged screw log. A type of electric log which is actuated by the flow of water past a propeller.

subordinate current station. 1. A current station from which a relatively short series of observations is reduced by comparison with simultaneous observations from a control current station. 2. A station listed in the *Tidal Current Tables* for which predictions are to be obtained by means of differences and ratios applied to the full predictions at a reference station. See also CURRENT STATION, CONTROL CURRENT STATION. REFERENCE STATION.

subordinate tide station. 1. A tide station from which a relatively short series of observations is reduced by comparison with simultaneous observations from a tide station with a relatively long series of observations. 2. A station listed in the *Tide Tables* for which predictions are to be obtained by means of differences and ratios applied to the full predictions at a reference station. See also PRIMARY CONTROL TIDE STATION, REFERENCE STATION, SECONDARY CONTROL TIDE STATION, TERTIARY TIDE STATION.

subpermanent magnetism. The magnetism in the intermediate iron of a ship which tends to change as a result of vibration, aging, or cruising in the same direction for a long period, but does not alter immediately so as to be properly termed induced magnetism. This magnetism is the principal cause of deviation changes of a magnetic compass. At any instant this magnetism is recognized as part of the ship's permanent magnetism, and consequently must be corrected as such by means of permanent magnet correctors. See also MAGNETISM.

sub-refraction, *n*. Less-than-normal refraction, particularly as related to the atmosphere. Greater than normal refraction is called SUPERREFRACTION.

subregion. One of the subdivisions of the earth based on the DMAHTC chart numbering system.

subsatellite point. The point at which a line from the satellite perpendicular to the ellipsoid intersects the surface of the earth.

subsidence, *n*. Decrease in the elevation of land without removal of surface material due to tectonic, seismic, or artificial forces.

subsidiary light. A light placed on or near the support of a main light and having a special use in navigation. See also PASSING LIGHT.

subsolar point. The geographical position of the sun; the point on the earth at which the sun is in the zenith at a specified time.

substellar point. The geographical position of a star; that point on the earth at which the star is in the zenith at a specified time. Also called SUBASTRAL POINT.

substratosphere, *n*. A region of indefinite lower limit just below the stratosphere.

subsurface current. An underwater current which is not present at the surface. See also SURFACE CURRENT, UNDERCURRENT, UNDERTOW.

subtend, *v., t*. To be opposite, as an arc of a circle subtends an angle at the center of the circle, the angle being formed by the radii joining the ends of the arc with the center.

subtrack, *n.* See ORBITAL PATH.

subtropical anticyclones. High pressure belts which prevail on the poleward sides of the trade winds characterized by calms, light breezes, and dryness.

sudden ionospheric disturbances (SID's). Sudden increases in the ionization density in the lower part of the ionosphere caused by very sudden and large increases in X-ray flux emitted from the sun, usually during a solar flare. SlD's also occur during flares called X-ray flares that produce large X-ray flux, but which have no components in the visible light spectrum. The effect, which is restricted to sunlit propagation paths, causes a phase advance in certain radionavigation systems and is known as a SUDDEN PHASE ANOMALY (SPA). The SID effects are related to solar zenith angle, and consequently, occur mostly in lower latitude regions. Usually there is a phase advance over a period of 5 to 10 minutes followed by a recovery over a period of 30 to 60 minutes. See also POLAR CAP DISTURBANCE, MODAL INTERFERENCE.

sudden phase anomaly. See under SUDDEN IONOSPHERIC DISTURBANCES.

Suestado, *n.* A storm with southeast gales, caused by intense cyclonic activity off the coasts of Argentina and Uruguay, which affects the southern part of the coast of Brazil in the winter.

sugarloaf sea. A sea characterized by waves that rise into sugarloaf (conical) shapes, with little wind, resulting from intersecting waves.

sugg, *v., i*. To roll with the action of the sea when aground.

sumatra, *n*. A squall with violent thunder, lightning, and rain, which blows at night in the Malacca Straits, especially during the southwest monsoon. It is intensified by strong mountain breezes.

Summary of Corrections. A cumulative summary of corrections to charts, *Sailing Directions*, and *United States Coast Pilots* previously published in *Notice to Mariners*, published by the Defense Mapping Agency Hydrographic/Topographic Center.

summer, *n*. In the Northern Hemisphere summer begins astronomically at the summer solstice and ends at the autumnal equinox. In the Southern Hemisphere the limits are the winter solstice and the vernal equinox. The meteorological limits vary with the locality and the year. See also INDIAN SUMMER.

summer noon. Daylight saving noon. The expression applies where summer time is used, particularly in Europe.

summer solstice. l. The point on the ecliptic occupied by the sun at maximum northerly declination. Sometimes called JUNE SOLSTICE, FIRST POINT OF CANCER. 2. That instant at which the sun reaches the point of maximum northerly declination, about June 21.

summer time. A variation of standard time in which the clocks are advanced 1 hour. The variation when the clocks are advanced 2 hours is called double summer time. The expression is used principally in Europe. See also DAYLIGHT SAVING TIME.

Sumner line. A line of position established by the Sumner method or, loosely, any celestial line of position.

Sumner method. The establishing of a line of position from the observation of the altitude of a celestial body by assuming two latitudes (or longitudes) and calculating the longitudes (or latitudes) through which the line of position passes. The line of position is the straight line connecting these two points (extended if necessary). This method, discovered by Thomas H. Sumner, an American sea captain, is seldom used by modern navigators, an adaptation of it, called ST. HILAIRE METHOD, being favored. See also LONGITUDE METHOD, HIGH ALTITUDE METHOD.

Sumner point. See COMPUTED POINT.

sun, *n*. The luminous celestial body at the center of the solar system, around which the planets asteroids, and comets revolve. It is an average star in terms of size and age. The sun visible in the sky is called apparent or true sun. A fictitious sun conceived to move eastward along the celestial equator at a rate that provides a uniform measure of time equal to the average apparent time is called mean sun or astronomical mean sun; a fictitious sun conceived to move eastward along the ecliptic at the average rate of the apparent sun is called dynamical mean sun. When the sun is observable at midnight, in high latitudes, it is called midnight sun.

sun cross. A rare halo phenomenon in which horizontal and vertical shafts of light intersect at the sun. It is probably due to the simultaneous occurrence of a sun pillar and a parhelic circle.

sun dog. See PARHELION.

sun line, *n*. A line of position determined from a sextant observation of the sun.

sun pillar. A glittering shaft of light, white or reddish, extending above and below the sun, most frequently observed at sunrise or sunset. If a parhelic circle is observed at the same time, a SUN CROSS results. See also HALO.

sun relay. See DAYLIGHT CONTROL.

sunrise, *n*. The crossing of the visible horizon by the upper limb of the rising sun.

sunset, *n*. The crossing of the visible horizon by the upper limb of the setting sun.

sunspot, *n*. Dark spots on the sun's surface. These spots are apparently magnetic in character and exert a disturbing influence on radio propagation on the earth.

sun's way. The path of the solar system through space.

sun switch. See DAYLIGHT CONTROL.

super-. A prefix meaning over, more, greater. The opposite is SUB-.

super-buoy. A very large buoy, generally more than 5 meters in diameter, used for navigation, offshore mooring, or data acquisition.

superheterodyne receiver. A receiver in which the incoming radio frequency signals are normally amplified before being fed into a mixer (first detector) for conversion into a fixed, lower carrier (the intermediate frequency). The intermediate frequency signals undergo very high amplification in the intermediate frequency amplifier stages and are then fed into a detector (second detector) for demodulation. The resulting audio or video signals are then usually further amplified before use.

super high frequency. Radio frequency of 3,000 to 30,000 megahertz.

superior conjunction. The conjunction of an inferior planet and the sun when the sun is between the earth and the other planet.

superior planets. The planets with orbits outside that of the Earth: Mars, Jupiter, Saturn Uranus, Neptune, and Pluto. See also PLANET.

superior transit. See UPPER TRANSIT.

super-refraction, *n*. Greater than normal refraction, particularly as related to the atmosphere. Less than normal refraction is called SUB-REFRACTION.

supersaturation, *n*. Beyond the usual point of saturation. As an example, if saturated air is cooled, condensation takes place only if nuclei are present. If they are not present, the air continues to hold more water than required for saturation until the temperature is increased or until a nucleus is introduced.

supersonic, *adj*. Faster than sound. Formerly this term was also applied to a frequency above the audible range, but in this usage it has been replaced by the term ULTRASONIC.

superstructure, *n*. See CAGE.

supplement, *n*. An angle equal to 180° minus a given angle. Two angles which equal 180° supplementary. See also COMPLEMENT, EXPLEMENT.

supplementary angles. Two angles whose sum is 180°.

supplementary units. See under INTERNATIONAL SYSTEM OF UNITS.

surf, *n*. The region of breaking waves near a beach or over a detached reef.

surface, *v., i*. To rise to the surface. The opposite is SUBMERGE.

surface boundary layer. That thin layer of air adjacent to the earth's surface extending up to a level of about 10 to 100 meters. Within this layer the wind distribution is determined largely by the vertical temperature gradient and the nature and contours of the underlying surface; shearing stresses are approximately constant. Also called FRICTION LAYER.

surface chart. Short for SYNOPTIC SURFACE CHART.

surface current. A current which does not extend more than about 3 meters below the surface. See also SUBSURFACE CURRENT, UNDERCURRENT, UNDERTOW.

surfaced, *adj*. & *adv*. Having come to the surface from below the water. The opposite is SUBMERGED. See also AFLOAT, UNCOVERED.

surface duct. A tropospheric radio duct in which the lower boundary is the surface of the earth. Also called GROUND-BASED DUCT.

surface front. See under FRONT.

surface of position. A surface on some point of which a craft is located. See also LINE OPPOSITION, FIX.

surface wave. A radio wave which is propagated along the boundary between two media in a manner determined by the properties of the two media in the vicinity of the boundary.

surf zone. The area between the outermost limit of breakers and the limit of wave uprush.

surge, *n*. 1. The bodily motion of a vessel in a seaway forward and backward along the longitudinal axis, caused by the force of the sea acting alternately on the bow and stern. Also called SURGING. See also SHIP MOTIONS. 2. See as STORM SURGE.

surging, *n*. See SURGE, *n*., definition.

surveillance, *n*. The observation of an area or space for the purpose of determining the position and movements of craft or vehicles in that area or space. Surveillance can be either dependent, independent, or pseudo-independent.

surveillance radar. A primary radar installation at a land station used to display at that station the position of vessels within its range, usually for advisory purposes.

survey, *n*. 1. The act or operation of making measurements for determining the relative positions of points on, above, or beneath the earth's surface. 2. The results of operations as in definition 1. 3. An organization for making surveys. See also GEODETIC SURVEY, HYDROGRAPHIC SURVEY, OCEANOGRAPHIC SURVEY, TOPOGRAPHIC SURVEY.

surveying, *n*. The branch of applied mathematics which teaches the art of determining accurately the area of any part of the earth's surface, the lengths and directions of bounding lines, the contour of the surface, etc., and accurately delineating the whole on a map or chart for a specified datum.

surveying sextant. See HYDROGRAPHIC SEXTANT.

swamp, *n*. An area of spongy land saturated with water. It may have a shallow covering of water, usually with a considerable amount of vegetation appearing above the surface. Sometimes called SLOUGH.

swash, *n*. 1. A narrow channel or sound within a sand bank, or between a sand bank and the shore. 2. A bar over which the sea washes. 3. The rush of water up onto the beach following the breaking of a wave.

sway, *n*. The side-to-side bodily motion of a vessel in a seaway, independent of rolling, caused by uniform pressure being exerted all along one side of the hull. Also called LATERAL DRIFTING, SWAYING. See also SHIP MOTIONS.

swaying, *n.* See SWAY.

sweep, *v., t.* To tow a line or object below the surface, to determine the least depth in an area or to insure that a given area is free from navigational dangers to a certain depth; or the removal of such dangers. See also DRAG, *v., t.*

sweep (of radarscope), *n.* As determined by the time base or range calibration, the radial movement of the stream of electrons impinging on the face of the cathode-ray tube.

sweeping, *n.* 1. The process of towing a line or object below the surface, to determine whether an area is free from isolated submerged dangers to vessels and to determine the position of any dangers that exist, or to determine the least depth of an area. 2. The process of clearing an area or channel of mines or other dangers to navigation.

sweep rate. The number of times a radar radiation pattern rotates during 1 minute of time. Sometimes expressed as the duration of one complete rotation in seconds of time.

swell, *n.* A relatively long wind wave, or series of waves, that has traveled out of the generating area. In contrast the term SEA is applied to the waves while still in the generating area. As these waves travel away from the area in which they are formed, the shorter ones die out. The surviving waves exhibit a more regular and longer period with flatter crests. When these waves reach shoal water, they become more prominent in height and of decreased wave length and are then known as ground swell.

swell direction. The direction from which swell is moving.

swept-frequency racon. An in-band racon which sweeps through the marine radar band (2920-3100 MHz in the 10-centimeter band and 9220-9500 MHz in the 3-centimeter band) in order that it may be triggered at the frequency of the interrogating radar transmitting at a given frequency within the band. Almost all such racons operate in the 3-centimeter band only. There are two types of swept-frequency racons: the slow-sweep racon sweeps through the 180 MHz frequency band in 10s of seconds (1.5 to 3.0 MHz per second); the fast-sweep racon sweeps through the band in microseconds.

swept gain. See SENSITIVITY TIME CONTROL.

swinger, *n.* See REVOLVER.

swinging buoy. A buoy placed at a favorable location to assist a vessel to adjust its compass or swing ship. The bow of the vessel is made fast to one buoy and the vessel is swung by means of lines to a tug or to additional buoys. Also called COMPASS ADJUSTMENT BUOY.

swinging ship. The process of placing a vessel on various headings and comparing magnetic compass readings with the corresponding magnetic directions, to determine deviation. This usually follows compass adjustment or compass compensation, and is done to obtain information for making a deviation table.

swinging the arc. The process of rotating a sextant about the line of sight to the horizon to determine the foot of the vertical circle through a body being observed. Also called ROCKING THE SEXTANT.

swirl error. The additional error in the reading of a magnetic compass during a turn, due to friction in the compass liquid.

symmetrical, *adj*. Being equal or identical on each side of a center line or middle value. The opposite is ASYMMETRICAL.

synchronism, *n.* The relationship between two or more periodic quantities of the same frequency when the phase difference between them is zero or constant at a predetermined value.

synchronization error. In radionavigation, the error due to imperfect timing of two operations.

synchronize, *v., t.* To bring into synchronization.

synchronous, *adj.* Coincident in time, phase, rate, etc.

synchronous lights. Two or more lights the characteristics of which are in synchronism.

synchronous satellite. A satellite whose period of rotation is equal to the period of rotation of the primary about its axis. The orbit of a synchronous satellite must be equatorial if the satellite is to remain fixed over a point on the primary's equator. See also GEOSYNCHRONOUS SATELLITE, GEOSTATIONARY SATELLITE.

synodical month. The average period of revolution of the moon about the earth with respect to the sun, a period of 29 days, 12 hours, 44 minutes, 2.8 seconds. This is sometimes called the MONTH OF THE PHASES, since it extends from new moon to the next new moon. Also called LUNATION.

synodical period. See SYNODIC PERIOD.

synodic period. The interval of time between any planetary configuration of a celestial body, with respect to the sun, and the next successive same configuration of that body, as from inferior conjunction to inferior conjunction. Also called SYNODICAL PERIOD.

synoptic chart. In meteorology, any chart or map on which data and analyses are presented that describe the state of the atmosphere over a large area at a given moment of time. A synoptic surface chart is an analyzed synoptic chart of surface weather observations.

synoptic surface chart. See under SYNOPTIC CHART.

system accuracy. The expected accuracy of a navigation system expressed in d_{rms} units, not including errors which may be introduced by the user, or geodetic or cartographic errors.

systematic error. One of the two categories of errors of observation, measurement and calculation, the other category being random error. Systematic errors are characterized by an orderly trend, and are usually predictable once the cause is known. They are divided into three classes: (1) errors resulting from changing or nonstandard natural physical conditions, sometimes called theoretical errors, (2) personal (nonaccidental) errors, and (3) instrument errors. Also called REGULAR ERROR. See also ERROR.

system electronic navigation chart. The electronic chart data base actually accessed aboard ship for the display of electronic charts. It is developed from the ENC provided by hydrographic authorities, but is specific to the shipboard system. When corrected, it is the equivalent of a paper chart.

syzygy, *n.* 1. A point of the orbit of a planet or satellite at which it is in conjunction or opposition. The term is used chiefly in connection with the moon at its new and full phase. 2. A west wind on the seas between New Guinea and Australia preceding the summer northwest monsoon.