
**Ships and marine technology —
Terms, abbreviations, graphical
symbols and concepts on navigation**

*Navires et technologie maritime — Termes, abréviations, symboles
graphiques et concepts relatifs à la navigation*

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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This document was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*, Subcommittee SC 6, *Navigation and ship operations*.

This second edition cancels and replaces the first edition (ISO 19018:2004), which has been technically revised.

The main changes compared to the previous edition are as follows:

- [Clause 2](#): updated referenced documents: ISO 31 deleted (its current revision, ISO 80000-3:2019, does no longer mention the nautical mile, knot, degree and minute), and changed from IEC 60872 and IEC 60936 to related original IMO resolutions;
- added [Clause 3](#), “Terms and definitions”, and subsequent clauses renumbered;
- items 4.1.1 to 4.1.3: referenced document changed from “ISO 31-1 and/or Chart INT 1” to “Chart INT” only, as applicable;
- items [6.1](#) and 6.1.1: abbreviation of “course” changed from “CSE” to “CRS”, and the second sentence of the explanation of [6.1](#) deleted (harmonized with that in radar navigation; IEC 62288 and/or IEC 62388);
- items 6.1.1 to 6.1.15 and 7.1 to 7.5: updated “Definition, remarks” based on IMO Resolution MSC. 192 (79) (harmonized with abbreviation and definition in IEC 62288 and/or IEC 62388);
- items 6.1.1, 6.1.2 and 6.1.4: added 6.1.1 “course”, 6.1.2 “heading” and 6.1.4 “course to steer” (harmonized with abbreviation and definition in IEC 62288 and/or IEC 62388);
- items 7.1 to 7.5: changed the “Definition, remarks”, based on IMO Resolution MSC, 192[79];
- deleted former Clause 15, “Radar navigation”, and former Clause 16, “LORAN-C”; and former Clause 17 renumbered as new [Clause 16](#);

- new [Clause 16](#) (former Clause 17): title changed from “Global Positioning System (GPS)” to “Global Navigation Satellite System (GNSS)”;
- Bibliography: added “[4] IEC 62288:2014”, “[5] IEC 62388:2013”, “[6] IMO Resolution MSC. 191(79)” and “[7] IMO Resolution MSC. 192(79)”.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Ships and marine technology — Terms, abbreviations, graphical symbols and concepts on navigation

1 Scope

This document provides terms, abbreviations and graphical symbols for use in maritime navigation on board ships. Symbols for use in mathematical formulae are also given, as applicable.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

Terms, abbreviation and symbols used in navigation are given in [Clauses 4](#) to [16](#). Abbreviations can prove useful, but they should not be used in mathematical formulae.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1

navigation

process of finding the position of a craft or vehicle, and of planning, recording and controlling its movement from one place to another

4 Special units in maritime navigation

Item No.	Name of the unit	International symbol	Definition, conversion factors and remarks
4.1 Unit of length			
4.1.1	nautical mile	NM in charts: M ^a	1 NM = 1 852 m. The nautical mile is not an SI-unit. This definition was adopted by the First International Hydrographic Conference in 1929.
4.1.2	cable, cable length	cbl	One-tenth of a nautical mile. The cable is not an SI unit.
^a Symbol M is to be used in Charts according to the "Chart Specifications of the IHO" which came into force at the XIIth International Hydrographic Conference 1982 in Monaco.			

Item No.	Name of the unit	International symbol	Definition, conversion factors and remarks
4.2 Unit of velocity and speed			
4.2.1	knot, knots	kn	$1 \text{ kn} = 1 \frac{\text{NM}}{\text{h}} = 0,514 \text{ 444 m/s}$ (see Chart INT 1). Velocity is a vector quantity, whereas speed is a scalar having magnitude only. The knot is not an SI unit.
4.3 Unit of angle			
4.3.1	degree	°	$1^\circ = \frac{\pi}{180} \text{ rad}$
4.3.2	minute	'	$1' = \frac{1^\circ}{60}$ In maritime navigation, angles should be specified in degrees, minutes and decimals of minutes (example: write 17° 40,25' not 17° 40' 15"). Degrees and minutes are not SI units.
^a Symbol M is to be used in Charts according to the "Chart Specifications of the IHO" which came into force at the XIIth International Hydrographic Conference 1982 in Monaco.			

5 Reference directions

5.1 North directions

North directions are horizontal reference directions.

Item No.	Term	Abbreviation	Definition, remarks
5.1.1	true north	TN	Northerly direction of the meridian (see 10.1.12).
5.1.2	magnetic north	MN	Northerly direction of the horizontal component of the Earth's magnetic field (see 15.2).
5.1.3	compass north	CN	Northerly direction of the needle or zero-index of a magnetic compass.
5.1.4	gyro north	GyN	Northerly direction indicated by the gyro-compass.

5.2 Dead ahead direction

Dead ahead direction is the direction ahead of the ship's fore-and-aft line.

6 Course, heading, track, speed

6.1 Course, heading

Course (CRS) and heading (HDG) are angles, measured in the horizontal plane from one of the reference directions specified in [Clause 5](#), counted clockwise from 000° through <360°, written as three-digit numbers.

Item No.	Term	Abbreviation	Definition, remarks
6.1.1	course	CRS	Direction of motion relative to ground or to sea, of a ship, expressed as an angular displacement from north.
6.1.2	heading	HDG	Direction in which the bow of a ship is pointing, expressed as an angular displacement from north. [SOURCE: IMO Resolution MSC. 192(79), Appendix 2.]
6.1.3	true course	TC T CRS	Direction of motion relative to ground or to sea, of a target, expressed as an angular displacement from true north. [SOURCE: IMO Resolution MSC. 192(79), Appendix 2.]
6.1.4	course to steer	CTS	The direction in which the ship is intended to be steered, defined as an angular displacement from true course.
6.1.5	true heading	TH T HDG	Horizontal direction that the bow of a ship is pointing, expressed as an angular displacement from true north.
6.1.6	magnetic course	MC M CRS	Direction of motion relative to ground or to sea, of a ship, expressed as an angular displacement from magnetic north.
6.1.7	magnetic heading	MH M HDG	Horizontal direction that the bow of a ship is pointing, expressed as an angular displacement from magnetic north.
6.1.8	compass course	CC C CRS	Direction of motion relative to ground or to sea, of a ship, expressed as an angular displacement from compass north.
6.1.9	compass heading	CH C HDG	Horizontal direction that the bow of a ship is pointing, expressed as an angular displacement from compass north.
6.1.10	gyro course	GyC Gy CRS	Direction of motion relative to ground or to sea, of a ship, expressed as an angular displacement from gyro north.
6.1.11	gyro heading	GyH GY HDG	Horizontal direction that the bow of a ship is pointing, expressed as an angular displacement from gyro north.
6.1.12	course through water	CTW	Direction of the ship's movement through the water, defined by the angle between the meridian through its position and the direction of the ship's movement through the water, expressed in angular units from true north. [SOURCE: IMO Resolution MSC. 192(79), Appendix 2.]
6.1.13	course of advance, course to make good	COA	Direction from the ship's last fix (see 10.2.5) to the next estimated position (see 10.2.3), expressed in angular units from true north.
6.1.14	course over ground	COG	Direction of the ship's movement relative to the Earth, measured on board the ship, expressed in angular units from true north. [SOURCE: IMO Resolution MSC. 192(79), Appendix 2.]

Item No.	Term	Abbreviation	Definition, remarks
6.1.15	course made good	CMG	Rhumb-line direction (see 10.2.11) between two fixes (see 10.2.5).

6.2 Track

The term “track” is used

- as the path of voyage over the ground (ground track) or through the water (water track), as plotted in the chart, expressed in angular units from true north (000°) clockwise through <360°; one must distinguish rhumb-line track (see 10.2.11) and great-circle track (see 10.2.9),
- as the path of radar-targets on a plan position indicator.

Item No.	Term	Abbreviation	Definition, remarks
6.2.1	intended water track	WT	Intended path of the ship's movement through the water.
6.2.2	water track	WAT TRK	Actual path of the ship's movement through the water.
6.2.3	intended ground track	GT	Intended path of the ship's movement over the ground.
6.2.4	ground track	GND TRK	Actual path of the ship's movement relative to the Earth.
6.2.5	track made good	TMG	Track between two fixes (see 10.2.5).

6.3 Speed

Item No.	Name of the term	Abbreviation	Definition, remarks
6.3.1	speed	SPD	Own ship's speed in dead ahead direction (see 5.2) produced by machine or sail.
6.3.2	speed through the water	STW	Speed of the ship relative to the water surface.
6.3.3	speed of advance, speed to make good	SOA	Estimated speed of the ship relative to the Earth.
6.3.4	speed over the ground	SOG	Speed of the ship relative to the Earth, measured on board the ship.
6.3.5	speed made good	SMG	Speed of the ship between two fixes.

7 Bearings

Bearing (BRG) is an angle measured in the horizontal plane from one of the reference directions specified in [Clause 5](#), measured clockwise from 000° through 360°, written as three-digit numbers. In radar navigation, the abbreviation BRG for bearing is preferred.

Item No.	Term	Abbreviation	Definition, remarks
7.1	true bearing	TB T BRG	Direction of a target from own ship's consistent common reference point (CCRP) or from another target's position, expressed as an angular displacement from true north. [SOURCE: IMO Resolution MSC. 192(79), Appendix 2, modified – added CCRP.]

Item No.	Term	Abbreviation	Definition, remarks
7.2	magnetic bearing	MB	Direction of a target from own ship's consistent common reference point (CCRP) or from another target's position, expressed as an angular displacement from magnetic north. [SOURCE: IMO Resolution MSC. 192(79), Appendix 2, modified – added CCRP.]
7.3	compass bearing	CB	Direction of a target from own ship's consistent common reference point (CCRP) or from another target's position, expressed as an angular displacement from compass north. [SOURCE: IMO Resolution MSC. 192(79), Appendix 2, modified – added CCRP.]
7.4	gyro bearing	GyB Gy BRG	Direction of a target from own ship's consistent common reference point (CCRP) or from another target's position, expressed as an angular displacement from gyro north. [SOURCE: IMO Resolution MSC. 192(79), Appendix 2, modified – added CCRP.]
7.5	relative bearing	RB R BRG	Direction of a target's position from own ship's consistent common reference point (CCRP) expressed as an angular displacement from own ship's heading. [SOURCE: IMO Resolution MSC. 192(79), Appendix 2, modified – added CCRP.]

8 Corrections

The numerical value of a correction is the best estimate which can be made of the difference between the true and the measured value of a parameter. The sign is such that a correction which is to be added to an observed reading is taken as positive.

Item No.	Name of the term	Abbreviation	Definition, remarks
8.1	magnetic variation	MAG VAR	Angle between the geographic and the magnetic meridians (see 10.1.12 and 15.4) at any place of the Earth, also called magnetic declination, from true north to magnetic north, eastwards named E (sign plus), westwards named W (sign minus).
8.2	deviation	DEV	Angle between the magnetic meridian (see 15.4) and the axis of a compass card, expressed in degrees east or west to indicate the direction in which the northern end of the compass card is offset from magnetic north when it is disturbed by local attraction, from magnetic north to compass north, eastwards named E (sign plus), westwards named W (sign minus).
8.3	total compass error correction	CE	Sum of variation and deviation. Angle between true north and compass north, from true north eastwards named E (sign plus), westwards named W (sign minus).
8.4	speed error correction	δ_{Gy}^a	Correction of the gyro heading error, which depends on position, speed and course of the ship; sign plus when the ship moves southwards, sign minus when the ship moves northwards.
^a Formula symbol.			

Item No.	Name of the term	Abbreviation	Definition, remarks
8.5	gyro error correction	GyE	Correction of all errors (including speed error) of a gyro compass. Angle between true north and gyro north, from true north eastwards with sign plus, error low, westwards with sign minus, error high.
8.6	gyro-R		Correction of the measured error of a gyro compass indication without speed error (gyro residual aberration).
8.7	gyro-A		Correction of the constant part of gyro-R; mean value of measured gyro-R values.
8.8	leeway angle		Angular difference between the course through water and the course to steer (CTW – TC).
8.9	drift angle		Angular difference between the course of advance or course over ground and the course through water (COA – CTW or COG – CTW).
8.10	leeway and drift angle		Angular difference between the course of advance or course over ground and the course to steer (COA – TC or COG – TC); sum of leeway angle and drift angle.
8.11	conversion angle	u^a	Angular difference at a point between the rhumb line and a great circle (see 10.2.11 and 10.2.9) from that point to another point on the Earth's surface.
^a Formula symbol.			

9 Influence of wind and current

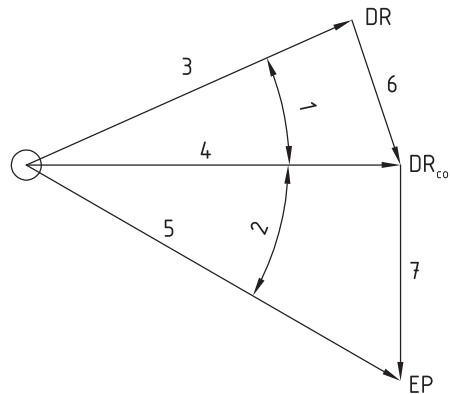
9.1 Wind

Wind direction is the direction where the movement of the air comes from. The vector of this movement is in the opposite direction of the wind direction. For instance, in the case of an east wind, the movement of the air is in the direction of 270° (direction of the vector in weather charts).

Item No.	Name of the term	Definition, remarks
9.1.1	true wind	Velocity of the air (speed and direction) relative to a fixed point on the Earth.
9.1.2	speed wind	Velocity of the air (speed and direction) only caused by the ship's motion relative to the Earth; (direction against course over ground).
9.1.3	apparent wind, relative wind	Velocity of the air (speed and direction) relative to the moving ship; the vector of apparent wind or relative wind (wind feeling on board) minus the vector of speed wind is equal to the vector of true wind.

9.2 Leeway and drift triangle

See [Figure 1](#).

**Key**

- $\oplus$ last fix (see 10.2.5)
 1 leeway angle (see 8.8)
 2 drift angle (see 8.9)
 3 own ship's velocity (see 9.2.1)
 4 intended water track (see 6.2.1 and 9.2.3)
 5 intended ground track (see 6.2.3 and 9.2.5)
 6 leeway vector (see 9.2.2)
 7 drift vector (see 9.2.4)
 DR dead reckoning position (see 10.2.1)
 DR_{cor} corrected dead reckoning position (sea position) (see 10.2.2)
 EP estimated position (see 10.2.3)

Figure 1 — Leeway and drift triangle

Item No.	Term	Definition of the vector	Item No.	Magnitude of vector	Abbreviation	Item No.	Direction of vector	Abbreviation
9.2.1	own ship's velocity	own ship's velocity	9.2.1.1	speed (6.3.1)	SPD	9.2.1.2	course to steer (6.1.4)	CTS TC
9.2.2	leeway vector	ship's velocity due to influence of wind	9.2.2.1	leeway drift		9.2.2.2	leeway set	
9.2.3	intended water track	ship's velocity relative to the water	9.2.3.1	speed through water (6.3.2)	STW	9.2.3.2	course through water (6.1.12)	CTW
9.2.4	drift vector	horizontal velocity of the water surface	9.2.4.1	drift		9.2.4.2	set	
9.2.5	intended ground track	ship's velocity relative to the Earth	9.2.5.1	speed of advance (6.3.3)	SOA	9.2.5.2	course of advance (6.1.13)	COA

10 Geographical coordinates, positions and lines, and graphical symbols

10.1 Geographical coordinates

Item No.	Term	Abbreviation	Definition, remarks
10.1.1	geodetic datum		A set of parameters specifying the reference co-ordinate system used for geodetic control in the calculation of coordinates of points on the Earth.
10.1.2	World Geodetic System	WGS	A global geodetic reference system developed by the USA for satellite position fixing and recommended by the IHO for hydrographic and cartographic use.
10.1.3	latitude, geographic latitude	φ LAT	Angular distance from the Equator (00°) measured northwards or southwards through 90° and labelled N or S to indicate the direction of measurement.
10.1.4	longitude, geographic longitude	λ LON	Angle at the Pole between the prime meridian (000°) (see 10.1.13) and the meridian of a point on the Earth, measured eastwards or westwards from the prime meridian through 180° and labelled E or W to indicate the direction of measurement ^a .
10.1.5	geodetic latitude		Angular distance between the plane of the geodetic equator and the normal to a station on the Earth ellipsoid, measured from the Equator (00°) northwards or southwards through 90° and labelled N or S.
10.1.6	geodetic longitude		Angle between the plane of the geodetic prime meridian (000°) and the plane of the station's geodetic meridian, measured eastwards or westwards from the prime meridian through 180° and labelled E or W ^a .
10.1.7	geocentric latitude		Angle at the centre of the reference ellipsoid between the plane of the Equator (10.2.8) and the radius vector to a point on the ellipsoid, measured from the Equator (00°) northwards or southwards through 90° and labelled N or S.
10.1.8	geocentric longitude		Angle between the plane of the geocentric prime meridian (000°) and the plane of the station's geocentric meridian, measured eastwards or westwards from the prime meridian through 180° and labelled E or W ^a .
10.1.9	astronomical latitude		Angular distance between the plane of the celestial equator (00°) and the plumb line through the station, measured northwards or southwards through 90° and labelled N or S.
10.1.10	astronomical longitude		Angle between the plane of the prime meridian and the plane of the station's celestial meridian (see 13.2.8), measured eastwards or westwards, from the prime meridian through 180° and labelled E or W.
10.1.11	parallel of latitude		A small circle on the Earth's surface parallel to the Equator.
10.1.12	meridian		Great circle between the geographical poles of the Earth; north-south-reference line.
10.1.13	prime meridian, Greenwich meridian		The reference meridian 000°; origin for measurement of longitude.
^a The planes of geographic, geodetic and geocentric meridians are identical.			
^b Formula symbol.			

Item No.	Term	Abbreviation	Definition, remarks
10.1.14	difference of latitude	$d.\text{lat}$ $\Delta\varphi^b$	The shorter arc of any meridian between the parallels of two places, expressed in angular measurement.
10.1.15	distance of latitude	b^b	Distance on a meridian between two parallels of latitude, expressed in nautical miles.
10.1.16	difference of longitude	$d.\text{lon}$ $\Delta\lambda^b$	The shorter arc of a parallel between the meridians of two places, expressed in angular units.
10.1.17	distance of longitude on equator	l^b	Distance on the Equator between two meridians, expressed in nautical miles.
10.1.18	mean latitude	L_m φ_m	Half of the sum of the latitudes of two places, expressed in angular units.
10.1.19	departure	Dep α^b	Distance between two meridians at any given parallel of latitude, expressed in nautical miles, the distance to the east or west made good, or to make good, in proceeding from one point to another.
10.1.20	meridional parts	ϕ^b	The length of the arc of a meridian between the Equator and a given parallel on a Mercator chart, expressed in units of 1' of longitude on the Equator.
10.1.21	meridional difference	$\Delta\phi^b$	The difference of the meridional parts of any two given parallels.
^a The planes of geographic, geodetic and geocentric meridians are identical.			
^b Formula symbol.			

10.2 Positions and lines

Item No.	Term	Abbreviation	Definition, remarks
10.2.1	dead reckoning position	DR	Calculated position of a vessel obtained by adding to the last fix (see 10.2.5) the ship's true course (see 6.1.1) and own speed (see 6.3.1).
10.2.2	corrected dead reckoning position, sea position	DR_{cor}	Calculated position of a vessel obtained by adding to the last fix the ship's course and speed through water (see 6.1.12 and 6.3.2).
10.2.3	estimated position	EP	Most probable position of a vessel obtained by adding to the last fix the ship's course and speed of advance, considering all estimated influences, including current (see 6.1.13 and 6.3.3).
10.2.4	assumed position	AP	A point on the surface of the Earth at which a vessel is assumed to be located and for which the computed altitude is determined in the solution of a celestial observation.
10.2.5	fix	Fix	Ship's position determined without reference to any other former position.
10.2.6	North pole	P_N	North geographical pole.
10.2.7	South pole	P_S	South geographical pole.
10.2.8	equator		Primary great circle of the Earth whose plane is at right angles to the Earth's axis.
10.2.9	great circle	GC	The intersection of a sphere on the Earth and a plane through its centre; also called orthodrome.
10.2.10	great-circle direction		Horizontal direction of a great circle, expressed as an angular distance from true north (000°) at the ship's position.

Item No.	Term	Abbreviation	Definition, remarks
10.2.11	rhumb line	RL	Line on the surface of the Earth forming the same angle with all meridians; straight line on a Mercator chart; also called loxodrome.
10.2.12	rhumb-line direction		Horizontal direction of a rhumb line, expressed as an angular distance from true north (000°) at the ship's position.
10.2.13	course line		Graphic representation of a ship's intended course to make good.
10.2.14	line of position	LOP	A plotted line on which a ship is located.
10.2.15	transferred line of position		Line of position transferred to the direction of the course line by the distance sailed.
10.2.16	line of equal bearings	LEB	Line of equal bearings of an object.
10.2.17	line of equal altitudes		Line of equal angular distances of the centre of a celestial body above the celestial horizon (13.2.1).

10.3 Graphical symbols

Graphical symbols, abbreviations and terms which are used on charts on board ships are published in Chart INT 1 (see footnote to 4.1.1). This subclause lists the symbols for the terms which are given in this standard.

Item No.	Graphical symbol	Definition, remarks
10.3.1	----->	Line of position (see 10.2.14); if the line of position points towards an object, with the arrowhead towards this object.
10.3.2	----->-->	Transferred line of position (see 10.2.15); arrowheads point towards the object.
10.3.3	+	Estimated or dead reckoning position, annotated with time in a four-digit notation in parentheses; e.g. (0715).
10.3.4	⊕	Fix (see 10.2.5); annotated with time in a four-digit notation in parentheses; e.g. (0715).

11 Waypoint navigation

Item No.	Term	Abbreviation	Definition, remarks
11.1 Points			
11.1.1	port (or point) of departure		The port (or point) where a voyage begins.
11.1.2	destination	DEST	The geographic point to which a craft is navigating. It may be the next waypoint along a route of waypoints or the final destination of a voyage.
11.1.3	waypoint	WPT	Point on a route (see 11.2.3).
	a) waypoint distance	WPD	Distance to a waypoint.
	b) waypoint bearing	WPB	Bearing of a waypoint.
11.1.4	vertex		The point on a great circle nearest to the north or south pole.

Item No.	Term	Abbreviation	Definition, remarks
11.2 Distances			
11.2.1	great-circle distance, orthodromic distance	D_G	Distance between two points on a great circle.
11.2.2	rhumb-line distance, loxodromic distance	D_L	Distance between two points on a rhumb line.
11.2.3	route	RTE	Intended ground tracks (see 6.2.2) of a voyage.
11.2.4	leg	DTG	Intended ground track between two waypoints.
11.2.5	distance to go		Distance on the route to the next waypoint or to destination.
11.2.6	cross track distance	XTD	Position distance perpendicular to the intended ground track (see 6.2.3).
11.2.7	along track error	ATE	Position error in the direction of the intended ground track.
11.2.8	fix adjustment		Vector from the estimated position (see 10.2.3) to the fix (see 10.2.5).
11.3 Time			
11.3.1	estimated time of arrival	ETA	The predicted time of reaching a destination or waypoint.
11.3.2	time to go	TTG	The predicted duration to reach a destination or waypoint from the present position.
11.3.3	estimated time of departure	ETD	The predicted time of leaving a port or waypoint.

12 Terms of time

12.1 Universal terms of time

Item No.	Term	Abbreviation	Definition, remarks
12.1.1	International Atomic Time	TAI	The time reference coordinate established by the Bureau International de l'Heure (BIH) on the basis of atomic clocks.
12.1.2	Universal Time	UT	Time as defined by the rotational motion of the Earth and determined from the apparent diurnal motions which reflect this rotation. Because of variations in the rate of rotation, Universal Time is not rigorously uniform.
12.1.3	Universal Time 0	UT0	The uncorrected time of the Earth's rotation as measured by the transit of stars across the observer's meridian. This rotation is referred to a fiducial mark on the ecliptic which approximates the position of the mean sun.
12.1.4	Universal Time One	UT1	UT0 corrected for polar motion. Mean solar time of the prime meridian (see 10.1.13), measured from midnight through 24 h due to the observed motion of the geographic pole; used in astronomical navigation.
12.1.5	Universal Time Two	UT2	UT1 corrected for seasonal variations in the Earth's rotation.

Item No.	Term	Abbreviation	Definition, remarks
12.1.6	Coordinated Universal Time	UTC	The time scale that is available from most broadcast time signals. It differs from TAI (see 12.1.1) by an integral number of seconds. UTC is maintained within 1 s of UT1 by the introduction of 1 s-steps (leap seconds) when necessary, normally at the end of December.
12.1.7	DUT1	DUT1	Approximation to the difference: UT1 minus UTC, transmitted in codes on broadcast signals.
12.1.8	standard time	ST	The legally established time for a given zone.
12.1.9	Greenwich Mean Time	GMT	Former time scale; sometimes still used if difference between UTC and UT1 is not important. Local mean time (see 12.2.2) at the Greenwich meridian (see 10.1.13).

12.2 Terms concerning time for navigation use

Item No.	Name of the term	Abbreviation	Definition, remarks
12.2.1	local apparent time	LAT	The arc of the celestial equator between the lower branch of the local celestial meridian (see 13.2.10) and the hour circle of the true sun, measured westwards from the lower branch of the local celestial meridian through 24 h.
12.2.2	local mean time	LMT	The arc of the celestial equator between the lower branch of the celestial meridian and the hour circle of the mean sun, measured westwards from the lower branch of the local celestial meridian through 24 h.
12.2.3	equation of time		The difference at any instant between local apparent and local mean time (LAT – LMT).
12.2.4	zone time	ZT	The local mean time of a reference or zone meridian whose time is kept throughout a designated zone. The zone meridian is usually the nearest meridian whose longitude is exactly divisible by 15°.
12.2.5	chronometer time		The time as indicated by a chronometer.
12.2.6	chronometer correction	CC	The amount that must be added algebraically to the chronometer time to obtain UT. Chronometer correction is numerically equal to the chronometer error, but of opposite sign.
12.2.7	difference of longitude in time		Difference of longitude (see 10.1.16) divided by the Earth's angular velocity of 15°/h.
12.2.8	zone description		Time difference between zone time and UTC.
12.2.9	meridian passage	MP	The passage time of a celestial body across the Greenwich hour circle.

13 Astronomical navigation

13.1 Celestial coordinates, points, lines and angles on the celestial sphere

Item No.	Term	Abbreviation	Definition, remarks
13.1.1	zenith	Z	The point of the celestial sphere vertically overhead.
13.1.2	nadir	Na	The point of the celestial sphere vertically below the observer.
13.1.3	celestial poles	P_N, P_S	Points of intersection of the celestial sphere and the extended axis of the Earth, labelled N and S.
13.1.4	elevated pole		The celestial pole above the horizon.
13.1.5	depressed pole		The celestial pole below the horizon.
13.1.6	cardinal points		Any of the four principal directions, north, east, south and west.
13.1.7	north	N	The primary reference direction relative to the Earth, indicated by true north (000°) (see 5.1.1).
13.1.8	east	E	The direction 090° to the right of north.
13.1.9	south	S	The direction 180° from north.
13.1.10	west	W	The direction 270° to the right of north or 090° to the left of north.
13.1.11	Aries, vernal equinox	Y	The point of intersection of the ecliptic and the celestial equator, occupied by the Sun as it changes from south to north declination; also called "First point of Aries".
13.1.12	autumnal equinox	Ω	The point of intersection of the ecliptic and the celestial equator, occupied by the Sun as it changes from north to south declination; also called "First point of Libra".

13.2 Great and small circles

Item No.	Name of the term	Abbreviation	Definition, remarks
13.2.1	celestial horizon		The circle of the celestial sphere formed by the intersection of the celestial sphere and a plane through the centre of the Earth and perpendicular to the zenith-nadir line.
13.2.2	parallel of altitude		A circle of the celestial sphere parallel to the celestial horizon, connecting all points of equal altitudes; also called circle of equal altitudes.
13.2.3	vertical circle		A great circle of the celestial sphere through the zenith and nadir.
	a) principal vertical		The vertical circle passing through the north and south celestial poles.
	b) prime vertical		The vertical circle perpendicular to the principal vertical. The intersection of the prime vertical with the horizon defines the east and west points of the celestial horizon.
13.2.4	celestial equator		The primary great circle of the celestial sphere, everywhere 90° from the celestial poles.
13.2.5	parallel of declination		A circle of the celestial sphere parallel to the celestial equator.
13.2.6	hour circle		A great circle through the celestial poles.

Item No.	Name of the term	Abbreviation	Definition, remarks
13.2.7	Greenwich hour circle		Hour circle on the celestial sphere projected from the prime meridian (see 10.1.13).
13.2.8	celestial meridian		A great circle of the celestial sphere through the celestial poles, zenith and nadir.
13.2.9	upper branch		The half of a celestial meridian from pole to pole through the zenith.
13.2.10	lower branch		The half of a celestial meridian from pole to pole through the nadir.
13.2.11	north meridian		Vertical circle through the north-point.
13.2.12	south meridian		Vertical circle through the south-point.

13.3 Altitudes and angular distances on the celestial sphere

Item No.	Name of the term	Abbreviation/ symbol	Definition, remarks
13.3.1	true altitude	h	Angular distance of the centre of a celestial body above the celestial horizon.
13.3.2	azimuth	Zn	The horizontal direction of a celestial point, expressed as the angular distance from true north (000°) clockwise through <360°.
13.3.3	declination	d, dec	The arc of an hour circle between the celestial equator and a point on the celestial sphere, measured northwards or southwards from the celestial equator (00°) through 90°, and labelled N (sign +) or S (sign -) to indicate the direction of measurement.
13.3.4	local hour angle	LHA	The angle at the celestial pole between the upper branch of the local celestial meridian and the hour circle of a point on the celestial sphere, measured westwards from the local celestial meridian (000°) through <360°.
13.3.4.1	meridian angle (East)	t_E	Angle at the celestial pole between the upper branch of the local celestial meridian and the hour circle of a celestial body, measured eastwards; from the local celestial meridian through 180°.
13.3.4.2	meridian angle (West)	t_W	Angle at the celestial pole between the upper branch of the local celestial meridian and the hour circle of a celestial body, measured westwards from the local celestial meridian through 180°.
13.3.4.3	local hour angle of Aries	LHA Υ	The angle at the celestial pole between the upper branch of the local celestial meridian and the hour circle of Aries, measured westwards from the local celestial meridian (000°) through <360°.
13.3.6	a) Greenwich hour angle	GHA	Local hour angle at longitude 000°.
	b) Greenwich hour angle of Aries	GHA Υ	Angle at the celestial pole between the Greenwich hour circle and the hour circle of Aries, measured westwards from the Greenwich hour circle (000°) through <360°.
13.3.6	siderial hour angle	SHA	The angle at the celestial pole between the hour circle of Aries and the hour circle of a point on the celestial sphere, measured westwards from the hour circle of Aries (000°) through <360°.
13.3.7	right ascension	RA	360° – SHA

Item No.	Name of the term	Abbreviation/ symbol	Definition, remarks
13.3.8	navigational triangle		Celestial triangle formed on the celestial sphere by the great circles connecting the elevated pole, zenith of the observer's (assumed) position and a celestial body.
13.3.9	parallactic angle		The angle between a body's hour circle and its vertical circle on the celestial sphere.
13.3.10	zenith distance		The arc of a vertical circle between the zenith and a point of the celestial sphere, measured from the zenith through 90° for bodies above the horizon.
13.3.11	meridian altitude	z	Altitude of a celestial body on the celestial meridian.
13.3.12	polar distance		The arc of an hour circle between a celestial elevated pole and a point on the celestial sphere.

13.4 Sight reduction

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

Item No.	Name of the term	Abbreviation/ symbol	Definition, remarks
13.4.1	visible horizon	h_s	The line where sky and Earth appear to meet, and the projection of this line upon the celestial sphere.
13.4.2	sextant altitude		Altitude as indicated by a sextant before corrections are applied.
13.4.3	index correction		The correction due to the error in the reading of a sextant equal to the difference between the zero of the scale and the zero of the index.
13.4.4	sextant altitude above the visible horizon	IC	Altitude of a celestial body after index correction has been applied.
13.4.5	a) sensible horizon		The circle of the celestial sphere formed by the intersection of the celestial sphere and a plane through the observer's eye which is perpendicular to the zenith-nadir line.
	b) geoidal horizon	PinA	The circle of the celestial sphere formed by the intersection of the celestial sphere and a plane through a point on the sea level surface of the Earth which is perpendicular to the zenith-nadir line.
13.4.6	parallax in altitude		Geocentric parallax of a celestial body; the difference in the direction of the body due to the displacement of the observer from the centre of the Earth. The expression is used to distinguish the given altitude from HP.
13.4.7	parallax in horizon	HP	Parallax in altitude when the body is in the sensible horizon (see 13.4.5).
13.4.8	refraction correction	R	Correction to a sextant altitude due to the atmospheric refraction.
13.4.9	dip of the horizon	D	The vertical angle at the observer's eye between the sensible horizon and the line of sight to the visible horizon.
13.4.10	height of eye	HE	Height of the observer's eyes above the water surface.
13.4.11	apparent altitude		Corrected sextant altitude (see 13.4.2) including all corrections, IC, PinA, R and D.

Item No.	Name of the term	Abbreviation/symbol	Definition, remarks
13.4.12	semidiameter	SD	Half the angle at the observer subtended by the visible disk of a celestial body.
13.4.13	assumed position	AP	See 10.2.4.
13.4.14	observed altitude, true altitude	H_o	Corrected sextant altitude; angular distance of the centre of a celestial body above the celestial horizon of an observer, measured along a vertical circle through 90°.
13.4.15	computed altitude	H_c	Altitude of the centre of a celestial body determined by tables or computation as an arc on a vertical circle of the celestial sphere from the celestial horizon.
13.4.16	altitude intercept	$H_o - H_c$	The difference in minutes between the observed and the computed altitude, labelled + (towards) and - (away), as the observed altitude is greater or smaller than the computed altitude.

13.5 Symbols of celestial bodies and sextant altitudes

Item No.	Symbol	Celestial body
13.5.1	☉	Sun
13.5.2	☾	Moon
13.5.3	*	star
13.5.4	♀	Venus
13.5.5	♁	Earth
13.5.6	♂	Mars
13.5.7	♃	Jupiter
13.5.8	♄	Saturn
13.5.9	☉ ^a	upper limb ^a (Sun)
13.5.10	☾ ^a	lower limb ^a (Moon)
13.5.11	—*—	centre of a celestial body (star or planet)

^a A limb is the upper or lower edge of an observed celestial body.

14 Depth of water and tides

Item No.	Name of the term	Abbreviation	Definition, remarks
14.1 Depth data			
14.1.1	depth of water	CD	Distance between water surface and bottom.
14.1.2	depth below keel, or under-keel clearance		Distance between keel and bottom.
14.1.3	depth below transducer		Distance of transducer from bottom.
14.1.4	chart datum		The vertical datum to which depths and drying heights on a chart are referred.
14.1.5	charted depth		The vertical distance from the chart datum to the bottom.