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IALA Maritime Buoyage System. A uniform system of maritime buoyage which is now implemented by most maritime nations. Within the single system there are two buoyage *regions*, designated as Region A and Region B, where lateral marks differ only in the colors of port and starboard hand marks. In Region A, red is to port on entering; in Region B, red is to starboard on entering. The system is a combined cardinal and lateral system, and applies to all fixed and floating marks, other than lighthouses, sector lights, leading lights and marks, lightships and large navigational buoys.

ice, n. Frozen water, the solid form of H₂O.

ice anchor. An anchor designed for securing a vessel to ice.

ice atlas. A publication containing a series of ice charts showing geographic distribution of ice, usually by seasons or months.

iceberg, n. A massive piece of ice greatly varying in shape, showing more than 5 meters above the sea surface, which has broken away from a glacier, and which may be afloat or aground. Icebergs may be described as tabular, dome shaped, pinnacled, drydock, glacier or weathered, blocky, tilted blocky, or drydock icebergs. For reports to the International Ice Patrol they are described with respect to size as small, medium, or large icebergs.

iceberg tongue. A major accumulation of icebergs projecting from the coast, held in place by grounding and joined together by fast ice.

ice-blink. A whitish glare on low clouds above an accumulation of distant ice.

ice-bound, adj. Pertaining to a harbor, inlet, etc. when entry or exit is prevented by ice, except possibly with the assistance of an icebreaker.

ice boundary. The demarcation at any given time between fast ice and pack ice or between areas of pack ice of different concentrations. See also ICE EDGE.

ice breccia. Ice pieces of different age frozen together.

ice bridge, n. 1. Surface river ice of sufficient thickness to impede or prevent navigation. 2. An area of fast ice between the mainland and nearby inhabited islands used in winter as a means of travel.

ice buoy. A sturdy buoy, usually a metal spar, used to replace a more easily damaged buoy during a period when heavy ice is anticipated.

ice cake. Any relatively flat piece of sea ice less than 20 meters across. See also SMALL ICE CAKE.

ice canopy. From the point of view of the submariner, PACK ICE.

ice-cap. A perennial cover of ice and snow over an extensive portion of the earth's surface. The largest ice caps are those in Antarctica and Greenland. Arctic Ocean ice is seasonal and in motion, and is not considered an ice cap.

ice cover. The ratio, expressed in tenths, of the amount of ice to the total area of sea surface in a defined area; this locale may be global, hemispheric, or a specific geographic entity.

ice crystal. Any one of a number of macroscopic crystalline forms in which ice appears.

ice-crystal haze. A type of very light ice fog composed only of ice crystals (no droxtals). It is usually associated with precipitation of ice crystals.

ice crystals. A type of precipitation composed of slowly falling, very small, unbranched crystals of ice which often seem to float in the air. It may fall from a cloud or from a cloudless sky. It is visible only in direct sunlight or in an artificial light beam, and does not appreciably reduce visibility. The latter quality helps to distinguish it from ice fog, which is composed largely of droxtals.

ice edge. The demarcation at any given time between the open sea and sea ice of any kind, whether fast or drifting. See also COMPACTED ICE EDGE, DIFFUSE ICE EDGE, ICE BOUNDARY.

ice field. An area of pack ice consisting of floes of any size, which is greater than 10 kilometers (5.4 nautical miles) across. Ice fields are subdivided according to areal extent. A large ice field is over 11 nautical miles across; a medium ice field is 8 to 11 nautical miles across; a small ice field is 5.4 to 8 nautical miles across.

ice fog. Fog composed of suspended particles of ice, partly ice crystals 20 to 100 microns in diameter but chiefly, especially when dense, droxtals 12 to 20 microns in diameter. It occurs at very low temperatures, and usually in clear, calm weather in high latitudes. The sun is usually visible and may cause halo phenomena. Ice fog is rare at temperatures warmer than -30° C or -20°F. Also called RIME FOG. See also FREEZING FOG.

icefoot, n. A narrow fringe of ice attached to the coast, unmoved by tides and remaining after the fast ice has moved away.

ice-free, adj. Referring to a locale with no sea ice; there may be some ice of land origin present.

ice front. The vertical cliff forming the seaward face of an ice shelf or other floating glacier varying in height from 2 to 50 meters above sea level. See also ICE WALL.

ice island. A large piece of floating ice showing about 5 meters above the sea surface, which has broken away from an ice shelf, having a thickness of 30 to 50 meters and an area of from a few thousand square meters to 150 square nautical miles or more; usually characterized by a regularly undulating surface which gives it a ribbed appearance from the air.

ice jam. An accumulation of broken river ice or sea ice caught in a narrow channel.

ice keel. A downward projecting ridge on the underside of the ICE CANOPY, the counterpart of a RIDGE. An ice keel may extend as much as 50 meters below sea level.

ice limit. The climatological term referring to the extreme minimum or extreme maximum extent of the ice edge in any given month or period based on observations over a number of years. The term should be preceded by minimum or maximum, as appropriate. See also MEAN ICE EDGE.

ice massif. A concentration of sea ice covering an area of hundreds of kilometers, which is found in the same region every summer.

ice needle. A long, thin ice crystal whose cross-section is typically hexagonal. The expression ICE NEEDLE should not be confused with NEEDLE ICE.

ice of land origin. Ice formed on land or in an ice shelf, found floating in water, including ice that is stranded or grounded.

ice patch. An area of pack ice less than 5.4 nautical miles (10 kilometers) across.

ice pellets. A type of precipitation consisting of transparent or translucent pellets of ice, 5 millimeters or less in diameter. The pellets may be spherical, irregular, or (rarely) conical in shape. They usually bounce when hitting hard ground, and make a sound upon impact. Ice pellets includes two basically different types of precipitation, those which are known in the United States as SLEET and SMALL HAIL. Sleet is generally transparent, globular, solid grains of ice which have formed from the freezing of raindrops or the refreezing of largely melted snowflakes when falling through a below-freezing layer of air near the earth's surface. Small hail is generally translucent particles, consisting of snow pellets encased in a thin layer of ice. The ice layer may form either by the accretion of droplets upon the snow pellet, or by the melting and refreezing of the surface of the snow pellet.

ice port. An embayment in an ice front, often of a temporary nature, where ships can moor alongside and unload directly onto the ice shelf.

ice rind. A brittle shiny crust of ice formed on a quiet surface by direct freezing or from grease ice, usually in water of low salinity. Of thickness to about 5 centimeters, ice rind is easily broken by wind or swell, commonly breaking into rectangular pieces.

ice sheet. Continuous ice overlaying a large land area.

ice shelf. A floating ice sheet attached to the coast and of considerable thickness, showing 20 to 50 meters or more above sea level. Usually of great horizontal extent and with a level or gently undulating surface, the ice shelf is augmented by annual snow accumulation and often also by the seaward extension of land glaciers. Limited areas of the ice shelf may be aground. The seaward edge is called ICE FRONT.

ice storm. A storm characterized by a fall of freezing precipitation with significant buildup of ice on exposed surfaces.

ice stream. The part of an inland ice sheet in which the ice flows more rapidly and not necessarily in the same direction as the surrounding ice. The margins are sometimes clearly marked by a change in direction of the surface slope, but may be indistinct.

ice under pressure. Ice in which deformation processes are actively occurring; hence the ice is a potential impediment or danger to shipping.

ice wall. An ice cliff forming the seaward margin of a glacier which is not afloat. An ice wall is aground with the underlying land at or below sea level. See also ICE FRONT.

ice-worn, *adj.* Abraded by ice.

icicle, *n.* A hanging mass of ice, usually conical, formed by the freezing of dripping water.

illumination, *n.* The luminous flux per unit of area. The derived unit of illumination in the International System of Units is the LUX.

image, *n.* 1. The optical counterpart of an object. A real image is actually produced and is capable of being shown on a surface, as in a camera; while a virtual image cannot be shown on a surface, but is visible, as in a mirror. 2. A visual representation, as on a radarscope.

improved channels. Dredged channels under the jurisdiction of the U.S. Army Corps of Engineers, and maintained to provide an assigned CONTROLLING DEPTH. Symbolized on National Ocean Survey charts by black, broken lines to represent side limits, with the controlling depth and date of the survey given together with a tabulation of more detailed information.

impulse train. See PULSE TRAIN.

in-band racon. A racon which transmits in the marine radar frequency band. There are two types of in-band racons, swept-frequency racons and experimental fixed-frequency racons. The transmitter of the swept-frequency racon sweeps through a range of frequencies within the band to insure that a radar receiver tuned to a particular frequency within the band will be able to detect the signal. The fixed-frequency racon transmits on a fixed frequency at the band edge. It is therefore necessary that the radar set be tuned to the racon's transmitting frequency or that auxiliary receiving equipment be used. When the radar is tuned to the fixed-frequency racon, normal radar echoes are not painted on the radarscope. See also CROSS-BAND RACON.

incandescence, *n.* Emission of light due to high temperature. Any other emission of light is called LUMINESCENCE.

inch, *n.* A unit of length equal to one-twelfth of foot, or 2.54 centimeters.

incidence, *n.* 1. Partial coincidence, as a circle and a tangent line. 2. The impingement of a ray on a surface.

incident ray. A ray impinging on a surface.

incineration area. An officially designated offshore area for the burning of chemical waste by specially equipped vessels. The depiction of incineration areas on charts (in conjunction with radio warnings) is necessary to insure that passing vessels do not mistake the burning of waste for a vessel on fire.

inclination, *n.* 1. The angle which a line or surface makes with the vertical, horizontal, or with another line or surface. 2. One of the orbital elements (parameters) that specifies the orientation of an orbit. It is the angle between the orbital plane and a reference plane, the plane of the celestial equator for geocentric orbits and the ecliptic for heliocentric orbits. See also ORBITAL ELEMENTS, ORBITAL PARAMETERS OF ARTIFICIAL EARTH SATELLITE.

inclination of an orbit. 1. See INCLINATION, definition 2. 2. As defined by the International Telecommunication Union (ITU), the angle determined by the plane containing an orbit and the plane of the earth's equator.

increment, *n.* A change in the value of a variable. A negative increment is also called DECREMENT.

independent surveillance, Position determination by means requiring no cooperation from the craft or vehicle.

index (*pl. indices or indexes*), *n.* 1. A mark on the scale of an instrument, diagram, etc., to indicate the origin of measurement. 2. A pointer or part of an instrument which points to a value, like the needle of a gage. 3. A list or diagram serving as a guide to a book, set of charts, etc. 4. A ratio or value used as a basis for comparison of other values.

index arm. A slender bar carrying an index; particularly the bar which pivots at the center of curvature of the arc of a marine sextant and carries the index and the vernier or micrometer.

index chart. An outline chart showing the limits and identifying designations of navigational charts, volumes of sailing directions, etc.

index correction. The correction due to index error.

index error. The error in the reading of an instrument equal to the difference between the zero of the scale and the zero of the index. In a marine sextant it is due primarily to lack of parallelism of the index mirror and the horizon glass at zero reading.

index glass. See INDEX MIRROR.

index mirror. The mirror attached to the index arm of a marine sextant. The bubble or pendulum sextant counterpart is called INDEX PRISM. Also called INDEX GLASS.

index prism. A sextant prism which can be rotated to any angle corresponding to altitudes between established limits. It is the bubble or pendulum sextant counterpart of the INDEX MIRROR of a marine sextant.

Indian Equatorial Countercurrent. A complex Indian Ocean current which is influenced by the monsoons and the circulations of the Arabian Sea and the Bay of Bengal. At times it is easily distinguishable; at other times it is not evident. During December through March, the countercurrent has a marked tendency to migrate southward and to become narrower. In December the northern and southern boundaries are at 2° N and 4° S, respectively, moving southward to 3° S and 6° S by February. The northern boundary of Indian Equatorial Countercurrent is easily discernible at this time due to the generally westward current flow in the region immediately north. During May through July the cell, within which the Indian Equatorial Countercurrent and the Monsoon Drift flow clockwise, moves toward the west side of the region. In June and July the southeastward flowing currents prevail in the region between the Bay of Bengal and the Indian South Equatorial Current; only traces of the countercurrent remain. During August through November eastward flowing currents prevail north of the Indian Equatorial Countercurrent. As a result, the northern boundary of the countercurrent is difficult to distinguish from the eastward drift currents. See also MONSOON.

Indian South Equatorial Current. An Indian Ocean current that flows westward throughout the year, controlled by the southeast trade winds. Its northern and southern boundaries are at approximately 10° S and 25° S, respectively. The northern boundary of the current fluctuates seasonally between 9° S and 11° S, being at its northernmost limit during the southwest monsoon and at its southernmost limit during the northeast monsoon. The current flows westward toward the east coast of Madagascar to the vicinity of Tamatave and Ile Sainte-Marie, where it divides; one part turns northward, flows past the northern tip of the island with speeds up to 3.3 knots, and then flows westward and northwestward toward the African coast. The northern branch of the current divides upon reaching the coast of Africa near Cabo Delgado; one part turns and flows northward, the other turns and flows southward in the western part of the Mozambique Channel and forms the AGULHAS CURRENT. See also MONSOON.

Indian spring low water. A tidal datum originated by G.H. Darwin when investigating the tides of India. It is an elevation depressed below mean sea level by an amount equal to the sum of the amplitudes of certain constituents as given in the *Tide and Current Glossary* published by the National Ocean Survey. Also called INDIAN TIDE PLANE, HARMONIC TIDE PLANE.

Indian summer. An indefinite and irregular period of mild, calm, hazy weather often occurring in autumn or early winter, especially in the United States and Canada.

Indian tide plane. See INDIAN SPRING LOW WATER.

indicator, *n.* See RADAR INDICATOR.

indirect echo. A radar echo which is caused by the electromagnetic energy being transmitted to the target by an indirect path and returned as an echo along the same path. An indirect echo may appear on the radar display when the main lobe of the radar beam is reflected off part of the structure of the ship (the stack for example) from which it is reflected to the target. Returning to own ship by the same indirect path, the echo appears on the PPI at the bearing of the reflecting surface. Assuming that the additional distance by the indirect path is negligible, the indirect echo appears on the PPI at the same range as the direct echo received. Also called FALSE ECHO.

- indirect wave.** A radio wave which reaches a given reception point by a path from the transmitting point other than the direct line path between the two. An example is the SKYWAVE received after reflection from one of the layers of the ionosphere.
- induced magnetism.** The magnetism acquired by soft iron while it is in a magnetic field. Soft iron will lose its induced magnetism when it is removed from a magnetic field. The strength and polarity of the induced magnetism will alter immediately as its magnetic latitude, or its orientation in a magnetic field, is changed. The induced magnetism has an immediate effect upon the magnetic compass as the magnetic latitude or heading of a craft changes. See also PERMANENT MAGNETISM, SUBPERMANENT MAGNETISM.
- induced precession.** See REAL PRECESSION.
- inequality (tidal), n.** A systematic departure from the mean value of a tidal quantity.
- inertia, n.** The tendency of a body at rest to remain at rest and of a body in motion to remain in motion, unless acted upon by another force. See also GYROSCOPIC INERTIA.
- inertial alignment.** The process of orienting the measuring axes of the inertial components of inertial navigation equipment with respect to the coordinate system in which the equipment is to be used.
- inertial coordinate system.** A coordinate system in which the axes do not rotate with respect to the "fixed stars" and in which dynamic behavior can be described using Newton's laws of motion. See also EARTH-FIXED COORDINATE.
- inertial force.** A force in a given coordinate system arising from the inertia of a mass moving with respect to another coordinate system.
- inertial navigation.** The process of measuring a craft's velocity, attitude, and displacement from a known start point through sensing the accelerations acting on it in known directions using devices that mechanize Newton's laws of motion. Inertial navigation is described as self-contained because it is independent of external aids to navigation, and passive because no energy is emitted to obtain information. The basic principle of inertial navigation is the measurement of the accelerations acting on a craft, other than those not associated with its orientation or motion with respect to the earth, and the double integration of these accelerations along known directions to obtain the displacement from the start point. Due to increasing position errors with time, an inertial system must be reset from time to time using another navigation system.
- in extremis.** Condition in which either course or speed changes or both are required on the part of both ships if the ships are to avoid collision.
- inferior conjunction.** The conjunction of an inferior planet and the sun when the planet is between the earth and the sun.
- inferior planets.** The planets with orbits smaller than that of the earth; Mercury and Venus. See also PLANET.
- inferior transit.** See LOWER TRANSIT.
- infinite, adj.** Without limits. The opposite is FINITE.
- infinitesimal, adj.** 1. Immeasurably small. 2. Approaching zero as a limit.
- infinity, n.** Beyond finite limits. In navigation, a source of light is regarded as at infinity if it is at such a great distance that rays from it can be considered parallel. The sun, planets, and stars can be considered at infinity without serious error. See also PARALLAX.
- inflection, inflexion, n.** Reversal of direction of curvature. A point at which reversal takes place is called POINT OF INFLECTION.
- infrared, adj.** Having a frequency immediately beyond the red end of the visible spectrum; rays of longer wavelength than visible light, but shorter than radio waves.
- infrasonic, adj.** Having a frequency below the audible range. Frequencies above the audible range are called ULTRASONIC.
- initial great circle course.** The direction, at the point of departure, of the great circle through that point and the destination, expressed as the angular distance from a reference direction, usually north, to that part of the great circle extending toward the designation. Also called INITIAL GREAT CIRCLE DIRECTION. See also FINAL GREAT CIRCLE COURSE.
- initial great circle direction.** See INITIAL GREAT CIRCLE COURSE.
- injection messages.** Messages periodically transmitted to artificial satellites for storage in satellite memory.
- Inland Rules of the Road.** Officially the Inland Navigation Rules; Rules to be followed by all vessels while navigating upon certain defined inland waters of the United States. See also COLREGS DEMARCATION LINES, RULES OF THE ROAD.
- inland sea.** A body of water nearly or completely surrounded by land, especially if very large or composed of salt water. If completely surrounded by land, it is usually called a LAKE. This should not be confused with CLOSED SEA, that part of the ocean enclosed by headlands, within narrow straits, etc., or within the territorial jurisdiction of a country.
- inlet, n.** A narrow body of water extending into the land from a larger body of water. A long, narrow inlet with gradually decreasing depth inward is called a ria. Also called ARM, TONGUE.
- inner harbor.** The part of a harbor most remote from the sea, as contrasted with the OUTER HARBOR. These expressions are usually used only in a harbor that is clearly divided into two parts by a narrow passageway or manmade structures.
- inner planets.** The four planets nearest the sun; Mercury, Venus, Earth, and Mars.
- inoperative, adj.** Said of a sound signal or radionavigation aid out of service due to a malfunction.
- in phase.** The condition of two or more cyclic motions which are at the same part of their cycles at the same instant. Two or more cyclic motions which are not at the same part of their cycles at the same instant are said to be OUT OF PHASE.
- input axis.** The axis of applied torque of a gyroscope. See also OUTPUT AXIS, PRECESSION.
- inshore, adj., adv.** Near or toward the shore.
- inshore, n.** The zone of variable width between the shore face and the seaward limit of the breaker zone.
- inshore traffic zone.** A routing measure comprising a designated area between the landward boundary of a traffic separation scheme and the adjacent coast, intended for local traffic.
- in situ.** A Latin term meaning "in place"; in the natural or original position.
- insolation, n.** Solar radiation received, or the rate of delivery of such radiation.
- instability, n.** The state or property of submitting to change or of tending to increase the departure from original conditions after being disturbed. The opposite is STABILITY.
- instability line.** Any non-frontal line or band of convective activity in the atmosphere. This is the general term and includes the developing, mature, and dissipating stages. However, when the mature stage consists of a line of active thunderstorms, it is properly called SQUALL LINE; therefore, in practice, *instability line* often refers only to the less active phases. Instability lines are usually hundreds of miles long (not necessarily continuous), 10 to 50 miles wide, and are most often formed in the warm sectors of wave cyclones. Unlike true fronts, they are transitory in character, ordinarily developing to maximum intensity in less than 12 hours and then dissipating in about the same time. Maximum intensity is usually attained in late afternoon.
- instrument correction.** That correction due to instrument error.
- instrument error.** The inaccuracy of an instrument due to imperfections within the instrument. See CALIBRATION ERROR, CENTERING ERROR, FRICTION ERROR, GRADUATION ERROR, HYSTERESIS ERROR, LAG ERROR, PRISMATIC ERROR, SECULAR ERROR, TEMPERATURE ERROR, VERNIER ERROR.
- instrument shelter.** A cage or screen in which a thermometer and sometimes other instrument are placed to shield them from the direct rays of the sun and from other conditions that would interfere with registration of true conditions. It is usually a small wooden structure with louvered sides.
- insular, adj.** Of or pertaining to an island or islands.
- insular borderland.** A region around an island normally occupied by or bordering a shelf, that is highly irregular with depths well in excess of those typical of a shelf. See also CONTINENTAL BORDERLAND.
- insular shelf.** A zone 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. See also CONTINENTAL SHELF.

- insulate**, *v. t.* To separate or isolate a conducting body from its surroundings, by means of a nonconductor, as to prevent transfer of electricity, heat, or sound.
- insulator**, *n.* A non conducting substance or one offering high resistance to passage of energy.
- integer**, *n.* A whole number; a number that is not a fraction.
- integral**, *adj.* Of or pertaining to an integer.
- integral Doppler navigation**. Navigation by means of integrating the Doppler frequency shift that occurs over a specific interval of time as the distance between a navigational satellite and navigator is changing to determine the time rate of change of range of the satellite from the navigator for the same interval. See also DOPPLER SATELLITE NAVIGATION BASIC PRINCIPLES, NAVY NAVIGATION SATELLITE SYSTEM.
- integrated navigation system**. A navigation system which comprises two or more positioning systems combined in such manner as to achieve performance better than each constituent system.
- integrating accelerometer**. An instrument which senses the component of specific acceleration along an axis known as the sensitive axis of the accelerometer, and produces an output equal to the time integral of that quantity. Also called VELOCITY METER.
- intended track**. See TRACK, definition 2.
- intercalary day**. A day inserted or introduced among others in a calendar, such as February 29 during leap years.
- intercardinal heading**. A heading in the direction of any of the intercardinal points. See also CARDINAL HEADING.
- intercardinal point**. Any of the four directions midway between the cardinal points; northeast, southeast, southwest, or northwest. Also called QUADRANTAL POINT.
- intercardinal rolling error**. See under QUADRANTAL ERROR.
- intercept**, *n.* See ALTITUDE INTERCEPT, ALTITUDE INTERCEPT METHOD.
- interference**, *n.* 1. Unwanted and confusing signals or patterns produced by nearby electrical equipment or machinery, or by atmospheric phenomena. 2. The variation of wave amplitude with distance or time, caused by superposition of two or more waves. Sometimes called WAVE INTERFERENCE.
- interferometer**, *n.* An apparatus used to produce and measure interference from two or more coherent wave trains from the same source. Used to measure wavelengths, to measure angular width of sources, to determine the angular position of sources (as in satellite tracking), and for other purposes. See also RADIO INTERFEROMETER.
- interlaced**. Referring to a computer monitor which displays data by scanning alternate lines instead of each line sequentially.
- intermediate frequency**. In super heterodyne reception, the frequency which is derived by mixing the signal-carrying frequency with the local oscillator frequency. If there are more than one such mixing process, the successive intermediate frequencies are known as the first, second, etc. intermediate frequency.
- intermediate light**. The middle light of the three-light range.
- intermediate orbit**. A central force orbit that is tangent to the real (or disturbed) orbit at some point. A fictitious satellite traveling in the intermediate orbit would have the same position, but not the same velocity, as the real satellite at the point of tangency.
- internal noise**. In radio reception, the noise which is produced in the receiver circuits. Internal noise is in addition to external noise.
- internal tide**. A tidal wave propagating along a sharp density discontinuity, such as at a thermocline, or in an area of gradual changing density (vertically).
- International Atomic Time**. See under ATOMIC TIME.
- International Bureau of Weights and Measures**. The International Bureau of Weights and Measures (BIPM) insures worldwide unification of physical measurements. It is responsible for establishing the fundamental standards and scales for measurement of the principal physical quantities and maintaining the international prototypes, carrying out comparisons of national and international standards insuring coordination of corresponding measuring techniques; and carrying out and coordinating the determinations relating to the fundamental physical constants.
- international call sign**. An alpha-numeric symbol assigned in accordance with the provisions of the International Telecommunications Union to identify a radio station. The nationality or the radio station is identified by the first three characters; also referred to as call letters or signal letters.
- international chart**. One of a coordinated series of small-scale charts for planning and long range navigation. The charts are prepared and published by different Member States of the International Hydrographic Organization using the same specifications.
- Intentional Code of Signals**. See PUB. 102.
- international date line**. See DATE LINE.
- International ellipsoid of reference**. The reference ellipsoid of which the semimajor axis is 6,378 388.0 meters, the semiminor axis is 6,356 911.9 meters, and the flattening or ellipticity is 1/297. Also called INTERNATIONAL SPHEROID OF REFERENCE.
- International Great Lakes Datum (1955)**. Mean water level at Pointeau-Pere, Quebec, on the Gulf of St. Lawrence over the period 1941-1956, from which dynamic elevations throughout the Great Lakes region are measured. The term is often used to mean the entire system of dynamic elevations rather than just the referenced water level.
- International Hydrographic Bulletin**. A publication, published monthly by the International Hydrographic Bureau for the International Hydrographic Organization, which contains information of current hydrographic interest.
- International Hydrographic Bureau**. The Directors and administrative staff of the International Hydrographic Organization, based in Monaco.
- International Hydrographic Organization**. An institution formed in 1921, consisting of representatives of maritime nations organized for the purpose of coordinating the hydrographic work of the participating governments.
- international low water**. A hydrographic datum originally suggested for international use at the International Hydrographic Conference in London in 1919 and later discussed at the Monaco Conference in 1926. The proposed datum, which has not yet been generally adopted, was to be "a plane so low that the tide will but seldom fall below it." This datum was the subject of the International Hydrographic Bureau's Special Publications No. 5 (March 1925) and No. 10 (January 1926), reproduced in the *Hydrographic Reviews* for May 1925 and July 1926.
- International Maritime Organization (IMO)**. A Specialized Agency of the United Nations responsible for maritime safety and efficiency of navigation. The IMO provides for cooperation among governments in the field of governmental regulations and practices relating to technical matters of all kinds affecting shipping engaged in international trade: to encourage the general adoption of the highest practicable standards in matters concerning maritime safety, efficiency of navigation, and the prevention and control of marine pollution from ships, and to deal with legal matters related to the purposes set out in Article 1 of the Convention.
- International Nautical Mile**. A unit of length equal to 1,852 meters, exactly. See also NAUTICAL MILE.
- international number**. The number of a navigational light, assigned in accordance with the Resolution adopted at the Fifth International Hydrographic Conference in 1949 by Member Nations of the International Hydrographic Bureau (now the International Hydrographic Organization). This number is in italic type and under the light list number in the light list.
- International spheroid of reference**. See INTERNATIONAL ELLIPSOID OF REFERENCE.
- International System of Units**. A modern form of the metric system adopted in 1960 by the General Conference of Weights and Measures (CGPM). The units of the International System of Units (SI) are divided into three classes. The first class of SI units are the base units or the seven well defined units which by convention are regarded as dimensionally independent: the meter the kilogram, the second, the ampere, the kelvin, the mole, and the candela. The second class of SI units are the derived units, i.e., the units that can be formed by combining base units according to the algebraic relations linking the corresponding quantities. Several of these algebraic expressions in terms of base units can be replaced by special names and symbols which can themselves be used to form other derived units. The third class of SI units are the supplementary units, those units not yet classified by the CGPM as either base units or derived units. In 1969 the International Committee of Weights and Measures (CIPM) recognized that users of SI units will wish to employ with it certain units not part of SI, but which are important and are widely used. These are the minute, the hour, the day, the degree of arc, the minute of arc, the second of arc, the liter, and the tonne.

- Outside the International System are some other units useful in specialized fields. Their value expressed in SI units must be obtained by experiment, and are therefore not known exactly. These are the electron-volt, the unified atomic mass unit, the astronomical unit, and the parsec. Other temporary units are the nautical mile, the knot, the angstrom, the arc, the hectare, the barn, the bar, the standard atmosphere, the gal, the curie, the röntgen, and the rod.
- interpolation**, *n.* The process of determining intermediate values between given values in accordance with some known or assumed rate or system of change. Linear interpolation assumes that changes of tabulated values are proportional to changes in entering arguments. Interpolation is designated as single, double, or triple if there are one, two, or three arguments or variables respectively. The extension of the process of interpolation beyond the limits of known value is called **EXTRAPOLATION**.
- interpolation table**. An auxiliary table used for interpolating. See also **PROPORTIONAL PART**.
- interrogating signal**. The signal emitted by interrogator to trigger a transponder.
- interrogation**, *n.* The transmission of a radio frequency pulse, or combination of pulses, intended to trigger a transponder or group of transponder.
- interrogator**, *n.* A radar transmitter which sends out a pulse that triggers a transponder. An interrogator may be combined in a single unit with a responder, which receives the reply from a transponder and produces an output suitable for feeding a display system; the combined unit is called **INTERROGATOR-RESPONDER**. Also called **CHALLENGER**.
- interrogator-responder**, *n.* A radar transmitter and receiver combined to interrogate a transponder and display the resulting replies. Often shortened to **INTERROGATOR** and sometimes called **CHALLENGER**.
- interrupted quick flashing light**. A quick flashing light (50-80 flashes per minute) is interrupted at regular intervals by eclipses of long duration. See also **QUICK FLASHING LIGHT**, **VERY QUICK FLASHING LIGHT**.
- interrupted quick light**. A quick light in which the sequence of flashes is interrupted by regularly repeated eclipses of constant and long duration. See also **CONTINUOUS QUICK LIGHT**, **GROUP QUICK LIGHT**.
- interrupted very quick light**. A very quick light (80-160 flashes per minute) in which the sequence of flashes is interrupted by regularly repeated eclipses of long duration. See also **CONTINUOUS VERY QUICK LIGHT**, **GROUP VERY QUICK LIGHT**.
- interscan**, *n.* See **INTER-TRACE DISPLAY**.
- intersect**, *v., t. & i.* To cut or cross. For example, two non parallel lines in a plane intersect in a point, and a plane intersects a sphere in a circle.
- inter-trace display**. A technique for presenting additional information, in the form of alphanumeric, markers, cursors, etc., on a radar display, by using the intervals between the normal presentation scans. Also called **INTER-SCAN**.
- Intracoastal Waterway**. An inside protected route for small craft and small commercial vessels extending through New Jersey; from Norfolk, Virginia to Key West, Florida; across Florida from St. Lucie Inlet to Fort Myers, Charlotte Harbor, Tampa Bay, and Tarpon Springs; and from Carabelle, Florida, to Brownsville, Texas. Some portions are in exposed waters; some portions are very limited in depth.
- Invar**, *n.* The registered trade name for an alloy of nickel and iron, containing about 36% nickel. Its coefficient of expansion is extremely small over a wide range of temperature.
- inverse chart**. See **TRANSVERSE CHART**.
- inverse cylindrical orthomorphic chart**. See **TRANSVERSE MERCATOR CHART**.
- inverse cylindrical orthomorphic map projection**. See **TRANSVERSE MERCATOR MAP PROJECTION**.
- inverse equator**. See **TRANSVERSE EQUATOR**.
- inverse latitude**. See **TRANSVERSE LATITUDE**.
- inverse logarithm**. See **ANTILOGARITHM**.
- inverse longitude**. See **TRANSVERSE LONGITUDE**.
- inverse Mercator chart**. See **TRANSVERSE MERCATOR CHART**.
- inverse Mercator map projection**. See **TRANSVERSE MERCATOR MAP PROJECTION**.
- inverse meridian**. See **TRANSVERSE MERIDIAN**.
- inverse parallel**. See **TRANSVERSE PARALLEL**.
- inverse rhumb line**. See **TRANSVERSE RHUMB LINE**.
- inversion**, *n.* In meteorology, a departure from the usual decrease or increase with altitude of the value of an atmospheric property. This term is almost always used to refer to a temperature inversion, an atmospheric condition in which the temperature increases with increasing altitude.
- inverted compass**. A marine magnetic compass designed and installed for observation from below the compass card. Frequently used as a tell-tale compass. Also called **HANGING COMPASS**, **OVERHEAD COMPASS**.
- inverted image**. An image that appears upside down in relation to the object.
- inverter**, *n.* A device for changing direct current to alternating current. A device for changing alternating current to direct current is called a **CONVERTER** if a rotary device and a **RECTIFIER** if a static device.
- inverting telescope**. An instrument with the optics so arranged that the light rays entering the objective of the lens meet at the crosshairs and appear inverted when viewed through the eyepiece without altering the orientation of the image. See also **ERECTING TELESCOPE**.
- inward bound**. Heading toward the land or up a harbor away from the open sea. The opposite is **OUTWARD BOUND**.
- ion**, *n.* An atom or group of atoms which has become electrically charged, either positively or negatively, by the loss or gain of one or more electrons.
- ionization**, *n.* The process by which neutral atoms or groups of atoms become electrically charged either positively or negatively, by the loss or gain of electrons; or the state of a substance whose atoms or groups of atoms have become thus charged.
- ionized layers**. Layers of charged particles existing in the upper reaches of the atmosphere as a result of solar radiation.
- ionosphere**, *n.* 1. The region of the atmosphere extending from about 40 to 250 miles above the earth's surface, in which there is appreciable ionization. The presence of charged particles in this region profoundly affects the propagation of certain electromagnetic radiation. 2. A region composed of highly ionized layers at varying heights above the surface of the earth which may cause the return to the earth of radio waves originating below these layers. See also **D-LAYER**, **E-LAYER**, **F-LAYER**, **F1-LAYER**, **F2-LAYER**.
- ionospheric correction**. A correction for ionospheric refraction, a major potential source of error in all satellite radionavigation systems. Navigation errors can result from the effect of refraction on the measurement of the doppler shift and from the errors in the satellite's orbit if refraction is not accurately accounted for in the satellite tracking. The refraction contribution can be eliminated by the proper mixing of the received Doppler shift from two harmonically related frequencies to yield an accurate estimate of the vacuum doppler shift. Also called **REFRACTION CORRECTION**.
- ionospheric disturbance**. A sudden outburst of ultraviolet light on the sun, known as a **SOLAR FLARE** or **CHROMOSPHERIC ERUPTION**, which produces abnormally high ionization in the region of the D-layer. The result is a sudden increase in radio wave absorption, with particular severity in the upper medium frequencies and lower high frequencies. It has negligible effects on the heights of the reflecting/refracting layers and, consequently, upon critical frequencies, but enormous transmission losses may occur. See also **SUDDEN IONOSPHERIC DISTURBANCE**.
- ionospheric error**. The total systematic and random error resulting from the reception of a navigation signal after ionospheric reflections. It may be due to variations in transmission paths, non-uniform height

- of the ionosphere, or non-uniform propagation within the ionosphere. Also called IONOSPHERIC-PATH ERROR, SKYWAVE ERROR.
- ionospheric-path error.** See IONOSPHERIC ERROR.
- ionospheric storm.** An ionospheric disturbance characterized by wide variations from normal in the state of the ionosphere, such as turbulence in the F-region, absorption increase, height increase, and ionization density decreases. The effects are most marked in high magnetic latitudes and are associated with abnormal solar activity.
- ionospheric wave.** See SKYWAVE.
- iridescence, n.** Changing-color appearance, such as of a soap bubble, caused by interference of colors in a thin film or by diffraction.
- iridescent clouds.** Ice-crystal clouds which exhibit brilliant spots or borders of colors, usually red and green, observed up to about 30° from the sun.
- irisation, n.** The coloration exhibited by iridescent clouds.
- Irminger Current.** A North Atlantic Ocean current, one of the terminal branches of the Gulf Stream System (part of the northern branch of the North Atlantic Current); it flows toward the west off the southwest coast of Iceland. A small portion of the water of the Irminger Current bends around the west coast of Iceland but the greater amount turns south and becomes more or less mixed with the water of the East Greenland Current.
- ironbound, adj.** Rugged, rocky, as an *ironbound coast*.
- irradiation, n.** The apparent enlargement of a bright surface against a darker background.
- irradiation correction.** A correction due to irradiation, particularly that sextant altitude correction caused by the apparent enlargement of the bright surface of a celestial body against the darker background of the sky.
- irregular error.** See RANDOM ERROR.
- irregular iceberg.** See PINNACLE ICEBERG.
- isalobar, n.** A line of equal change in atmospheric pressure during a specified time interval.
- isallotherm, n.** A line connecting points having the same anomalies of temperature, pressure, etc.
- isanomal, n.** A line connecting points of equal variations from a normal value.
- island, n.** An area of land not a continent, surrounded by water.
- islet, n.** A very small and minor island.
- iso-**A prefix meaning equal.
- isobar, n.** A line connecting points having the same atmospheric pressure reduced to a common datum, usually sea level.
- isobaric, adj.** Having the same pressure.
- isobaric chart.** See CONSTANT-PRESSURE CHART.
- isobaric surface.** See CONSTANT PRESSURE SURFACE.
- isobath, n.** See DEPTH CONTOUR.
- isobathic, adj.** Having equal depth.
- isobathytherm, n.** A line on the earth's surface connecting points at which the same temperature occurs at some specified depth.
- isobront, n.** A line connecting points at which some specified phase of a thunderstorm occurs at the same time.
- isoceraunic, isokeraunic, adj.** Indicating or having equal frequency or intensity of thunderstorms.
- isochasm, n.** A line connecting points having the same average frequency of auroras.
- isochronal, adj.** Of equal time; recurring at equal intervals of time. Also called ISOCHRONOUS.
- isochrone, n.** A line connecting points having the same time or time difference relationship, as a line representing all points having the same time difference in the reception of signals from two radio stations such as the master and slave stations of a Loran rate.
- isochronize, v., t.** To render isochronal.
- isochronon, n.** A clock designed to keep very accurate time.
- isochronous, adj.** See ISOCHRONAL.
- isoclinal, adj.** Of or pertaining to equal magnetic dip.
- isoclinal, n.** See ISOCLINIC LINE.
- isoclinic chart.** See ISOCLINIC CHART.
- isoclinic chart.** A chart of which the chief feature is a system of isoclinic lines. Also called ISOCLINIC CHART.
- isoclinic line.** A line drawn through all points on the earth's surface having the same magnetic dip. The particular isoclinic line drawn through points of zero dip is called ACLINIC LINE. Also called ISOCLINIC LINE.
- isodynamic chart.** A chart showing isodynamic lines. See also MAGNETIC CHART.
- isodynamic line.** A line connecting points of equal magnetic intensity, either the total or any component.
- isogonal, adj.** Having equal angles; isogonic.
- isogonic, adj.** Having equal angles; isogonic.
- isogonic, n.** A line connecting points of equal magnetic variation. Also called ISOGONIC LINE, ISOGONAL.
- isogonic chart.** A chart showing magnetic variation with isogonic lines and the annual rate of change in variation with isoporic lines. See also MAGNETIC CHART.
- isogonic line.** See ISOGONIC, *n.*
- isogram, n.** That line, on a chart or diagram, connecting points of equal value of some phenomenon.
- isogriv, n.** A line drawn on a map or chart joining points of equal grivation.
- isogriv chart.** A chart showing isogrivs. See also MAGNETIC CHART.
- isohaline, isohalsine, n.** A line connecting points of equal salinity in the ocean.
- isolated danger mark (or buoy).** An IALA navigation aid marking a danger with clear water all around; it has a double ball topmark and is black with at least one red band. If lighted its characteristic is Fl(2).
- isosceles, adj.** Having two equal sides.
- isosceles triangle.** A triangle having two of its sides equal.
- isomagnetic, adj.;** Of or pertaining to lines connecting points of equality in some magnetic element *t*.
- isomagnetic, n.** A line connecting points of equality in some magnetic element. Also called ISOMAGNETIC LINE.
- isomagnetic chart.** A chart showing isomagnetics. See also MAGNETIC CHART.
- isomagnetic line.** See ISOMAGNETIC, *n.*
- isometric, n.** Of or pertaining to equal measure.
- isophase, adj.** Referring to a light having a characteristic of equal intervals of light and darkness.
- isopleth, n.** 1. An isogram indicating the variation of an element with respect to two variables, one of which is usually the time of year. The other may be time of day, altitude, or some other variable. 2. A line on a map depicting points of constant value of a variable. Examples are contours, isobars, and isogons.
- isopor, n.** See ISOPORIC LINE.
- isopor chart.** A chart with lines connecting points of equal annual rate of change of any magnetic element. See also ISOPORIC LINE.
- isopor line.** A line connecting points of equal annual rate of change of any magnetic element. Also called ISOPOR. See also ISOGONIC.
- isostasy, n.** A supposed equality existing in vertical sections of the earth, whereby the weight of any column from the surface of the earth to a constant depth is approximately the same as that of any other column of equal area, the equilibrium being maintained by plastic flow of material from one part of the earth to another.
- isotropic antenna.** A hypothetical antenna which radiates or receives equally well in all directions. Although such an antenna does not physically exist, it provides a convenient reference for expressing the directional properties of actual antennas. Also called UNIPOLE.
- isotropic gain of an antenna.** The gain of an antenna in a given direction when the reference antenna is an isotropic antenna isolated in space. Also called ABSOLUTE GAIN OF AN ANTENNA.
- isthmus, n.** A narrow strip of land connecting two larger portions of land. A submarine elevation joining two land areas and separating two basins or depressions by a depth less than that of the basins is called a submarine isthmus.