

## **USPS CPS-EN Electronic Navigation Consolidated Glossary**

**2D** (Two (2) Dimensional Fix). A GPS is operating in the 2D mode to display latitude and longitude when it has insufficient satellite information to calculate the altitude of the top of the GPS antenna.

**3D** (Three (3) Dimensional Fix) A GPS is operating in the 3D mode when it is tracking enough satellites to calculate the latitude, longitude and altitude of the top of the GPS antenna.

**A-GPS (Assisted GPS)** – A concept utilized by several cell phone and tablet manufacturers that utilizes components of a cellular telephone system to help the portable device compute a fix.

**Almanac** (as in GPS system) – One of two messages sent from satellites to notify receivers of current constellation status. Almanac provides general information about current status of the GPS system. Report may contain the identity of up to 32 satellites as well as data related to atmospheric conditions.

**ARCS (Admiralty Raster Chart Service)** the department of the United Kingdom Hydrographic Office, which began producing charts for the British Royal Navy and then for commercial use in its own proprietary format, the ARCS format. The charts from ARCS are updated weekly as needed.

**BSB** (BSB Electronic Charts). Most popular raster electronic chart format for raster electronic navigational charts.

**CD-ROM Compact Disc (Compact Disk Read Only Memory)** version of the common music recording medium which can store over 600 Mbytes of data in a computer readable format.

**CF (Compact Flash)**, one of a few standards for removable storage cards for digital data that can be used with Personal Digital Assistants, cameras, GPS receivers and computers.

**CHS (Canadian Hydrographic Service)** The federal agency that produces charts in Canada.

**CMG (Course Made Good)** A straight line denoting the net direction you have travelled from the departure point to the arrival point or from one fix to another. This cannot be depicted until you have arrived at the second point.

**COG (Course Over the Ground)** The actual course, or track, the GPS is moving over the ground.

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**Course:** The angle that the intended path of the vehicle makes with a fixed reference object such as geographic north. In marine use - the direction (in magnetic degrees) in which the boat is to be steered or is being steered.

**Datum (geodetic)** a set of parameters specifying the reference surface or the reference coordinate system, used in the calculation of points on earth. Identifies base coordinates of specific locations used on a specific chart and the formula for calculating distance measurements based on the shape of the earth.

**DGPS (Differential Global Positioning System).** 1) A concept where corrections for ionospheric distortions and **SA** (if present) are collected at ground stations, processed at a central location for transmission to suitably equipped GPS receivers. Both the DGPS System and the FAA WAAS System are examples of DGPS. 2) A complementary North American system that generates DGPS signals and transmits via high frequency radio signals to properly equipped GPS receivers. .

**DNC (Digital Nautical Chart)** a military electronic chart specification developed by the U.S. National Geospatial Intelligence Agency, and used by the NATO fleets.

**DOD – United States Department of Defense** - The owner/operator of the NavStar Global Positioning System.

**DOP (Dilution Of Precision)** (sometimes referred to as Horizontal Dilution of Precision). The fixes obtained from **GPS** are subject to varying degrees of accuracy depending upon the relative locations of the satellites overhead. The **DOP** is an internal measurement by the GPS of the reliability of the fix. Reported in both NMEA 0183 and 2000 sentences as a number between 0.x and 1 where 1 is the most reliable.

**ECDIS (Electronic Chart Display and Information System)** - A computer-based navigation information system that complies with International Maritime Organization (IMO) regulations and can be used as an alternative to paper nautical charts aboard SOLAS vessels.

**ECS (Electronic Chart System)** – A generic term used for any nautical charting system other than those meeting ECDIS specifications. As an example, a commercially available ChartPlotter for recreational boats is considered an ECS device.

**Emulator** – A computer simulator program that looks like and works like a particular model of equipment.

**ENC (Electronic Navigational Chart)** – a digital representation of a navigational chart. Internationally an ENC may be in either raster or vector format. As

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applied to NOAA produced charts ENC specifies a chart in the international S-57 (vector) format.

**ENT (Enter)** - The key which activates your entries or selections on a computerized device.

**EPE (Estimated Probable Error)** - A feature in which the GPS allows for the known inaccuracies that might be present in your position display.

**Ephemeris** - In astronomy and celestial navigation, an ephemeris gives the positions of astronomical objects in the sky at a given time or times.

**Ephemeris Data** (In the GPS system) One of two messages sent from satellites to notify receivers of current constellation status. The ephemeris identifies the precise orbit for a GPS satellite. It is transmitted through the L1 frequency. Each satellite sends its own ephemeris which is valid for about 2 hours.

**ETA (Estimated Time of Arrival)** - The calculated time at which you should reach the designated point, waypoint or destination at your present heading and speed.

**ETD (Estimated Time of Departure)** - The time at which you plan to leave a particular location.

**ETE (Estimated Time Reroute)** The calculated elapsed time that you are expected to take to reach a desired destination at your present heading and speed.

**FRS (Family Radio Service)** The most common use for FRS radios is for short-distance, low power two-way communications using small, portable hand-held devices that function similar to walkie-talkies. FRS uses Frequency Modulation.

**Flash Memory** A computer memory chip which can be reprogrammed from a PC without specialized devices using a simple program, or directly over the Internet.

**GALILEO** Is the developing European Union satellite navigation standard and system. It will comprise a constellation of a total of 30 Medium Earth Orbit (MEO) satellites, of which 3 are spares. It is being developed as European users have no alternative today other than to take their positions from U.S. GPS or Russian **GLONASS** satellites.

**GDOP (Geometric Dilution of Precision)** An assessment of the amount of possible inaccuracy in a **GPS** fix due to the poor geographic placement of the satellites it is using to obtain the fix in all planes around the receiver.

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**GIS (Geographical Information System)** A system of computers and software for collecting, holding, assessing the integrity of, correcting, manipulating, analyzing, and graphically displaying data which are spatially referenced to the earth.

**GLONASS** – Russia's Satellite Based global navigation system.

**GMT (Greenwich Mean Time)** The time standard at zero degrees longitude located at the position of an observatory located at Greenwich, England, a suburb of London. The term 'GMT' is now replaced by '**UTC**'.

**GNSS (Global Navigation Satellite System)** A generic term. GPS, Galileo and GLONASS are GNSS.

**GPS (Global Positioning System)** A U.S. military satellite constellation and control systems that provides positioning information to receivers on aircraft, boats, and other vehicles on or above the earth's surface.

**HDOP (Horizontal Dilution of Precision)** An assessment of the amount of possible inaccuracy in a **GPS** fix due to the poor relative placement, in the horizontal plane, of the received satellites being used to calculate the fix.

**IMO (International Maritime Organization)** A United Nations organization. Its primary purpose is to develop and maintain a comprehensive regulatory framework for shipping and its remit today includes safety, environmental concerns, legal matters, technical co-operation, maritime security and the efficiency of shipping.

**L1** - One of two **GPS** frequencies. L1 frequency is 1.57542 GHz. L1 provides several modulated signals that transfer the C/A code transmission protocol used by all users to determine their position.

**L2** – One of two **GPS** frequencies. L2 frequency is 1.2276 GHz. L2 provides several modulated signals that transfer the P-code transmission protocol. Originally L2 was intended for use by military receivers to obtain the encrypted precision information. L2 is being enhanced to carry an additional signal to improve civilian GPS precision.

**LAN (Local Area Network)** Is a computer network that interconnects computers within a limited area such as a home, computer laboratory, or office building using network media such as fiber optic or Ethernet cables.

**LCD (Liquid Crystal Display)** The flat screen, low energy technology used to display information in the text or graphic formats found in radar sets, laptop computers and digital watches.

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**MASA** The Japanese **Satellite DGPS** equivalent to **WAAS** so that locations in Japan can be calculated down to within centimeters.

**MARK** May refer to a geographic location such as a pencil mark on a chart or a named geographic object identified within a GPS or PC based navigation program. Often confused with a Waypoint. Used as a formal term in some navigation devices. Please see **Waypoint** below.

**MOB (Man Overboard)** A feature of GPS and ChartPlotters which stores the current position at a press of the MOB or Mark button. This enables the vessel to be steered back to the original position to retrieve a crew member who has fallen overboard.

**Navigation Terms** (Bearing, Course, Heading, Track and others). A boater's definition of terms are listed in this document. However, manufacturers of GPS and ChartPlotter devices may program a term into the device's user interface with a different meaning. Readers are encouraged to understand both the general and specific definition.

**NAVSTAR** The U.S. Military's formal name for the **GPS system**.

**NMEA (National Marine Electronics Association)** Is a U.S.-based marine electronics trade organization setting combined electrical and data specification between marine electronic devices. Is a plug-and-play communications standard used for connecting marine sensors and display units within ships and boats. **NMEA 0183** is the current specification and is slowly being phased out in favor of the newer **NMEA 2000** standard.

**NAD (North American Datum)** The original standard point of reference for all North American maps and charts, and the dimensions of the sphere of the Earth that are to be used to produce them. The numerical suffix depicts the publication year of the standard. The current standard is **NAD1983**. (Compatible with **WGS1984**)

**NOAA (Nautical Oceanic and Atmospheric Administration)** A U.S. government agency that produces charts in the U.S.

**NOTMAR (Notices to Mariners)** available from the Canadian Coast Guard by mail or from <http://www.notmar.gc.ca>.

**OpenCPN (Open ChartPlotter, GPS and Navigation)** software OpenCPN is a free software (GPLv2) project to create a concise chart plotter and navigation software, for use underway or as a planning tool. OpenCPN is developed by a team of active sailors using real world conditions for program testing and refinement. Additional information at <http://opencpn.org/ocpn/>

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**PAN (Personal Area Network)** connecting computers and peripherals over very short distances (10 m, 30 ft.).

**PCMCIA (Personal Computer Memory Card International Association)** the body setting standards for flash memory cards to be added to personal computers, cameras and **PDA**s.

**PDA (Personal Digital Assistant)** a small personal computer capable of being held in one hand, usually used for scheduling, e-mail or voice communications, but capable of running PC-like programs and ChartPlotters.

**PIXEL (Picture Element)** - A single addressable point on an electronic digital display screen, one of the thousands, even millions, of points which form the picture. The higher the number of PIXELS the greater the detail in the images the screen is capable of displaying.

**PPS (Positioning Service)** That portion of the **GPS** which provides the U.S. military, and other allied armed forces with high accuracy unadulterated, but encrypted, positioning signals.

**PRN** A pseudo-random bit sequence. A C/A PRN will have 1024 bits and can be decrypted by a commercial receiver. A P PRN will have 6,187 G bits and can only be decrypted by military receivers.

**PRNs** - An identity of a specific C/A PRN. May be any number in the range 1 thru 32 that identified a satellite.

**QZSS (Quasi-Zenith Satellite System)** Japanese regional system providing GPS Augmentation covering Asia and Oceania.

**RCDS (Raster Chart Display System)** A set of performance standards for raster charts used in commercial applications.

**RNC (Raster Nautical Chart)** Geo-referenced, digital images of NOAA navigational charts. Because the images are geo-referenced, you can display your vessel's position on the chart image if you have a computer-based navigation system that is connected to a Global Positioning System (GPS).

**Route** A way or course taken in getting from a starting point to a destination. In marine navigation a "Route" is typically a series of waypoints used for point to point navigation. A route must have at least two waypoints, a start and finish, but can contain as many as needed to define a safe path to the destination. GPS & ChartPlotter devices and navigation programs provide tools to define and name a **Route** by organizing waypoints. Then, while underway provide guidance information to safely travel the route.

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**S-57** – International Hydrographic Organization Transfer Standard for Digital Hydrographic Data. Specifies the format used by NOAA and other national hydrographic offices to create official Electronic Nautical Chart (**ENC**)s in vector format.

**SA (Selective Availability)** The feature of the **GPS** which allows the U.S. **DOD** to selectively introduce errors into the satellite signals received by non-military users, for security reasons. It was rescinded by order of President Clinton on the first of May 2000, but it can be reintroduced during times of international crisis without prior warning.

**SD (Secure Digital)** SD is another format of removable digital storage media for cameras, PDAs, etc.

**SMG (Speed Made Good)** The speed that you actually achieved taking into account the **CMG** from your departure point to the arrival point (or from one waypoint to another) and the time it took to accomplish this. **SMG** cannot be calculated until the **CMG** has been established.

**SOG (Speed Over the Ground)** The actual speed the vessel is moving over the ground, rather than through the water.

**SOLAS** – refers to the 1974 *International Convention for Safety of Life at Sea*, a treaty that governs the minimum standards of construction, operation, and equipment of merchant ships which are consistent with safety.

**SPS (Standard Positioning Service)** - That portion of the **GPS** made available to the public-at-large but subject to the **SA** deliberate degradation of accuracy in the interests of U.S. national security.

**SVN (Space Vehicle Number)** A number given out in manufacture or launch sequence to Navstar GPS satellites

**TKE (Track Error)** - A now rarely used term to indicate the amount of error in angle or distance you are 'off track' from the desired course. See **XTE**.

**TMG (Track Made Good)** - The net direction the boat has traveled measured from the start point to a destination (or between two waypoints).

**Track** The actual path of the vessel. Can be expressed as "Course Over Ground (**COG**)". Many GPS or ChartPlotter devices will record 'TRACK' data as a series of geographic points where the device has traveled.

**TTG (Time To Go)** The time predicted as remaining until the event of interest occurs, such as arriving at a waypoint (**WPT**), etc. The display usually counts down the time.

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**Title Block** An area of a raster or printed nautical chart where important information is shown concerning the chart.

**UTC (Universal Coordinated Time)** a recent revision of the expression GMT (Greenwich Mean Time).

**UTM (Universal Transverse Mercator)** A grid system used instead of the latitude/longitude method of global positioning. Used by the military and on topographical charts.

**VMG (Velocity Made Good)** The speed the vessel is making **directly towards** a particular destination such as a selected waypoint. This is the rate of closure towards a destination.

**Vector Chart** An electronic chart format where each known element (a piece of the shoreline, a depth sounding, an Aid to Navigation (ATON), an underwater object, and others) existing within a geographic area are identified and stored as a series of records. **ECS** devices read and interpret each record to create a graphical display on computer screens. ECS device controls allow an operator to choose what information is displayed and what information is held in reserve to be queried later. As an example the operator may choose to just display colored icons for each ATON. Then display all details of a specific ATON when needed. Other ECS features may interpret the records to assist in creating and navigating a route through the area.

**WAAS (Wide Area Augmentation System)** - The U.S. FAA system being developed to provide extremely accurate GPS signals for aircraft navigation. Precision coverage will extend from Hawaii to Puerto Rico and Mexico to well north in Canada and about 100+ miles out to sea around most of the continent. (See **DGPS**).

**Waypoint** - Literally 'a point along the way'. It is usually a point of some significance either marked on a paper chart or entered as geographical coordinates into an electronic navigation device. Typically a planned route will consist of several segments with each segment having a beginning and ending Waypoint. In an electronic navigation device such as a ChartPlotter the device will provide useful information (such as magnetic bearing, distance, and time-to-go) for navigating to the active Waypoint.

**WGS (World Geodetic System)** - The advent of satellite soundings has made it possible to produce a single world model with one datum and one set of dimensions. The latest datum is **WGS(19)84** which is used by the **GPS** and in all **Vector Charts**.

**WGS84 (World Geodetic System 1984 datum)** used as a standard.



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**WPT (Waypoint)** See Waypoint.

**XTE (Cross (X) Track Error)** Indicates the direction, Port or Starboard (Left/Right) and distance the vessel is away from its intended track (to a selected point).

**XTK (Cross (X) Track)** - More commonly **XTE** as **XTK** and **TKE** combined.