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- table**, *n.* An orderly, condensed arrangement of numerical or other information, usually in parallel rows or columns. A table in which values of the quantity to be found are tabulated for limiting values of the entering argument is called critical table. See also CALIBRATION TABLE, CONVERSION TABLE, CURRENT TABLES, TIDE TABLES, TRAVERSE TABLE.
- tablemount**, *n.* A seamount having a comparatively smooth, flat top. Also called GUYOT.
- Tables of Computed Altitude and Azimuth**. See H.O. PUB. NO. 214.
- tabular altitude**. See TABULATED ALTITUDE.
- tabular azimuth**. See TABULATED AZIMUTH.
- tabular azimuth angle**. See TABULATED AZIMUTH ANGLE.
- tabular iceberg**. A flat-topped iceberg with length-to-height ratio greater than 5:1. Most tabular bergs form by calving from an ice shelf and show horizontal banding. See also ICE ISLAND, BLOCKY ICEBERG.
- tabulated altitude**. In navigational sight reduction tables, the altitude taken directly from a table for the entering arguments. After interpolation for argument increments, i.e., the difference between each entering argument and the actual value, it is called COMPUTED ALTITUDE. Also called TABULAR ALTITUDE.
- tabulated azimuth**. Azimuth taken directly from a table, before interpolation. After interpolation, it becomes COMPUTED AZIMUTH.
- tabulated azimuth angle**. Azimuth angle taken directly from a table, before interpolation. After interpolation, it becomes COMPUTED AZIMUTH ANGLE.
- Tacan**, *n.* An ultra high frequency aeronautical radionavigation system which provides a continuous indication of bearing and distance to a Tacan station. The term is derived from Tactical Air Navigation.
- tactical diameter**. The distance gained to the right or left of the original course when a turn of 180° with a constant rudder angle has been completed. See also STANDARD TACTICAL DIAMETER.
- taffrail**, *n.* The after rail at the stern of a vessel.
- taffrail log**. A log consisting of a rotator towed through the water by a braided log line attached to a distance-registering device usually secured at the taffrail. Also called PATENT LOG.
- tail wind**. A wind from behind the vessel. See FOLLOWING WIND.
- take departure**. See under DEPARTURE, definition 2.
- take the ground**. To become stranded by the tide.
- Taku wind**. A strong, gusty, east-northeast wind, occurring in the vicinity of Juneau, Alaska, between October and March. At the mouth of the Taku River, after which it is named, it sometimes attains hurricane force.
- tangent**, *adj.* Touching at a single point.
- tangent**, *n.* 1. The ratio of the side opposite an acute angle of a plane right triangle to the shorter side adjacent to the same angle. The expression NATURAL TANGENT is sometimes used to distinguish the tangent from its logarithm (called LOGARITHMIC TANGENT). 2. A straight line, curve, or surface touching a curve or surface at one point.
- tangent arc**. 1. An arc touching a curve or surface at one point. 2. A halo tangent to a circular halo.
- tangent latitude error**. On a nonpendulous gyrocompass where damping is accomplished by offsetting the point of application of the force of a mercury ballistic, the angle between the local meridian and the settling position or spin axis. Where the offset of the point of application of a mercury ballistic is to the east of the vertical axis of the gyrocompass, the settling position is to the east of the meridian in the north latitudes and to the west of the meridian in south latitudes. The error is so named because it is approximately proportional to the tangent of the latitude in which the gyrocompass is operating. The tangent latitude error varies from zero at the equator to a maximum at high northern and southern latitudes.
- tank**, *n.* An elevated water tank, indicated on a chart by a position circle.
- tape gage**. See ELECTRIC TAPE GAGE.
- tapper**, *n.* A heavy pendulum suspended outside a bell which rings it.
- target**, *n.* In navigation, an object observed on a radar screen. See also CONTACT.
- target angle**. The relative bearing of own ship from a target vessel, measured clockwise through 360°. See also ASPECT.
- target tail**. The display of diminishing luminance seen to follow a target on a radar display which results from afterglow and the progress of the target between successive scans of the radar. Also called TARGET TRAIL.
- target trail**. See TARGET TAIL.
- tehuantepecer**, *n.* A violent squally wind from north or north-northeast in the Gulf of Tehuantepec (south of southern Mexico) in winter. It originates in the Gulf of Mexico as a norther which crosses the isthmus and blows through the gap between the Mexican and Guatemalan mountains. It may be felt up to 100 miles out to sea. See also PAPAGAYO.
- telecommunication**, *n.* Any transmission, emission, sound, or intelligence of any nature by wire, radio, or other electromagnetic system. If the transfer is by radio, it may be called radiocommunication.
- telegraph buoy**. A buoy used to mark the position of a submarine telegraph cable.
- telemeter**, *n.* The complete equipment for measuring any quantity, transmitting the results electrically to a distant point, and there recording the values measured.
- telemetry**, *n.* The science of measuring a quantity or quantities, transmitting the measured value to a distant station, and there interpreting, indicating, or recording the quantities measured.
- telemotor**, *n.* A device for controlling the application of power at a distance, especially one by which the steering gear of a vessel is controlled from the wheel house.
- telescope**, *n.* An optical instrument used as an aid in viewing or photographing distant objects, particularly celestial objects. A reflecting telescope collects light by means of a concave mirror; a refracting telescope by means of a lens or system of lenses. A Cassegrainian telescope is a reflecting telescope in which the immergent light is reflected from the main mirror onto a secondary mirror, where it is reflected through a hole in the main mirror to an eyepiece; a Newtonian telescope is a reflecting telescope in which the immergent beam is reflected from the main mirror onto a small plane mirror, and from there to an eyepiece at the side of the telescope.
- telescopic alidade**. See ALIDADE.
- telescopic meteor**. See under METEOR.
- telltale compass**. A marine magnetic compass, usually of the inverted type, frequently installed in the master's cabin for his convenience.
- temperate zone**. Either of the two zones between the frigid and torrid zones, called the north temperate zone and the south temperate zone.
- temperature**, *n.* Intensity or degree of heat. Fahrenheit temperature is based upon a scale in which water freezes at 32°F and boils at about 212°F; Celsius temperature upon a scale in which water freezes at 0°C and boils at 100°C. Absolute temperature is measured from absolute zero which is zero on the Kelvin scale, -273.16° on the Celsius scale, and 459.69°F on the Fahrenheit scale. Absolute temperature based upon degrees Fahrenheit is called Rankine temperature and that based upon degrees Celsius is called Kelvin temperature.
- temperature error**. That instrument error due to nonstandard temperature of the instrument.
- temperature inversion**. An atmospheric condition in which the usual lapse rate is inverted, i.e., the temperature increases with increasing altitude.
- temporal**, *adj.* Pertaining to or limited by time.
- temporary light**. A light put into service for a limited period.
- temporary units**. See under INTERNATIONAL SYSTEM OF UNITS.
- tend**, *v., i.* To extend in a stated direction, as an anchor cable.
- tera-**. A prefix meaning one trillion (10¹²).
- terdiurnal**, *adj.* Occurring three times per day. A terdiurnal tidal constituent has three periods in a constituent day.
- terminator**, *n.* The line separating illuminated and dark portions of a non-self-luminous body, as the moon.
- terrace**, *n.* On the sea floor, a relatively flat horizontal or gently inclined surface, sometimes long and narrow, which is bounded by a steeper ascending slope on one side and by a steeper descending slope on the opposite side.
- terrestrial**, *adj.* Of or pertaining to the earth.
- terrestrial coordinates**. See GEOGRAPHICAL COORDINATES.
- terrestrial equator**. 1. The earth's equator, 90° from its geographical poles. 2. See ASTRONOMICAL EQUATOR.

- terrestrial latitude.** Latitude on the earth; angular distance from the equator, measured northward or southward through 90° and labeled N or S to indicate the direction of measurement. See also LATITUDE.
- terrestrial longitude.** Longitude on the earth, the arc of a parallel, or the angle at the pole, between the prime meridian and the meridian of a point on the earth, measured eastward or westward from the prime meridian through 180°, and labeled E or W to indicate the direction of measurement. See also LONGITUDE.
- terrestrial magnetism.** See GEOMAGNETISM.
- terrestrial meridian.** See ASTRONOMICAL MERIDIAN.
- terrestrial perturbations.** The largest gravitational perturbations of artificial satellites which are caused by the fact that the gravity field of the earth is not spherically symmetrical.
- terrestrial pole.** One of the poles of the earth. See also GEOGRAPHICAL POLE, GEOMAGNETIC POLE, MAGNETIC POLE.
- terrestrial radiation.** The total infrared radiation emitted from the earth's surface.
- terrestrial refraction.** Atmospheric refraction of a ray of radiant energy emanating from a point on or near the surface of the earth, as contrasted with ASTRONOMICAL REFRACTION of a ray passing through the earth's atmosphere from outer space.
- terrestrial sphere.** The earth.
- terrestrial triangle.** A triangle on the surface of the earth, especially the navigational triangle.
- territorial sea.** The zone off the coast of a nation immediately seaward from a base line. Sovereignty is maintained over this coastal zone by the coastal nation, subject to the right of innocent passage to the ships of all nations. The United States recognizes this zone as extending 4.8 kilometers from the base line. See also FISHING ZONE, FISHERY CONSERVATION ZONE.
- tertiary tide station.** A tide station at which continuous observations have been made over a minimum period of 30 days but less than 1 year. The series is reduced by comparison with simultaneous observations from a secondary control tide station. This station provides for a 29-day harmonic analysis. See also PRIMARY CONTROL TIDE STATION; SECONDARY CONTROL TIDE STATION; SUBORDINATE TIDE STATION, definition 2; TIDE STATION.
- tesla, n.** The derived unit of magnetic flux density in the International System of Units; it is equal to 1 weber per square meter.
- Texas norther.** See under NORTHER.
- thaw holes.** Vertical holes in sea ice formed when surface puddles melt through to the underlying water.
- thematic map.** See TOPICAL MAP.
- theoretical error.** See under SYSTEMATIC ERROR.
- thermometer, n.** An instrument for measuring temperature. A maximum thermometer automatically registers the highest temperature and a minimum thermometer the lowest temperature since the last thermometer setting.
- thermostat, n.** A device for automatically regulating temperature or detecting temperature changes.
- thick first-year ice.** First-year ice over 120 centimeters thick.
- thick weather.** Condition of greatly reduced visibility, as by fog, snow, rain, etc.
- thin first-year ice.** First-year ice 30 to 70 centimeters thick. Also called WHITE ICE.
- thin overcast.** An overcast sky cover which is predominantly transparent.
- thorofare, n.** This shortened form of thoroughfare has become standard for a natural waterway in marshy areas. It is the same type of feature as a slough or bayou.
- thoroughfare, n.** A public waterway such as a river or strait. See also THOROFARE.
- three-arm protractor.** An instrument consisting of a circle graduated in degrees, to which is attached one fixed arm and two arms pivoted at the center and provided with clamps so that they can be set at any angle to the fixed arm, within the limits of the instrument. It is used for finding a ship's position when the horizontal angles between three fixed and known points are measured.
- three-point problem.** From the observation of two horizontal angles between three objects or points of known (charted) positions, to determine the position of the point of observation. The problem is solved graphically by means of the three-arm protractor and analytically by trigonometrical calculation.
- threshold signal.** The smallest signal capable of being detected above the background noise level.
- threshold speed.** The minimum speed of current at which a particular current meter will measure at its rated reliability.
- thundercloud, n.** See CUMULONIMBUS.
- thunderhead, n.** See CUMULONIMBUS.
- thundersquall, n.** Strictly, the combined occurrence of a thunderstorm and a squall, the squall usually being associated with the downrush phenomenon typical of a well-developed thunderstorm.
- thunderstorm, n.** A local storm invariably produced by a cumulonimbus cloud and always accompanied by lightning and thunder, usually with strong gusts of wind, heavy rain, and sometimes with hail. It is usually of short duration. Sometimes called ELECTRICAL STORM.
- thunderstorm cirrus.** See FALSE CIRRUS.
- thunder sky.** A sky with an overcast and chaotic aspect, a general absence of wind except during showers, a mammatus appearance of the lower clouds, and dense cirrostratus and altocumulus above.
- tick, n.** A short, audible sound or beat, as that of a clock. A time signal in the form of one or more ticks is called a TIME TICK.
- tickle, n.** A narrow channel, as used locally in the Arctic and Newfoundland.
- tidal, adj.** Of or pertaining to tides.
- tidal amplitude.** One-half the range of a constituent tide.
- tidal basin.** A basin without a caisson or gate in which the level of water rises and falls with the tides. Also called OPEN BASIN. See also TIDAL HARBOR, NON-TIDAL BASIN.
- tidal bench mark.** See under BENCH MARK.
- tidal bench mark description.** A published, concise description of the location, stamped number of designation, date established, and elevation (referred to a tidal datum) of a specific bench mark.
- tidal bench mark state index map.** A state map which indicates the locations for which tidal datums and tidal bench mark descriptions are available.
- tidal bore.** A tidal wave that propagates up a relatively shallow and sloping estuary or river in a solitary wave. The leading edge presents an abrupt rise in level, frequently with continuous breaking and often immediately followed by several large undulations. An uncommon phenomenon, the tidal bore is usually associated with very large ranges in tide as well as wedge-shaped and rapidly shoaling entrances. Also called EAGRE, EAGER, MASCARET, PORORO-CA, BORE.
- tidal constants.** Tidal relations that remain practically constant for any particular locality. Tidal constants are classified as harmonic and nonharmonic. The harmonic constants consist of the amplitudes and epochs of the harmonic constituents, and the nonharmonic constants include the ranges and intervals derived directly from the high and low water observations.
- tidal constituent.** See CONSTITUENT.
- tidal current.** A horizontal movement of the water caused by gravitational interactions between the sun, moon, and earth. The horizontal component of the particulate motion of a tidal wave. Part of the same general movement of the sea that is manifested in the vertical rise and fall, called tide. Also called TIDAL STREAM. See also CURRENT, TIDAL WAVE, TIDE.
- tidal current charts.** 1. Charts on which tidal current data are depicted graphically. 2. *Tidal Current Chart*, as published by the National Ocean Survey, part of a set of charts which depict, by means of arrows and figures, the direction and velocity of the tidal current for each hour of the tidal cycle. The charts, which may be used for any year, present a comprehensive view of the tidal current movement in the respective waterways as a whole and also supply a means for readily determining for any time the direction and velocity of the current at various localities throughout the water area covered.
- tidal current constants.** See CURRENT CONSTANTS.
- tidal current diagrams.** Monthly diagrams which are used with tidal current charts to provide a convenient method to determine the current flow on a particular day.
- tidal current station.** See CURRENT STATION.
- tidal current tables.** 1. Tables which give the predicted times of slack water and the predicted times and velocities of maximum current flood and ebb for each day of the year at a number of reference stations, together with time differences and velocity ratios for obtaining predictions at subordinate stations. 2. *Tidal Current Tables*, published annually by the National Ocean Survey.
- tidal cycle.** A complete set of tidal conditions as those occurring during a tidal day, lunar month, or Metonic cycle.

- tidal datum.** See VERTICAL DATUM.
- tidal day.** See LUNAR DAY, definition 1.
- tidal difference.** Difference in time or height of a high or low water at a subordinate station and at a reference station for which predictions are given in the *Tide Tables*. The difference, when applied according to sign to the prediction at the reference station, gives the corresponding time or height for the subordinate station.
- tidal epoch.** See EPOCH, definition 3.
- tidal estuary.** See under ESTUARY, definition 1.
- tidal flats.** See FLAT.
- tidal harbor.** A harbor affected by the tides, distinct from a harbor in which the water level is maintained by caissons or gates. See also NON-TIDAL BASIN.
- tidal lights.** Lights shown at the entrance of a harbor, to indicate tide and tidal current conditions within the harbor.
- tidal lock.** See ENTRANCE LOCK.
- tidal marsh.** Any marsh the surface of which is covered and uncovered by tidal flow. See also FLAT.
- tidal platform ice foot.** An ice foot between high and low water levels, produced by the rise and fall of the tide.
- tidal quay.** A quay in an open harbor or basin with sufficient depth alongside to enable ships lying alongside to remain afloat at any state of the tide.
- tidal range.** See RANGE OF TIDE.
- tidal rise.** See RISE OF TIDE.
- tidal stream.** See TIDAL CURRENT.
- tidal water.** Any water subject to tidal action. See also TIDEWATER.
- tidal wave.** 1. A wave caused by the gravitational interactions between the sun, moon and earth. Essentially, high water is the crest of a tidal wave and low water is the trough. Tide is the vertical component of the particulate motion and tidal current is the horizontal component. The observed tide and tidal current can be considered the result of the combination of several tidal waves, each of which may vary from nearly pure progressive to nearly pure standing and with differing periods, heights, phase relationships, and directions. 2. An unusually high and destructive water level along a shore. It usually refers to either a storm surge or tsunami.
- tide, *n.*** The periodic rise and fall of the water resulting from gravitational interactions between the sun, moon, and earth. The vertical component of the particulate motion of a tidal wave. Although the accompanying horizontal movement of the water is part of the same phenomenon, it is preferable to designate this motion as TIDAL CURRENT. See also TIDAL WAVE definition 1.
- tide-bound, *adj.*** Unable to proceed because of insufficient depth of water due to tidal action.
- tide crack.** A crack at the line of junction between an immovable icefoot or ice wall and fast ice the latter subject to rise and fall of the tide.
- tide curve.** A graphic representation of the rise and fall of the tide in which time is usually represented by the abscissa and height by the ordinate of the graph. For a normal tide the graphic representation approximates a cosine curve. See also MARIGRAM.
- tide datum.** See VERTICAL DATUM.
- tide gage.** An instrument for measuring the rise and fall of the tide. See also AUTOMATIC TIDE GAGE, ELECTRIC TAPE GAGE, PRESSURE GAGE, TIDE STAFF.
- tide gate.** 1. A restricted passage through which water runs with great speed due to tidal action. 2. An opening through which water may flow freely when the tide sets in one direction, but which closes automatically and prevents the water from flowing in the other direction when the direction of flow is reversed.
- tidehead, *n.*** Inland limit of water affected by a tide.
- tide hole.** A hole made in ice to observe the height of the tide.
- tide indicator.** The part of a tide gage which indicates the height of tide at any time. The indicator may be in the immediate vicinity of the tidal water or at some distance from it.
- tideland, *n.*** Land which is under water at high tide and uncovered at low tide.
- tidemark, *n.*** 1. A high water mark left by tidal water. 2. The highest point reached by a high tide. 3. A mark placed to indicate the highest point reached by a high tide, or, occasionally, any specified state of tide.
- tide notes.** Notes included on nautical charts which give information on the mean range or the diurnal range of the tide, mean tide level, and extreme low water at key places on the chart.
- tide pole.** A graduated spar used for measuring the rise and fall of the tide. Also called TIDE STAFF.
- tide pool.** A pool left by an ebb tide.
- tide predicting machine.** A mechanical analog machine especially designed to handle the great quantity of constituent summations required in the harmonic method. William Ferrel's Maxima and Minima Tide Predictor was the first such machine used in the United States. Summing only 19 constituents, but giving direct readings of the predicted times and heights of the high and low waters, the Ferrel machine was used for the predictions of 1885 through 1914. A second machine was used for the predictions of 1912 through 1965. Predictions are now prepared using a computer.
- tide-producing force.** The part of the gravitational attraction of the moon and sun which is effective in producing the tides on the earth. The force varies approximately as the mass of the attracting body and inversely as the cube of its distance. The tide-producing force exerted by the sun is a little less than one-half as great as that of the moon.
- tide producing potential.** Tendency for particles on the earth to change their positions as a result of the gravitational interactions between the sun, moon, and earth. Although the gravitational attraction varies inversely as the square of the distance of the tide-producing body, the resulting potential varies inversely as the cube of the distance.
- tide race.** A very rapid tidal current through a comparatively narrow channel. Also called RACE.
- tide rips.** Small waves formed on the surface of water by the meeting of opposing tidal currents or by a tidal current crossing an irregular bottom. Vertical oscillation, rather than progressive waves, is characteristic of tide rips. See also RIPS.
- tide rode.** The condition of a ship at anchor heading into the tidal current. See also WIND RODE.
- tide signals.** Signals showing to navigators the state or change of the tide according to a prearranged code, or by direct display on a scale.
- tide staff.** A tide gage consisting of a vertical graduated staff from which the height of the tide can be read directly. See also ELECTRIC TAPE GAGE.
- tide station.** The geographic location at which tidal observations are conducted. Also, the facilities used to make tidal observations. These may include a tide house, tide gage, tide staff, and tidal bench marks. See also PRIMARY CONTROL TIDE STATION, SECONDARY CONTROL TIDE STATION, SUBORDINATE TIDE STATION, TERTIARY TIDE STATION.
- tide tables.** 1. Tables which give the predicted times and heights of high and low water for every day in the year for a number of reference stations, and tidal differences and ratios by which additional predictions can be obtained for subordinate stations. From these values it is possible to interpolate by a simple procedure the height of the tide at any hour of the day. See also TIDAL CURRENT TABLES.
- tidewater, *n.*** Water affected by tides or sometimes that part of it which covers the tideland. The term is sometimes used broadly to designate the seaboard. See also TIDAL WATER.
- tide wave.** See TIDAL WAVE, definition 1.
- tideway, *n.*** A channel through which a tidal current runs.
- tilt, *n.*** The angle which anything makes with the horizontal.
- tilted blocky iceberg.** A blocky iceberg which has tilted to present a triangular shape from the side.
- tilt correction.** The correction due to tilt error.
- tilt error.** The error introduced in the reading of an instrument when it is tilted, as a marine sextant held so that its frame is not perpendicular to the horizon.
- time, *n.*** 1. The interval between two events. 2. The date or other designated mark on a time scale. See also TIME SCALE, APPARENT TIME MEAN TIME, SIDEREAL TIME.
- time and altitude azimuth.** An azimuth determined by solution of the navigational triangle with meridian angle, declination, and altitude given. A TIME AZIMUTH is computed with meridian angle, declination, and latitude given. An ALTITUDE AZIMUTH is computed with altitude, declination, and latitude given.
- time azimuth.** An azimuth determined by solution of the navigational triangle, with meridian angle, declination, and latitude given. An ALTITUDE AZIMUTH is computed with altitude, declination, and latitude given. A TIME AND ALTITUDE AZIMUTH is computed with meridian angle, declination, and altitude given.

- time ball.** A visual time signal in the form of a ball. Before the widespread use of radio time signals, time balls were dropped, usually at local noon, from conspicuously-located masts in various ports. The accuracy of the signal was usually controlled by a telegraphic time signal from an observatory.
- time base.** A motion, of known but not necessarily of constant speed, used for measuring time intervals, particularly the sweep of a cathode-ray tube. In a linear time base the speed is constant in an expanded time base a selected part is of increased speed, and in a delayed time base the start is delayed. See also SWEEP.
- time diagram.** A diagram in which the celestial equator appears as a circle, and celestial meridians and hour circles as radial lines; used to facilitate solution of time problems and others involving arcs of the celestial equator or angles at the pole, by indicating relations between various quantities involved. Conventionally the relationships are given as viewed from a point over the south pole westward direction being counterclockwise. Also called DIAGRAM ON THE PLANE OF THE CELESTIAL EQUATOR, DIAGRAM ON THE PLANE OF THE EQUINOCTIAL.
- time line.** A line joining the heads of two vectors which represent successive courses and speeds of a ship in passing from one point to another in a known time via a specified intermediate point.
- time meridian.** Any meridian used as a reference for reckoning time, particularly a zone or standard meridian.
- timepiece, n.** An instrument for measuring time. See also CHRONOMETER, CLOCK, WATCH.
- time scale.** A system of assigning dates to events. There are three fundamental scales: Ephemeris Time, time based upon the rotation of the earth, and atomic time or time obtained by counting the cycles of a signal in resonance with certain kinds of atoms. Ephemeris Time (ET), the independent variable in the gravitational theories of the solar system, is the scale used by astronomers as the tabular argument of the precise, fundamental ephemerides of the sun, moon, and planets. Universal Time (UT1), time based on the rotation of the earth, is the scale used by astronomers as the tabular argument for most other ephemerides, e.g., the *Nautical Almanac*. Although ET and UT1 differ in concept, both are determined in arrears from astronomical observations and are extrapolated into the future based on International Atomic Time (TAI). Coordinated Universal Time (UTC) is the scale disseminated by most broadcast time services; it differs from TAI by an integral number of seconds.
- time sight.** Originally, an observation of the altitude of a celestial body, made for the purpose of determining longitude. Now, the expression is applied primarily to the common method of reducing such an observation.
- time signal.** An accurate signal marking a specified time or time interval. It is used primarily for determining errors of timepieces; usually sent from an observatory by radio. As defined by the International Telecommunications Union (ITU), a radiocommunication service for the transmission of time signals of stated high precision, intended for general reception.
- time switch.** A device for lighting or extinguishing a light at predetermined times, controlled by a timing device.
- time tick.** A time signal consisting of one or more short audible sounds or beats.
- time zone.** An area in all parts of which the same time is kept. In general, each zone is 15° of longitude in width with the Greenwich meridian (0° longitude) designated as the central meridian of zone 0 and the remaining zones centered on a meridian whose longitude is exactly divisible by 15. The zone boundary may vary considerably to conform to political and geographic boundaries. See also STANDARD TIME.
- Tokyo datum.** A geodetic datum that has its origin in Tokyo. It is defined in terms of the Bessel ellipsoid and is oriented by means of a single astronomic station. Using triangulation ties through Korea, the Tokyo datum is connected with the Manchurian datum. Unfortunately, since Tokyo is situated on a steep geoidal slope, the single station orientation has resulted in large systematic geoidal separations as the system is extended from its initial point.
- tombolo, n.** An islet and a shoal connecting it to a larger land area.
- tonnage.** A measure of the weight, size or capacity of a vessel. Dead-weight tonnage refers to the number of tons of 2240 lbs. that a vessel will carry in salt water loaded to summer marks. It may also be considered the difference between loaded and light displacement tonnage. Displacement tonnage refers to the amount of water displaced by a vessel afloat, and is thus a measure of actual weight. Gross tonnage or gross register tonnage refers to the total measured cubic volume (100 cubic feet per ton of 2240 lbs.), based on varying formulas. Net tonnage or net registered tonnage refers to the gross tonnage minus spaces generally not used for cargo, according to varying formulas. Register tonnage is the tonnage listed on the ship's registration certificate, usually gross and/or net. Cargo tonnage refers to the weight of the cargo, independent of the vessel. Merchant ships are normally referred to by their gross or dead-weight tonnage, warships by their displacement tonnage.
- tongue, n.** 1. A projection of the ice edge up to several kilometers in length, caused by wind or current. 2. An elongated extension of flat sea floor into an adjacent higher feature.
- topical map.** A map portraying a special subject. Also called SPECIAL SUBJECT MAP, THEMATIC MAP.
- topmark, n.** One or more objects of characteristic shape and color placed on top of a beacon or buoy to aid in its identification.
- topographical latitude.** See GEODETIC LATITUDE.
- topographic feature.** See under TOPOGRAPHY definition 1.
- topographic map.** A map which presents the vertical position of features in measurable form as well as their horizontal positions.
- topography, n.** 1. The configuration of the surface of the earth, including its relief and the position of features on it; the earth's natural and physical features collectively. 2. The science of delineation of natural and man-made features of a place or region especially in a way to show their positions and elevations.
- toponym, n.** A name applied to a physical or cultural topographic feature. For U.S. Government usage, policies and decisions governing place names on earth are established by the Board on Geographic Names. Also called PLACE NAME.
- toponymy, n.** 1. The study and treatment of toponyms. 2. A body of toponyms.
- topple, n.** 1. The vertical rotation of the spin axis of a gyroscope about the topple axis. 2. The vertical component of real precession or apparent precession, or the algebraic sum of the two. See also DRIFT, *n.* definition 6; TOTAL DRIFT.
- topple axis.** Of a gyroscope, the horizontal axis perpendicular to the horizontal spin axis, around which topple occurs. See also DRIFT AXIS, SPIN AXIS.
- tornado, n.** A violently rotating column of air, pendant from a cumulonimbus cloud, and nearly always observable as a funnel cloud. On a local scale, it is the most destructive of all atmospheric phenomena. Its vortex, commonly several hundreds of yards in diameter, whirls usually cyclonically with wind speeds estimated at 100 to more than 200 miles per hour. Its general direction of travel is governed by the motion of its parent cloud. Tornadoes occur on all continents, but are most common in Australia and the United States where the average number is 140 to 150 per year. They occur throughout the year and at any time of day, but are most frequent in spring and in middle and late afternoon. In the United States, tornadoes often develop several hundred miles southeast of a deep low centered in the central or north-central states. However, they may appear in any sector of the low, and/or be associated with fronts, instability lines, troughs, and even form within high-pressure ridges. A distinction sometimes is made between cyclonic tornadoes and convective tornadoes, the former occurring within the circulation of a well-developed parent cyclone, and the latter referring to all others. A tornado over water is called WATERSPOUT.
- tornado cloud.** See FUNNEL CLOUD.
- torque, n.** That which effects or tends to effect rotation or torsion and which is measured by the product of the applied force and the perpendicular distance from the line of action of the force to the axis of rotation.
- torrid zone.** The region of the earth between the Tropic of Cancer and the Tropic of Capricorn. Also called the TROPICS.
- total current.** The combination of the tidal and nontidal current. See also CURRENT.
- total drift.** The algebraic sum of drift due to real precession and that due to apparent precession.
- total eclipse.** An eclipse in which the entire source of light is obscured.
- tower, n.** A tall, slender structure, which may be charted with a position circle.

- towering**, *n.* Apparent increase 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 **STOOPING**.
- towing light**. A yellow light having the same characteristics as a **STERN LIGHT**.
- trace**, *n.* The luminous line resulting from the radial movement of the points of impingement of the electron stream on the face of the cathode-ray tube of a radar indicator. See also **SWEEP**.
- track**, *n.* 1. The intended or desired horizontal direction of travel with respect to the earth. The track as expressed in degrees of the compass may be different from the course due to such factors as making allowance for current or sea or steering to resume the **TRACK**, definition 2. 2. The path of intended travel with respect to the earth as drawn on the chart. Also called **INTENDED TRACK**, **TRACK-LINE**. 3. The actual path of a vessel over the ground, such as may be determined by tracking.
- track**, *v., t.* To follow the movements of an object such as by radar or an optical system.
- track angle**. See **TRACK**, definition 1.
- track chart**. A chart showing recommended, required, or established tracks, and usually indicating turning points, courses, and distances. A distinction is sometimes made between a **TRACK CHART** and a **ROUTE CHART**, the latter generally showing less specific information, and sometimes only the area for some distance each side of the great circle or rhumb line connecting two terminals.
- tracking**, *n.* In the operation of automated radar plotting aids, the process of observing the sequential changes in the position of a target to establish its motion.
- track-line**, *n.* See **TRACK**, definition 2.
- track made good**. The single resultant direction from a point of departure to a point of arrival at any given time. The use of this term to indicate a single resultant direction is preferred to the use of the misnomer course made good. See also **COURSE**, **TRACK**.
- trade winds**. Relatively permanent winds on each side of the equatorial doldrums, blowing from the northeast in the Northern Hemisphere and from the southeast in the Southern Hemisphere. See also **AN-TITRADES**.
- traffic control signals**. Visual signals placed in a harbor or waterway to indicate to shipping the movements authorized or prohibited at the time at which they are shown. Also called **DOCKING SIGNALS**.
- traffic lane**. An area of defined limits in which one-way traffic is established. See also **TWO-WAY ROUTE**, **ROUTING SYSTEM**.
- traffic separation scheme**. A routing measure designed for separating opposing streams of traffic in congested areas by the establishment of traffic lanes, precautionary areas, and other measures. See also **ROUTING SYSTEM**.
- train**, *v., t.* To control motion in bearing.
- training wall**. A wall, bank, or jetty, often submerged, built to direct or confine the flow of a river or tidal current.
- tramontana**, *n.* A northeasterly or northerly wind occurring in winter off the west coast of Italy. It is a fresh wind of the fine weather mistral type.
- transceiver**, *n.* A combination transmitter and receiver in a single housing, with some components being used by both parts. See also **TRANSPONDER**.
- transducer**, *n.* A device that converts one type of energy to another, such as the part of a depth sounder that changes electrical energy into acoustical energy.
- transfer**, *n.* 1. The distance a vessel moves perpendicular to its initial direction in making a turn of 90° with a constant rudder angle. 2. The distance a vessel moves perpendicular to its initial direction for turns of less than 90°. See also **ADVANCE**.
- transit**, *n.* 1. The passage of a celestial body across a celestial meridian, usually called **MERIDIAN TRANSIT**. 2. The apparent passage of a celestial body across the face of another celestial body or across any point, area, or line. 3. An instrument used by an astronomer to determine the exact instant of meridian transit of a celestial body. 4. A reversing instrument used by a surveyor for accurately measuring horizontal and vertical angles; a theodolite which can be reversed in its supports without being lifted from them.
- transit**, *v., t.* To cross. In navigation the term is generally used with reference to the passage of a celestial body over a meridian, across the face of another celestial body, or across the reticle of an optical instrument.
- TRANSIT**, *n.* See **NAVY NAVIGATION SATELLITE SYSTEM**.
- transition buoy**. A buoy indicating the transition between the lateral and cardinal systems of buoyage.
- transition mark**. A navigation mark indicating the transition between the lateral and cardinal systems of marking.
- translocation**, *n.* The determination of the relative positions of two points by simultaneous Doppler satellite observations from each point.
- translunar**, *adj.* Of or pertaining to space outside the moon's orbit about the earth.
- transmit-receive tube**. See as **TR TUBE**.
- transponder**, *n.* A component of a secondary radar system capable of accepting the interrogating signal, received from a radar set or interrogator, and in response automatically transmitting a signal which enables the transponder to be identified by the interrogating station. Also called **TRANSPONDER BEACON**. See also **RADAR BEACON**, **RACON**.
- transponder beacon**. See **TRANSPONDER**.
- transpose**, *v., t.* To change the relative place or position of, as to move a term from one side of an equation to the other with a change of sign.
- transverse bar**. A bar which extends approximately normal to the shoreline.
- transverse chart**. A chart on a transverse map projection. Also called **INVERSE CHART**.
- transverse cylindrical orthomorphic chart**. See **TRANSVERSE MERCATOR CHART**.
- transverse cylindrical orthomorphic projection**. See **TRANSVERSE MERCATOR MAP PROJECTION**.
- transverse equator**. The plane which is perpendicular to the axis of a transverse map projection. Also called **INVERSE EQUATOR**. See also **FICTITIOUS EQUATOR**.
- transverse graticule**. A fictitious graticule based upon a transverse map projection.
- transverse latitude**. Angular distance from a transverse equator. Also called **INVERSE LATITUDE**. See also **FICTITIOUS LATITUDE**.
- transverse longitude**. Angular distance between a prime transverse meridian and any given transverse meridian. Also called **INVERSE LONGITUDE**. See also **FICTITIOUS LONGITUDE**.
- transverse map projection**. A map projection with its axis in the plane of the equator.
- transverse Mercator chart**. A chart on the transverse Mercator projection. Also called **TRANSVERSE CYLINDRICAL ORTHOMORPHIC CHART**, **INVERSE MERCATOR CHART**, **INVERSE CYLINDRICAL ORTHOMORPHIC CHART**. See also **MERCATOR CHART**.
- transverse Mercator map projection**. A conformal cylindrical map projection, being in principle equivalent to the regular Mercator map projection turned (transversed) 90° in azimuth. In this projection, the central meridian is represented by a straight line, corresponding to the line which represents the equator on the regular Mercator projection. Neither the geographic meridians (except the central meridian) nor the geodetic parallels (except the equator) are represented by straight lines. Also called **INVERSE MERCATOR MAP PROJECTION**, **TRANSVERSE CYLINDRICAL ORTHOMORPHIC MAP PROJECTION**, **INVERSE CYLINDRICAL ORTHOMORPHIC MAP PROJECTION**. See also **MERCATOR MAP PROJECTION**.
- transverse meridian**. A great circle perpendicular to a transverse equator. The reference transverse meridian is called prime transverse meridian. Also called **INVERSE MERIDIAN**. See also **FICTITIOUS MERIDIAN**.
- transverse parallel**. A circle or line parallel to a transverse equator connecting all points of equal transverse latitude. Also called **INVERSE PARALLEL**. See also **FICTITIOUS PARALLEL**.
- transverse pole**. One of the two points 90° from a transverse equator.
- transverse rhumb line**. A line making the same oblique angle with all fictitious meridians of a transverse Mercator map projection. Transverse parallels and meridians may be considered special cases of the transverse rhumb line. Also called **INVERSE RHUMB LINE**. See also **FICTITIOUS RHUMB LINE**.
- transverse wave**. A wave in which the vibration is perpendicular to the direction of propagation, as in light waves. This is in contrast with a **LONGITUDINAL WAVE**, in which the vibration is in the direction of propagation.
- trapezoid**, *n.* A quadrilateral having two parallel sides and two nonparallel sides.

- traverse**, *n.* A series of directions and distances, such as when a sailing vessel beats into the wind, a steam vessel zigzags, or a surveyor makes measurements for determination of position.
- traverse sailing**. A method of determining the equivalent course and distance made good by a craft following a track consisting of a series of rhumb lines. The solution is usually made by means of traverse tables.
- traverse table**. A table giving relative values of various parts of plane right triangles, for use in solving such triangles, particularly in connection with various sailings.
- TR box**. See TR SWITCH.
- trench**, *n.* A long, narrow, characteristically very deep and asymmetrical depression of the sea floor, with relatively steep sides. See also TROUGH.
- triad**, *n.* Three radionavigation stations operated as a group for the determination of positions. Also called TRIPLET. See also STAR CHAIN.
- triangle**, *n.* A closed figure having three sides. The triangle is plane, spherical, or curvilinear as the sides are straight lines, arcs of great circles, or curves, respectively. See also EQUILATERAL TRIANGLE, ISOSCELES TRIANGLE, NAVIGATIONAL TRIANGLE, RIGHT TRIANGLE.
- triangulation**, *n.* A method of surveying in which the stations are points on the ground, located on the vertices of a chain or network of triangles. The angles of the triangles are measured instrumentally, and the sides are derived by computation from selected sides which are called BASE LINES, the lengths of which are obtained from direction measurements on the ground. See also TRILATERATION.
- triaxial ellipsoid**. A reference ellipsoid having three unequal axes; the shortest is the polar axis, and the two longer ones lie in the plane of the equator.
- tributary**, *n.* A stream that flows into another stream or a lake.
- tributary**. Any body of water that flows into a larger body, i.e., a creek in relation to a river, or a river in relation to a bay.
- trigger**, *n.* In a radar set, a sharp voltage pulse which is applied to the modulator tubes to fire the transmitter, applied simultaneously to the sweep generator to start the electron beam moving radially from the sweep origin to the edge of the face of the cathode-ray tube.
- triggering**, *n.* The process of causing a transponder to respond.
- trigonometric functions**. The ratios of the sides of a plane right triangle, as related to one of its angles. If a is the side opposite an acute angle, b the adjacent side, and c the hypotenuse the trigonometric functions are: $\text{sine} = a/c$, $\text{cosine} = b/c$, $\text{tangent} = a/b$, $\text{cotangent} = b/a$, $\text{secant} = c/b$, $\text{cosecant} = c/a$. The expression NATURAL TRIGONOMETRIC FUNCTION is sometimes used to distinguish a trigonometric function from its logarithm (called LOGARITHMIC TRIGONOMETRIC FUNCTION).
- trihedral reflector**. See CORNER REFLECTOR.
- trilateration**, *n.* A method of surveying wherein the lengths of the triangle sides are measured, usually by electronic methods, and the angles are computed from the measured lengths. See also TRIANGULATION.
- trim**, *n.* The relation of the draft of a vessel at the bow and stern. See also DOWN BY THE HEAD; DOWN BY THE STERN; DRAG, *n.*, definition 3; SQUAT, *n.*
- triple interpolation**. Interpolation when there are three arguments or variables.
- triples**, *n.* See TRIAD.
- trochoid**, *n.* In relation to wave motion, a curve described by a point on a radius of a circle that rolls along a straight line. Also called PROLATE CYCLOID.
- tropic**, *adj.* Of or pertaining to a tropic or the tropics.
- tropic**, *n.* Either of the two parallels of declination (north or south), approximately $23^{\circ}27'$ from the celestial equator, reached by the sun at its maximum declination, or the corresponding parallels on the earth. The northern of these is called the TROPIC OF CANCER and the southern, the TROPIC OF CAPRICORN. The region of the earth between these two parallels is called the TORRID ZONE, or often the TROPICS.
- tropical**, *adj.* 1. Of or pertaining to the vernal equinox. See also SIDEREAL. 2. Of or pertaining to the Tropics.
- tropical air**. Warm air of an air mass originating in subtropical anticyclones, further classified as tropical continental air and tropical maritime air, as it originates over land or sea, respectively.
- tropical continental air**. Air of an air mass originating over a land area in low latitudes, such as the Sahara desert. Tropical continental air is characterized by high surface temperature and low specific humidity.
- tropical cyclone**. The general term for cyclones originating in the tropics or subtropics. These cyclones are classified by form and intensity as follows: A tropical disturbance is a discrete system of apparently organized convection generally 100 to 300 miles in diameter, having a nonfrontal migratory character, having maintained its identity for 24 hours or more. It may or may not be associated with a detectable perturbation of the wind field. It has no strong winds and no closed isobars, i.e., isobars that completely enclose the low. In successive stages of intensification, the tropical cyclone are classified as tropical disturbance, tropical depression, tropical storm, and hurricane or typhoon. The tropical depression has one or more closed isobars and some rotary circulation at the surface. The highest sustained (1-minute mean) surface wind speed is 33 knots. The tropical storm has closed isobars and a distinct rotary circulation. The highest sustained (1-minute mean) surface wind speed is 34 to 63 knots. The hurricane or typhoon has closed isobars, a strong and very pronounced rotary circulation, and a sustained (1-minute mean) surface wind speed of 64 knots or higher. Tropical cyclones occur almost entirely in six rather distinct areas, four in the Northern Hemisphere and two in the Southern Hemisphere. The name by which the tropical cyclone is commonly known varies somewhat with locality as follows: North Atlantic: A tropical cyclone with winds of 64 knots or greater is called a HURRICANE. Eastern North Pacific: The name HURRICANE is used as in the North Atlantic. Western North Pacific: A fully developed storm with winds of 64 knots or greater is called a TYPHOON or, locally in the Philippines, a BAGUIO. North Indian Ocean: A tropical cyclone with winds of 34 knots or greater is called a CYCLONIC STORM. South Indian Ocean: A tropical storm with winds of 34 knots or greater is called a CYCLONE. Southwest Pacific and Australian Area: The name CYCLONE is used as in the South Indian Ocean. A severe tropical cyclone originating in the Timor Sea and moving southwestward and then southeastward across the interior of northwestern Australia is called a WILLY-WILLY. Tropical cyclones have not been observed in the South Atlantic Ocean or in the South Pacific Ocean east of longitude 140°W .
- tropical depression**. See under TROPICAL CYCLONE.
- tropical disturbance**. See under TROPICAL CYCLONE.
- tropical maritime air**. Air of an air mass originating over an ocean area in low latitudes. Tropical maritime air is characterized by high surface temperature and high specific humidity.
- tropical month**. The average period of the revolution of the moon about the earth with respect to the vernal equinox, a period of 27 days, 7 hours, 43 minutes, 4.7 seconds. This is almost the same length as the sidereal month.
- tropical storm**. See under TROPICAL CYCLONE.
- tropical year**. The period of one revolution of the earth around the sun, with respect to the vernal equinox. Because of precession of the equinoxes, this is not 360° with respect to the stars, but $50.3''$ less. A tropical year is about 20 minutes shorter than a sidereal year, averaging 365 days, 5 hours, 48 minutes, and 46 seconds in 1900, decreasing at the rate of 0.00530 second annually. Also called ASTRONOMICAL, EQUINOCTIAL, NATURAL, or SOLAR YEAR.
- tropic currents**. Tidal currents occurring semimonthly when the effect of the moon's maximum declination is greatest. At these times the tendency of the moon to produce a diurnal inequality in the current is at a maximum.
- tropic higher high water**. The higher high water of tropic tides. See also TROPIC TIDES.
- tropic higher high water interval**. The lunitidal interval pertaining to the higher high waters at the time of the tropic tides. See also TROPIC LOWER LOW WATER INTERVAL.
- tropic higher low water**. The higher low water of tropic tides. See also TROPIC TIDES.
- tropic high water inequality**. The average difference between the two high waters of the day at the times of the tropic tides. Applicable only when the tide is semidiurnal or mixed. See also TROPIC TIDES, TROPIC LOW WATER INEQUALITY.
- tropic inequalities**. See TROPIC HIGH WATER INEQUALITY, TROPIC LOW WATER INEQUALITY.
- tropic intervals**. See TROPIC HIGH WATER INTERVAL, TROPIC LOWER LOW WATER INTERVAL.

- tropic lower high water.** The lower high water of tropic tides. See also TROPIC TIDES.
- tropic lower low water.** The lower low water of tropic tides. See also TROPIC TIDES.
- tropic lower low water interval.** The lunital interval pertaining to the lower low waters at the time of tropic tides. See also TROPIC HIGHER HIGH WATER INTERVAL.
- tropic low water inequality.** The average difference between the two low waters of the day at the times of the tropic tides. Applicable only when the type of tide is semidiurnal or mixed. See also TROPIC TIDES, TROPIC HIGH WATER INEQUALITY.
- Tropic of Cancer.** The northern parallel of declination, approximately 23°27' from the celestial equator, reached by the sun at its maximum northerly declination, or the corresponding parallel on the earth. It is named for the sign of the zodiac in which the sun reached its maximum northerly declination at the time the parallel was so named.
- Tropic of Capricorn.** The southern parallel of declination, approximately 23°27' from the celestial equator, reached by the sun at its maximum southerly declination, or the corresponding parallel on the earth. It is named for the sign of the zodiac in which the sun reached its maximum southerly declination at the time the parallel was so named.
- tropic ranges.** See GREAT TROPIC RANGE, MEAN TROPIC RANGE, SMALL TROPIC RANGE.
- tropics, n.** See TORRID ZONE.
- tropic speed.** The greater flood or greater ebb speed at the time of tropic currents.
- tropic tides.** Tides occurring semimonthly when the effect of the moon's maximum declination is greatest. At these times there is a tendency for an increase in the diurnal range. The tidal datums pertaining to the tropic tides are designated as tropic higher high water, tropic lower high water, tropic higher low water, and tropic lower low water.
- tropopause, n.** The boundary between the troposphere and the stratosphere.
- troposphere, n.** The portion of the atmosphere from the earth's surface to the tropopause, i.e., the lowest 10 to 20 kilometers of the atmosphere. It is characterized by decreasing temperature with height, appreciable vertical wind motion, appreciable water vapor content, and variable weather.
- tropospheric radio duct.** A quasi-horizontal layer in the troposphere between the boundaries of which radio energy of sufficiently high frequency is substantially confined and propagated with abnormally low attenuation. The duct may be formed in the lower portion of the atmosphere when there is a marked temperature inversion or a sharp decrease in water vapor with increased height. See also SURFACE DUCT, ELEVATED DUCT.
- tropospheric wave.** A radio wave traveling between points on or near the surface of the earth by one or more paths lying wholly within the troposphere. The propagation of this wave is determined primarily by the distribution of the refractive index in the troposphere.
- trough, n.** 1. A long depression of the sea floor, characteristically flat bottomed and steep sided, and normally shallower than a trench. 2. In meteorology, an elongated area of relatively low pressure. The opposite of a trough is called RIDGE. The term trough is commonly used to distinguish the above elongated area from the closed circulation of a low (or cyclone). But a large-scale trough may include one or more lows. 3. The lowest part of a wave between two crests.
- TR switch (from transmit/receive).** A switch used to automatically decouple the receiver from the antenna during transmission when there is a common transmitting and receiving antenna. Also called TR BOX.
- TR tube.** An electronic switch capable of rapid switching between transmit and receive functions, used to protect the receiver from damage from energy generated by the transmitter. Another device called the anti-TR tube is used to block the passage of echoes to the receiver during the relatively long periods when the transmitter is inactive. See also TR SWITCH, ATR TUBE.
- true, adj.** 1. Related to true north. 2. Actual, as contrasted with fictitious, such as the true sun. 3. Related to a fixed point, either on the earth or in space, such as true wind, in contrast with RELATIVE, which is related to a moving point. 4. Corrected, as in the term true altitude.
- true altitude.** See OBSERVED ALTITUDE.
- true amplitude.** Amplitude relative to true east or west.
- true anomaly.** See under ANOMALY, definition 2.
- true azimuth.** Azimuth relative to true north.
- true bearing.** Bearing relative to true north; compass bearing corrected for compass error.
- true course.** Course relative to true north.
- true direction.** Horizontal direction expressed as angular distance from true north.
- true heading.** Heading relative to true north.
- true meridian.** A meridian through the geographical pole; compare with MAGNETIC MERIDIAN, COMPASS MERIDIAN, or GRID MERIDIAN, the north-south lines according to magnetic, compass, or grid direction, respectively.
- true motion display.** A type of radarscope display in which own ship and other moving targets move on the plan position indicator in accordance with their true courses and speeds. All fixed targets appear as stationary echoes. However, uncompensated set and drift of own ship may result in some movement of the echoes (of stationary targets). This display is similar to a navigational (geographical) plot. See also RELATIVE MOTION DISPLAY.
- true motion radar.** A radar set which provides a true motion display as opposed to the relative motion display most commonly used. The true motion radar requires own ship's speed input, either log or manual, in addition to own ship's course input.
- true north.** The direction of the north geographical pole; the reference direction for measurement of true directions.
- true plot.** See GEOGRAPHICAL PLOT.
- true prime vertical.** See under PRIME VERTICAL CIRCLE.
- true solar time.** See APPARENT TIME.
- true sun.** The actual sun as it appears in the sky. Usually called APPARENT SUN. See also MEAN SUN, DYNAMICAL MEAN SUN.
- true track of target.** The motion of a radar target on a true motion display. When the true motion display is ground stabilized, i.e., allowance is made for the set and drift of current, the motion displayed is called GROUND TRACK. Without such stabilization the motion displayed is called WATER TRACK.
- true wind.** Wind relative to a fixed point on the earth. Wind relative to a moving point is called APPARENT or RELATIVE WIND.
- trumpet, n.** See HORN.
- tsunami, n.** A long-period sea wave, potentially catastrophic, produced by a submarine earthquake or volcanic eruption. It may travel unnoticed across the ocean for thousands of miles from its point of origin, building up to great heights over shoal water. Also called SEISMIC SEA WAVE, TIDAL WAVE.
- Tsushima Current.** That part of the Kuroshio flowing northeastward through Korea Strait and along the Japanese coast in the Japan Sea; it flows strongly eastward through Tsugaru Strait at speeds to 7 knots. The Tsushima Current is strong most of the time, averaging about 1 knot; however, it may weaken somewhat during autumn. In Western Channel, between Tsushima and southeastern Korea, tidal currents retard the general northeastward flowing Tsushima Current during the southwest-setting flood and reinforce it during the northeast-setting ebb. Resultant current speeds range from 1/4 knot during flood to 3 knots during ebb. In the strait between Tsushima and Kyushu, the current flows northeastward throughout the year. Current speeds in Korea Strait also are affected by the seasonal variations of the monsoons. The strongest currents usually occur from July through November. The Tsushima Current divides after flowing through Korea Strait, a small branch flowing northward along the east coast of Korea as far as Vladivostok in summer. During this season the current is strongest and overcomes the weak southward flowing, coastal Liman Current. When the current combines with the ebb current, the resultant speed may reach 2 knots. During winter this branch of the Tsushima Current is weakest and is influenced by the stronger southward flowing Liman Current which normally extends as far south as 39°N, with speeds from 1/4 to 3/4 knot. The main body of the Tsushima Current flows northeastward off the northeast coast of Honshu. In summer, after entering the Japan Sea, its speed is about 1/2 to 1 knot. In winter the current is relatively weak, although near the islands and headlands speeds may exceed 1 knot, especially after northwesterly gales.

tuba, *n.* See FUNNEL CLOUD.

tufa, *n.* A porous rocky deposit formed in streams and in the ocean near the mouths of rivers.

tumble, *v., i.* The tendency of a gyroscope to precess suddenly and to an extreme extent as a result of exceeding its operating limits of bank or pitch.

tune, *v., t.* To adjust the frequency of a circuit or system to obtain optimum performance, commonly to adjust to resonance.

turbidity, *n.* A measure of the amount of suspended material in water.

turbulent, *n.* Agitated or disturbed fluid motion, not flowing smoothly or uniformly.

turbulent flow. Fluid motion in which random motions of parts of the fluid are superimposed upon a simple pattern of flow. All or nearly all fluid flow displays some degree of turbulence. The opposite is STREAMLINE FLOW.

turning basin. A water area, usually dredged to well-defined limits, used for turning vessels.

turning buoy. A buoy marking a turn in a channel.

turning circle. The path described by the pivot point of the vessel as it makes a turn of 360° with constant rudder and speed.

turn of the tide. See CHANGE OF TIDE.

twenty-four hour satellite. See GEOSYNCHRONOUS SATELLITE.

twilight, *n.* The period of incomplete darkness following sunset (evening twilight) or preceding sunrise (morning twilight). Twilight is designated as civil, nautical, or astronomical, as the darker limit occurs when the center of the sun is 6°, 12°, or 18° below the celestial horizon, respectively. See also DAWN, DUSK.

twinkle, *v., i.* To flicker randomly, or vary in intensity.

two-body orbit. The motion of a point mass in the presence of the gravitational attraction of another point mass, and in the absence of other forces. This orbit is usually an ellipse, but may be a parabola or hyperbola.

two-degree-of-freedom gyro. A gyroscope the spin axis of which is free to rotate about two orthogonal axes, not counting the spin axis. See also DEGREE-OF-FREEDOM.

two-tone diaphone. See under DIAPHONE.

two-way route. A route within defined limits in which two-way traffic is established, aimed at providing safe passage of ships through waters where navigation is difficult or dangerous. See also ROUTING SYSTEM.

tyfon, *n.* See TYPHON.

type of tide. A classification based on characteristic forms of a tide curve. Qualitatively, when the two high waters and two low waters of each tidal day are approximately equal in height, the tide is said to be semidiurnal; when there is a relatively large diurnal inequality in the high or low waters or both, it is said to be mixed; and when there is only one high water and one low water in each tidal day, it is said to be diurnal.

typhon, *n.* A diaphragm horn which operates under the influence of compressed air or steam. Also called TYFON.

typhoon, *n.* See under TROPICAL CYCLONE.