



# Coast Guard Navigation Standards Manual

COMDTINST M3530.2D  
January 2012





Commandant  
United States Coast Guard

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COMMANDANT INSTRUCTION M3530.2D

Subj: COAST GUARD NAVIGATION STANDARDS MANUAL

- Ref:
- (a) United States Coast Guard Regulations 1992, COMDTINST M5000.3 (series)
  - (b) Cutter Training and Qualification Manual, COMDTINST M3502.4 (series)
  - (c) U.S. Coast Guard Boat Operations and Training (BOAT) Manual, Volume I, COMDTINST M16114.32 (series)
  - (d) U.S. Coast Guard Boat Operations and Training (BOAT) Manual, Volume II, COMDTINST M16114.33 (series)
  - (e) Operational Risk Management, COMDTINST 3500.3 (series)
  - (f) U.S. Navy Ship Control and Navigation Personnel Qualification Standard (PQS), NAVEDTRA 43492-2 (series)
  - (g) Cutter Organization Manual, COMDTINST M5400.16 (series)
  - (h) Personnel Qualification Standard (PQS) Officer of the Deck (OOD), COMDTINST M3502.5 (series)
  - (i) Information and Life Cycle Management Manual, COMDTINST M5212.12 (series)
  - (j) Procedures for the Preparation and Disposition of Cutter Logs, COMDTINST M3123.12 (series)

1. PURPOSE. This Manual promulgates navigation policies and procedures for all cutters, cutter boats and shore based boats.

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2. ACTION. All Coast Guard unit commanders, commanding officers, officers-in-charge, deputy/assistant commandants, and chiefs of headquarters staff elements shall comply with the provisions of this Manual. Internet release is not authorized.
3. DIRECTIVES AFFECTED. Coast Guard Navigation Standards, COMDTINST 3530.2C is hereby cancelled.
4. DISCUSSION. Navigation remains a critical basis for all underway operations and a fundamental competency. This manual is designed to assist the CO/OINC, Navigator and Coxswain in carrying out their responsibilities as outlined in Coast Guard Regulations. New updates leverage the proven reliability of internationally accepted electronic navigation systems while retaining the capability to fix position using visual lines of position and radar ranges.
5. PROCEDURES. Official distribution will be via the Coast Guard Directive (CGDS) DVD. An electronic version will be located on the following Information and Technology CG-612 web sites. Intranet: <http://cgweb.comdt.uscg.mil/CGDirectives/Welcome.htm>, Internet: <http://www.uscg.mil/directives/>, and CGPortal: <https://cgportal.uscg.mil/delivery/Satellite/CG612>.
6. MAJOR CHANGES.
  - a. Chapter 1 additions:
    - (1) Commanding Officers/ Officers-in-Charge shall promulgate Command Navigation Standards within 90 days of assuming command. Portions of this manual now pertain to all cutters.
    - (2) Conduct a steering test and propulsion check prior to entering restricted waters or getting underway IAW reference (a).
    - (3) All Cutters will maintain proficiency in paper plot as a tertiary backup mode of navigation.
    - (4) Command Navigation Standards shall include:
      - (a) Definition of shoal water and method to indicate shoal water *for each navigational system as well as on paper charts*.
      - (b) Method of indicating that electronic tracklines are properly reviewed and approved, (i.e. ALL CAPS once approved).
      - (c) Specific guidance pertaining to electronic chart displays, including filters.
      - (d) Specific onboard chart hierarchy (Additional Cutter Items).
      - (e) Ship's characteristics and tactical data (Additional Cutter Items).
      - (f) Gyro error frequency determination (relocated from 3530.2C, 3.A.3).
      - (g) AIS settings and use policy.

- (h) Electronic casualty control.
  - (i) Requirements for logging propulsion and steering mode (relocated from 3530.2C, 9.C).
  - (j) GPS to antenna offset settings.
  - (k) Drag and swing circle procedures for electronic charts.
  - (l) Radar configurations with inputs specified.
- b. Chapter 2. Additions:
- (1) Preparations; verifying all positioning sources for accuracy.
  - (2) Position comparisons, clarification.
  - (3) DR Clarification.
  - (4) Fix labeling and set and drift standards (relocated from 3530.2C, 3.A.5 and 3.A.6).
  - (5) Navigation report information (relocated from 3530.2C, 1.B.2.g).
  - (6) Authorization for use of WAAS on GPS receivers.
- c. Chapter 3. Additional Requirements for Boat Navigation (relocated from 3530.2C ch. 4).
- d. Chapter 4. Electronic Navigation Systems (relocated from 3530.2C ch. 5).
- (1) Addition:
    - (a) Restricting applications on situational awareness computers.
    - (b) Clarification on ECINS/ECS use.
    - (c) Policy on Personal Navigation Applications (APPs).
- e. Chapter 5. Electronic Chart Data (relocated from 3530.2C ch. 6).
- (1) Updated to allow the use of Digital Navigation Charts in all waters not covered by NOAA.
- f. Chapter 6. Celestial Navigation (relocated from 3530.2C ch. 7).
- g. Chapter 7. Navigation Planning and Briefs (relocated from 3530.2C ch. 8)
- (1) Additions:
    - (a) Includes sections of 3530.2C ch. 3.
    - (b) Chart preparation section, broken down into electronic and paper chart requirements.

- (c) Additional requirements for navigation briefs.
- h. Chapter 8. Cutter Logs, Records and Checklists (relocated from 3530.2C ch. 9)
  - (1) Additions:
    - (a) Updated ECINS use guidelines to include fluxgate compass.
    - (b) Additional guidelines for Deviation Tables and use of fluxgate compasses.
  - i. Chapter 9. Anchoring (new chapter)
  - j. Enclosure (3). Cutter Navigation Teams
    - (1) Updated requirement for secondary Navigation Team in CIC/CSC.
- 7. REQUESTS FOR CHANGES. Change recommendations should be routed in writing via the chain of command to Commandant (CG-751) for cutters and Commandant (CG-731) for shore based boats.
- 8. ENVIRONMENTAL ASPECT AND IMPACT CONSIDERATIONS. Environmental considerations were examined in the development of this manual and were determined to be not applicable.
- 9. FORMS/ REPORTS. The forms referenced in this Manual are available in USCG Electronic Forms on the Standard Workstation or on the Internet: <http://www.uscg.mil/forms/> ; CGPortal at <https://cgportal.uscg.mil/delivery/Satellite/uscg/References>; and Intranet at <http://cgweb.comdt.uscg.mil/CGForms>. The Ship's Position Log, OPNAV-3100/3; Standard Bearing Book, OPNAV-3530/2; and Navy Navigation Workbook, OPNAV-3530/1 are only available through the Navy at <http://navalforms.daps.dla.mil/web/public/home>. Click on Forms from the menu and do a keyword search using the form number.

Vincent B. Atkins /s/  
Rear Admiral, U. S. Coast Guard  
Assistant Commandant for Capability



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**CHAPTER 1. COMMANDING OFFICER/ OFFICER-IN-CHARGE**

A. Responsibilities. Commanding Officers/ Officers-in-Charge (CO/OICs) shall:

1. All Units.

- a. Ensure compliance with the provisions of this Manual. (NOTE: COs/OICs of WLI, WLR, WLIC and WYTL class cutters, due to their unique areas of responsibility, missions, navigation techniques, and the lack of accurate charts that portray the ever-changing bottom contours of these areas, shall tailor the requirements discussed in section 1.B.2.e and Chapters 4, 5, and 8 of this manual, as appropriate, for incorporation into their Command Navigation Standards.)
- b. Promulgate Command Navigation Standards within 90 days of assuming command. Prior navigation standards shall remain in effect until superseded.
- c. Assign, train, and certify navigation personnel in accordance with references (a) through (d) as appropriate.
- d. Incorporate the principles of effective risk assessment into navigational planning in accordance with reference (e). The risk assessment process may be tailored to be consistent with the complexity of the specific mission, but should not omit any step in the process.
- e. Conduct navigation exercises in accordance with reference (b) and/or (d).
- f. Designate a Navigator in accordance with reference (a). Cutters that do not have an Operations Officer assigned shall designate an experienced underway Officer of the Deck that is an Officer, Chief, or Petty Officer who possesses the required proficiency, training, maturity, and judgment required of this position. The Navigator shall complete applicable parts of reference (f). Schools listed in reference (f) are recommended but not required.
- g. Conduct a steering test and propulsion check prior to entering restricted waters or getting underway in accordance with reference (a).
- h. Maintain proficiency of basic navigation skills (paper plot) through training and practice.
- i. Ensure Navigation Teams maintain a thorough understanding of principles of operation, use, and most importantly, limitations of installed equipment.
- j. Shall approve all tracklines and routes (Cutters only). The OOD retains discretion to maneuver as necessary in accordance with the promulgated Command Navigation Standards.

B. Command Navigation Standards. CO/ OICs shall publish Command Navigation Standards that incorporate the navigation requirements detailed in reference (a) and this Manual. Command Navigation Standards shall, at a minimum, include:

1. All Units.

- a. Navigational draft.
- b. Definition of shoal water and method to indicate shoal water for each navigational system as well as on paper charts.
  - (1) Safety Depth
  - (2) Safety Contour
  - (3) Depth Below Keel
- c. Command definitions of Navigational Zones (i.e. Areas that require specific levels of attention to and frequency of navigational tasks). Navigational Zones shall be based on the vessel's navigational draft, mission, operating environment, etc. Navigational Zones shall include:
  - (1) Restricted Waters (i.e. Harbor, Harbor Approach, Near Coastal)
  - (2) Coastal.
  - (3) Open Ocean.
  - (4) Any additional zones required by specific operating environments or operational circumstances.
- d. Standard navigational fix intervals for each Navigational Zone.
- e. The interval at which the primary positioning source must be compared to an unrelated positioning source and logged (i.e. radar overlay, chart matching, Vis/Radar LOP (see chapter 2.C.5)). This shall be done at least every third fix in Restricted Waters and in all other waters, at least once per day.
- f. Standard navigation plotting symbols. Enclosure (1) may be used for this purpose, either in its entirety, or tailored at command discretion.
- g. Alarm management. The conditions when an alarm may be silenced or disabled shall be addressed. The modern bridge may have more than 50 audible and/or visible alarms, warnings, and indicators available to help ensure safe operations.
- h. Standard line handling commands. Enclosure (2) may be used for this purpose in its entirety or tailored at command discretion.

- i. Method of indicating that electronic tracklines on all systems are properly reviewed and approved (i.e. trackline name in ALL CAPS once approved) before being put in use. Additionally, all tracklines on all systems must be identical with any offset issues resolved at the Navigation Brief stage.
  - j. Specific guidance pertaining to electronic chart displays, including filter settings and scaling below base scale, when deemed unavoidable.
2. Additional Cutter Items.
- a. Specific guidance concerning navigation of the cutter's boat(s) while operating independently of the cutter. For these standards, "independently" means the boat coxswain, not the bridge watch, is entirely responsible for the boat's safe navigation (i.e. Over the Horizon/out of the cutter's active sensor range).
  - b. Specific Navigation Team manning requirements for navigating with electronic navigation systems and/or paper charts for each navigational zone. Standard Navigation Team positions are listed in Enclosure (3).
  - c. Standard helm and engine order commands (see Enclosure (4)).
  - d. Special Sea Detail, Anchoring and Mooring Bills in accordance with reference (g) and relevant sections of this Manual.
  - e. A list of paper charts required to be onboard, further annotated to reflect those charts designated by the CO/OIC to be up-to-date through the latest Local Notice to Mariners. Follow the decision matrix in Enclosure (5) to determine paper chart carriage requirements.
  - f. Any deviation from this manual's recommended electronic chart data hierarchy (see Chapter 5.B).
  - g. In addition to the Navigational Draft, the following ship's characteristics shall be specified:
    - (1) Full load draft.
    - (2) Masthead height.
    - (3) Length overall.
    - (4) Length along the waterline.
    - (5) Distance from hawsepipe to alidade.
    - (6) Distance from hawsepipe to GPS antenna.
    - (7) Distance from hawsepipe to stern.
    - (8) Distance from GPS antenna to stern.

- (9) Distance from radar antenna to stern.
  - (10) Distance from radar antenna to hawsepipe.
  - h. Ship's unclassified tactical data, including tactical and final diameter in accordance with Chapter 4 of reference (a). Pertinent data must be posted at all conning stations while underway.
  - i. Determine gyro error prior to getting underway or entering restricted waters. If conditions permit, gyro error shall be determined at least once daily while underway. When gyro error is obtained, gyrocompass(es) and repeaters shall be compared and errors posted and entered into electronic navigation systems.
  - j. AIS settings and use policy to include setting transmit modes as well as ship's status (i.e. restricted maneuverability, anchored, underway, etc.).
  - k. Electronic casualty control procedures to include responses to loss of gyro or GPS input.
  - l. When navigating with automatic ship control systems such as autopilot or Dynamic Positioning System, the mode in use must be logged. Additionally, the propulsion mode shall be logged.
  - m. GPS to antenna offset settings during normal steaming, anchoring, ATON or other applicable evolutions.
  - n. Drag and swing circle procedures for electronic charting systems.
  - o. Standard heading and speed input configuration for the radar.
  - p. Cross track warning and alarm settings for each navigational zone.
  - q. Conditions under which CIC (if applicable) would take control of the primary plot.
3. Additional Shore-based Boat Force Unit Items.
- a. A list of paper charts, including the unit's Area of Responsibility (AOR) that must be ready and up-to-date through the latest Local Notice to Mariners. These charts will be carried on each assigned boat or in the unit navigation kit. Commands may require each coxswain to maintain their own copies of up-to-date ready charts.
  - b. Key operating areas.
  - c. Principle navigation routes, tracklines and standard waypoints.
  - d. Areas within the unit's AOR where boat crews shall conduct frequent area familiarization transits in accordance with reference (d).
  - e. Areas within the unit's AOR that pose significant navigational or environmental risks to boats. These areas shall also be displayed on a chart in the operations/

planning space.

- f. Specific operating guidance such as speed limits, safe operating distances from known hazards, frequency of fixes, and restricting operating areas for specific boat types. An example of unit level guidance is provided in Enclosure (6).
- g. Navigation and piloting requirements for use during surf operations (i.e. Use of natural ranges, radar ranges, waypoints, etc.).
- h. Requirements for maintaining Dead Reckoning plots based on boat type, navigational systems, and operating environments.

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## CHAPTER 2. GENERAL NAVIGATION REQUIREMENTS

- A. Purpose. This section sets forth minimum navigational requirements for all Coast Guard cutters and boats. (NOTE: WLI, WLR, WLIC and WYTL class cutters, while operating on rivers and the Intracoastal Waterways, are exempt from the specific requirements of this section. COs/OICs of these units shall tailor the requirements of this chapter, as appropriate, for incorporation into their Command Navigation Standards).
- B. Discussion. Navigation is fundamental to safe operations afloat. These requirements reflect the proven reliability and accuracy of internationally accepted electronic navigation systems while retaining the capability to fix position using visual lines of position and radar ranges. Coast Guard cutters will normally use electronic navigation systems as their primary means of navigation. COs/OINC's shall train and practice basic navigation skills (Mode III, paper plot) as directed by reference (b) to maintain a contingency navigation capability.
- C. Preparations. Prior to getting underway, all positioning sources shall be verified for accuracy, including GPS, Shipboard infrared Visual Sensor System (SIRVSS), radar, and/or gyrocompass if applicable.
- D. Positioning Sources. Figure 2-1 is the hierarchy of various positioning sources.
1. Category I. Category I positioning sources are adequate for use as the primary source of own vessel's position while operating in all waters.
  2. Category II. Category II positioning sources are not considered adequate for precise navigation and shall only be used as the primary source of the own vessel's position in open ocean.
  3. GPS Corrections. The only Global Positioning System (GPS) corrections currently authorized for Coast Guard coastal and restricted waters navigational use are provided by the Maritime Differential GPS system.
  4. GPS Receiver and WAAS. A unit equipped with a GPS receiver that is capable of receiving GPS corrections from the Wide Area Augmentation Systems (WAAS) is authorized to use this feature. WAAS is a satellite-based GPS augmentation system being implemented by the Federal Aviation Administration to support lateral and vertical navigation for all phases of flight in the US. However, WAAS is not yet an approved option for positioning ATON.
  5. Position comparisons. When using any form of GPS as the primary source for positioning information, the position shall be compared to an unrelated positioning source at intervals prescribed i.e. radar overlay, chart matching, Vis/Radar LOP. Another GPS or DGPS unit does not meet this requirement. This shall be done once a day in Open Ocean and every third fix in Restricted Waters. Units shall comply as capabilities allow. When navigating in Open Ocean, comparing GPS to a celestial observation once a day will meet this requirement. Only the units listed in Chapter 6 of this manual are required to maintain proficiency in celestial navigation.

<b>POSITIONING SOURCE HIERARCHY</b>	
<b>CATEGORY I</b>	
GPS with DGPS corrections or WAAS-enabled	
GPS PPS (Precise Positioning Service) Classified System, if applicable	
GPS SPS (Standard Positioning System (see note 1))	
Visual and/or RADAR (includes Radar or Chart Matching)	
<b>CATEGORY II</b>	
Inertial Navigation System	
Celestial	

**Figure 2-1**

**Note 1:** Use of GPS SPS as a Category I positioning source assumes that Selective Availability (SA), an intentional offset induced into GPS, is set to zero. At the time of this manual's promulgation, SA is set to zero. However, personnel involved with navigation must be aware that DoD may select signal degradation regionally using SA or other tactics. Therefore, cutters deploying abroad may require the use of PPS or other enhancements to ensure accurate fix information is being received. When intentional GPS signal degradation such as SA is being used, SPS shall be considered a Category II source, not adequate for navigation in Harbor, Harbor Approach, Near Coastal and other restricted waters.

E. Fixes.

1. Precautions. Cutters shall use all available data such as soundings, danger ranges/bearings, set and drift, and proximity to aids to navigation to fix the vessel's position and improve on the DR plot. At any time fix quality comes into question, particularly while operating in restricted waters, the following actions may be deemed appropriate depending on prevailing conditions:
  - a. Reducing speed as appropriate.
  - b. Take all way off.
  - c. Increase fix frequency.
  - d. Turning away from the danger.
2. Electronic. An electronically provided position when displayed on a chart from an adequate positioning source, as defined in Section C of this chapter, constitutes a fix. This includes radar or chart matching capability.
3. Paper. The intersection of lines of position (LOP) from at least three prominent points of land, fixed, and/or celestial objects with a separation of 15 degrees or greater.
  - a. When using relative bearings, a minimum of two visual LOPs and one radar range shall be used as capabilities allow.
  - b. When three LOPs are not simultaneously available, advancing LOPs to a common time to create a running fix may be used.

- c. Fixes will be labeled with the time and proper symbol.
  4. Erasures. Fixes shall not be erased or deleted because they appear in error; rather, another fix shall be taken immediately to ascertain the vessel's position.
  5. Intervals. The ship's position shall be fixed at an interval that ensures safe navigation with due regard to the proximity of shoal water, weather conditions, and mission, not to exceed one hour.
  6. Verification. Fixes shall be verified by all means including, in no particular order:
    - a. Soundings
    - b. Aids to Navigation (ATON)
    - c. Radar or other electronic means
    - d. Seaman's eye
- F. Charts. All charts used shall be of the best scale available for the circumstance. The "best scale" may not always be the largest available scale, depending on navigational and operational requirements.
1. Electronic Charts. Prior to use, electronic charts must be up-to-date in accordance with Chapter 5.C of this Manual.
  2. Paper Charts. Only up-to-date charts produced by an approved IHO will be used with priority given to NOAA and NGA. Paper charts are considered to be up-to-date if they are both the most current edition and corrected up to the latest Local Notice to Mariners, Weekly Notice to Mariners, and Broadcast Notice to Mariners.
  3. Allowances. Review chart and publication requirements and allowances annually, and provide any requests for new products or allowance changes via the Chain of Command. Register/update unit contact information in the Account Management and Provisioning System (AMPS) annually or as account point of contact changes, whichever is sooner.
- G. Navigating with Paper Charts.
1. Set and Drift.
    - a. If fix interval is three minutes or greater, set and drift shall be determined at every fix.
    - b. If fix interval is less than three minutes, set and drift shall be determined every second fix.
    - c. Set and drift shall be applied to subsequent DR positions to determine an EP in the event that planned fixes are not obtained.
    - d. When unable to maintain a steady course (i.e. vessel traffic avoidance becomes an

issue), set and drift will be determined upon the second fix after it again becomes possible to maintain a steady course.

2. Estimated Position. An estimated position (EP) is a Dead Reckoning position modified by additional information, which in itself is insufficient to establish a fix.
  - a. Verification. EPs shall be compared by using the available means listed in 2.C.5.
3. Dead Reckoning. A DR will be properly labeled and track projected for at least two fix intervals. A properly maintained DR is the foundation for maintaining an acceptable estimate of the ships position between fixes. The following are general rules used in constructing and maintaining the Navigator's plot.
  - a. Plot a DR position at least every hour on the hour in open ocean.
  - b. Plot a DR position at every course change.
  - c. Plot a DR position at every speed change.
  - d. Plot a DR position when obtaining a fix or running fix.
  - e. Plot a DR position when obtaining a single line of position.
  - f. A new course line shall be plotted from each fix or running fix.
4. Navigation Reports. At each fix interval, the Navigation Evaluator shall provide a navigation report to the Conning Officer, as required by the Command Navigation Standards.
5. Report information. Navigation reports shall be provided when using paper charts or an electronic charting system. These reports may include:
  - a. Fix time.
  - b. Fix type (and quality, as appropriate).
  - c. Fix position in relation to proposed track.
  - d. Report CIC/CSC concurs, does not concur, or has no fix (if applicable).
  - e. Any recommendation to regain/maintain proposed track.
  - f. Nearest hazard to navigation.
  - g. Next aid to navigation.
  - h. Distance to next turn.
  - i. Time to next turn and turn bearing/range.
  - j. Course after next turn.

- k. Set and drift (as required).
- l. Depth of water beneath the keel and comparison to charted depth.
- m. Other pertinent information.

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**CHAPTER 3. ADDITIONAL REQUIREMENTS FOR BOAT NAVIGATION**

A. General. This section applies to all shore based small boats and cutter boats operating outside the direct sight of the cutter.

1. Paper chart fixes. When navigating with paper charts, fixes shall be plotted no more than 30 minute intervals. Fixes may be timed to coincide with OPS/position reporting to the Operational Commander. Fixes shall become more frequent whenever the coxswain is operating in an unfamiliar area and during periods of restricted visibility.
2. Dead Reckoning. Maintain a Dead Reckoning plot as required by the Command Navigation Standards.
3. Boat's Position. Any time the coxswain is uncertain of the boat's position, the coxswain shall take all way off or anchor if necessary until the boat's position can be fixed.

B. Restricted Waters.

1. Paper chart fixes. When navigating within restricted waters designated by the CO/OIC, using paper charts, a fix shall be plotted at least every fifteen minutes.
2. Precautions. Coxswains transiting close to navigation hazards and shoals, during restricted visibility or darkness, or operating in an unfamiliar area shall operate the vessel with extreme caution, which may include:
  - a. Coordinating the boat crew as a navigation team to specifically observe the compass heading, fathometer, radar, electronic navigation systems, or otherwise augment the Coxswain's navigational ability.
  - b. Reducing speed as appropriate for prevailing circumstances.
  - c. Take all way off as appropriate for prevailing conditions to review the navigational picture.
  - d. Utilize navigational data such as soundings, danger ranges, or bearings to verify position.
  - e. Increase fix frequency.

C. Boats Equipped with Scalable Integrated Navigation System (SINS)/Electronic Charting System (ECS). The following boats are not required to place fixes on a paper chart unless specifically stated in Command Navigation Standards:

1. Boats using SINS or ECS with an adequate primary positioning source (electronic position-fixing system) and an up-to-date electronic chart.

D. Additional Requirements for Non-Standard Boat (NSB) Operations. At a minimum, CO/OIC shall ensure NSBs (not including work/flood punts and ice skiffs) have the capability to obtain a fix by electronic means (i.e. handheld or installed GPS, radar, chart plotter, etc.) excluding personal navigation applications that use cellular/GPS technology. (See paragraph 4.A.3.)

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## CHAPTER 4. ELECTRONIC NAVIGATION SYSTEMS

### A. Coast Guard Electronic Navigation Systems.

1. General. The Coast Guard has three general classifications of systems that are authorized for use as the primary means of navigation as prescribed in this Manual. Each system has its own unique capabilities and limitations. The type of system(s) installed varies by platform throughout the Coast Guard.
  - a. Electronic Charting and Integrated Navigation System (ECINS)
  - b. Electronic Chart System (ECS)
  - c. Scalable Integrated Navigation System (SINS)
2. Restricting Applications. On computers designated specifically for navigation or situational awareness, only the navigation program should be open. There shall be no other application window open on a designated navigation computer while underway.
3. Personal Navigation Applications. The use of personal navigation applications (APPs) using cellular/GPS technology is not approved for navigation aboard Coast Guard assets.

### B. Electronic Charting and Integrated Navigation System (ECINS).

1. General. The Coast Guard employs several ECINS that are intended to meet or to exceed international requirements for Electronic Chart Display and Information Systems (ECDIS) and ECS, but include some deliberate additions to, and deviations from, the standards governing those systems.
2. General ECINS Usage.
  - a. ECINS may be used as the primary means of navigation in lieu of paper charts if the following conditions are met:
    - (1) An adequate primary positioning source (see figure 2-1) is in use.
    - (2) Approved up-to-date electronic chart data as described in Chapter 5 is in use.
    - (3) Adequate back-up arrangements are available including:
      - a. Back-up Positioning Source. A positioning source from the same category as the primary positioning source that does not rely on any elements in common with the primary positioning source (e.g., a second GPS/DGPS receiver is not an adequate back-up positioning source for a GPS/DGPS receiver). Examples of adequate back-up positioning sources for GPS/DGPS include visual and/or radar lines of position

entered into ECINS or radar/chart matching on ECINS.

- b. **Back-up Arrangements.** Adequate back-up arrangements shall enable the continuous operation of essential ECINS functions during a failure of the ECINS to ensure that a failure does not result in a potentially dangerous situation. This includes a timely transfer of route monitoring functions within one fix interval.
  - b. Enclosure (5) outlines paper chart carriage requirements while using ECINS as the primary means of navigation.
  - c. In the case of failure of the primary electronic positioning source, where the ECINS is otherwise fully functional, it shall be possible to navigate using other available positioning sources with the ECINS. The cutter navigation team shall maintain proficiency in manually entering visual and radar LOPs. This is Mode II navigation as defined in this manual's glossary.
3. **System usage in Restricted Waters.** This section establishes additional requirements while transiting in or near restricted waters.
- a. Compare the primary positioning source to a back-up positioning source at least every third fix.
  - b. Maintain echo-sounding (i.e. fathometer) alarm on control unit or ECINS.
- C. **Electronic Chart System (ECS).** The Coast Guard employs ECS that are based upon recognized requirements, but include some deliberate additions to the international standards governing those systems.
1. **ECS Usage by Cutters.** An ECS is primarily used as a situational awareness tool, but may be also used in the following manner:
    - a. ECS may be used as the primary means of navigation in open ocean in lieu of paper charts if the following conditions are met:
      - (1) An adequate primary positioning source (see figure 2-1) is in use.
      - (2) Approved up-to-date electronic chart data as described in Chapter 5 is in use.
      - (3) An appropriate portfolio of paper charts is available to transfer the primary navigation plot to paper within one fix interval.
      - (4) An ECINS is not available.
    - b. ECS may be used as a backup arrangement to ECINS if the following conditions are met:
      - (1) An adequate primary positioning source (see figure 2-1) is in use.

- (2) Approved up-to-date electronic chart data as described by Chapter 5 is in use.
- (3) The planned route from the ECINS is in use on the ECS.
- (4) ECS meets requirements of 4.B.3. while in restricted waters.
- (5) Up-to-date paper charts\* available for route transfer within one fix interval while in restricted waters. (\* Per Command Navigation Standards)

2. ECS Usage by Boats. ECS may be used as the primary means of navigation in all waters if the following conditions are met:

- a. An adequate primary positioning source (see figure 2-1) is in use.
- b. Approved up-to-date electronic chart data as described in Chapter 5 is in use.
- c. Coxswain observes radar, fathometer, visual ranges, and ATON in order to verify the displayed position.
- d. Command promulgated standard waypoints and routes are used. (NOTE: Not required for cutter boats.)
- e. Up-to-date paper charts are onboard to transfer the primary navigation plot to paper within one fix interval. (NOTE: Not required for cutter boats.)

D. Scalable Integrated Navigation System (SINS) for Boats. The Coast Guard employs SINS that are intended to meet international requirements for small craft radar. SINS include additional chart plotting and limited navigational functionality. but do not meet standards for ECS.

1. SINS Usage. SINS may be used as the primary means of navigation in all waters on boats if the following conditions are met:

- a. An adequate primary positioning source (see figure 2-1) is in use.
- b. Approved up-to-date electronic chart data as described in Chapter 5 is in use.
- c. Up-to-date paper charts are onboard to transfer the primary navigation plot to paper within one fix interval.
- d. Command promulgated standard waypoints and routes are used.
- e. Coxswain observes radar, fathometer, visual ranges, and ATON in order to verify the displayed position.
- f. Depth alarms are set to the navigational draft.

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- g. Cross Track Error alarm is enabled when navigating to a waypoint.
- h. Radar and electronic chart data are displayed at all times.
- i. An ECS is not available for use.

## CHAPTER 5. ELECTRONIC CHART DATA

### A. General.

1. Data. Electronic charts consist of chart data that has been specifically developed for presentation on electronic navigation systems.
2. Licensing. Licensing agreements associated with procured electronic chart data must be followed and data sharing is not authorized.
3. Discrepancies. Chart Rendering, chart disk loading, and discrepancies in chart data for foreign waters shall be reported to the Navigation Center via priority message to COGARD NAVCEN ALEXANDRIA VA//NIS//. For ATON discrepancies on charts covering US waters, units shall ensure the appropriate district (dpw) office is notified via priority message traffic.

### B. Approved Electronic Chart Data. The Coast Guard has approved the following electronic chart data for use with electronic navigation systems:

1. Electronic Navigational Charts (ENC). Official Electronic Navigation Charts (ENC) produced or issued by or on the authority of a government authorized hydrographic office.

**Note:** ENC produced and certified under NOAA's "Certified NOAA ENC Value Added Distributor" (CEVAD) program are official data.

2. Digital Nautical Charts. Digital Nautical Charts (DNC) are produced and issued by the National Geospatial-Intelligence Agency (NGA). DNC are published in general, coastal, approach, and harbor libraries. These libraries may not correspond directly with Command definitions of Navigational Zones contained in the Command Navigation Standards. DNC are updated monthly via VDU (Vector Data Update) patch provided on CD through NGA automatic distribution or by download directly from the NGA web-site. These charts have since been updated monthly using ALL available information provided by worldwide Official Hydrographic Offices. Like all charts, including paper, the data is only as accurate and timely as the host countries Hydrographic Office. Over dependence on navigation systems and data is an ever-present hazard, the best information lies in the buoy line and should be used with caution until the information has been verified. NGA paper charts are derived from the same database and the importance of reporting inaccuracies cannot be overstated.
3. Raster Navigational Chart. An official Raster Navigation Chart (RNC) produced or issued by or on the authority of a government authorized hydrographic office.
4. Commercial products. Commercial vector and/or raster charts procured by or through the Coast Guard Electronic Chart Manager.

### C. Up-To-Date Electronic Chart Data. An Electronic Chart is considered up-to-date if it has been corrected within the last forty-five days. The approved methods are:

1. Full file. Full file replacement of the electronic chart data (e.g. cell, library, chart, or chartlet).
2. Official updates. Applying official updates (e.g. ENC updates, Vector Product Format (VPF) Database Updates, or raster updates (patches)).
3. Manual. Manual corrections, using information provided by:
  - a. The cognizant hydrographic office (e.g. National Oceanic and Atmospheric Administration (NOAA), US Army Corps of Engineers (USACE), National Geospatial-Intelligence Agency (NGA), Canadian Hydrographic Services (CHS), United Kingdom Hydrographic Office (UKHO) etc.)
  - b. Local Notice to Mariners.
  - c. Broadcast notifications (e.g. Broadcast Notice to Mariners, HYDROLANTS, etc.)

**Note:** Limited temporary corrections may be manually entered into the electronic navigation system.

4. NOAA Updates. Weekly updated ENC and RNC are available for free download by district or state from NOAA's ENC mirror site. NOAA applies updates weekly to the ENCs and RNCs on this site. It is highly recommended cutters download fresh charts prior to getting underway and as often as connectivity allows.

NOAA ENC Mirror Site

<http://www.charts.noaa.gov/ENCs/ENCs.shtml>

NOAA RNC Mirror Site

<http://www.charts.noaa.gov/RNCs/RNCs.shtml>

5. Scalable Integrated Navigation System (SINS).
  - a. For SINS equipped vessels, an electronic chart is considered up-to-date if it has been corrected or replaced within six months of a permanent chart change.
  - b. Upon notification of a temporary or permanent chart correction, SINS may continue to be used as primary means of navigation if the temporary or permanent chart corrections are manually entered. In cases where the temporary or permanent chart correction cannot be manually entered, SINS may continue to be used as the primary means of navigation if an up-to-date paper chart is out and being used in conjunction with SINS.

- D. Recommended Electronic Chart Type Hierarchy. Navigators shall consult the latest chart advisories provided by the Electronic Chart Manager. The following recommended hierarchy (Figure 5-1) is intended to aid with the chart selection process. Variances are allowed at the discretion of the CO/OIC, provided they are spelled out in the Command Navigation Standards.

Official ENC  
 DNC Waters not covered by NOAA  
 Official RNC  
 Commercial Vector Chart  
 Commercial Raster Chart (i.e. Caribbean and Central America Data)

Figure 5-1

E. Electronic Chart Data Selection. For electronic navigation systems that render multiple chart products, selecting the appropriate electronic chart product is based upon several factors. The following steps are intended to help with the selection process:

1. Render. Determine what type of data the system can render.
2. Coverage. Determine the available coverage for the area of operations. In U.S. coastal waters, NOAA data shall take precedence. In U.S. inland waters (Western Rivers), United States Army Corps of Engineers data shall take precedence.
3. Scale. Select the best scale chart product for that area and for the mission being conducted.
4. Up-to-date. Of the available chart products, determine which are up-to-date.
5. Scale/ Up-to-date. Scale and most up-to-date must be weighed together in determining the best chart for navigation.

F. Electronic Chart Data Scaling.

1. Viewing. Electronic chart data is most accurately viewed when displayed at its source scale. Scaling/zooming in or out will distort the visually perceived relative distance between chart objects. In addition, cursor-indicated positions for charted features vary when scaling the chart.
2. Display matching. When radar and electronic chart data are presented together on the same display, the display shall match in scale, orientation and projection. Scaling out the Radar to 24 nm for example, when the electronic chart is scaled to only 3 nm can cause misinterpretations. Display Matching and Chart Matching are not the same, Chart Matching is a positioning source, Display Matching is not.

G. Notes on Electronic Chart Data Use.

1. Vector vs. Raster Charts.
  - a. Vector Charts. ENC and DNC are vector charts. In vector chart data, the real world is portrayed as charted objects that are represented by lines, points, polygons (areas), and text. This representation is described by attributes and coordinates in a database. This database can be queried and used for such functions such as anti-grounding alerts.

**NOTE** 

**When using vector format electronic chart data products, some charted features with navigational significance can be hidden from view IF:**

- (a) The chart is zoomed/scaled out too far. Chart features such as soundings and buoys may disappear for de-cluttering purposes.**
- (b) The chart is zoomed/scaled in too far. “Area” features cannot be distinguished from “line” features.**
- (c) Specific charted features/layers have been removed from the display by a user.**
- (d) Time varying objects exist on the chart in use. (Seasonal ATON can be set to automatically be removed from the display during the scheduled removal dates per the Light List).**

b. Raster Charts. In RNCs, the real world is portrayed using bitmap images. The image is made up of cells in a grid that are comprised of color and position information. A cell is often referred to as a picture element or pixel. Each pixel has an assigned position. Essentially, a raster chart looks like a digital picture of a paper chart. *This chart data does not have the ability to be queried, and when used, alarms are not available as they are with ENC and DNC.*

2. Chart Symbology.

- a. NOAA’s RNCs are the only charts that use US Chart 1 Symbology.
- b. ENC data is presented using IHO Chart INT 1 (maintained in the IHO ECDIS Presentation library).
- c. DNC data is presented using NGA’s Geospatial Symbols for Digital Displays, which is harmonized with IHO ECDIS Presentation Library and IHO Chart INT 1.
- d. RNC other than NOAA’s RNC are based on International Chart 1 and contain variants as determined by the producer.

3. Situational awareness use. Some electronic charts procured and distributed by the Coast Guard are for situational use only. Section 3.A of the Electronic Chart General Information And Advisement for US Coast Guard Cutters, available at the Cutter Forces Website at the following link; <http://cgweb.comdt.uscg.mil/CG-51/programs/NAV.htm> “E-Chart General Info Advisement for CG Cutters” addresses information about charts clearly labeled as derived from private source data and Caribbean RNCs which may contain questionable datum.

## CHAPTER 6. CELESTIAL NAVIGATION

General. This section states the basic requirements for celestial navigation. Nothing in this section shall be construed so as to relieve members of their responsibility for the completion of celestial navigation portions of references (g) and (h).

### A. Proficiency.

1. Cutter class. WAGB, WMSL, WHEC, WMEC, WIX and D14/D17 WLB class cutters, shall maintain proficiency in the art of celestial navigation.
2. Proficient. To be considered proficient, cutters must be able to:
  - a. Determine the time of sunrise and sunset.
  - b. Determine the time of moonrise and moonset.
  - c. Determine gyro error by azimuth of the sun or other celestial body.
  - d. Determine gyro error by amplitude of the sun or other celestial body.
  - e. Obtain an LOP from the sun.
  - f. Observe Local Apparent Noon (LAN). Reduce sighting and determine ship's latitude.
  - g. Obtain the ship's position by reducing celestial objects to a fix.
  - h. Compute latitude and gyro error by Polaris.
3. Opportunities. Weather and operations permitting, cutters shall take advantage of opportunities to maintain proficiency in celestial navigation.
4. Training. Units are highly encouraged to access the Celestial Training program located under the Training and Education section of the Learning Management System on the CG Portal.

### B. Requirements.

1. Documentation. All celestial work must be documented in the ship's Navigation Workbook.
2. Computer computations. Units using the System to Estimate Latitude and Longitude Astronomically (STELLA) computer software application to perform celestial computations shall follow the guidelines in Chapter 8.
3. Chronometers. Chronometers are no longer required to be carried onboard. Observation time(s) can be obtained from an electronic clock that is synchronized with the GPS time signal.

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## CHAPTER 7. NAVIGATION PLANNING AND BRIEFS

### A. Navigation Planning.

1. Purpose. Navigation planning encompasses the development of long and short term plans as well as contingency plans for a mission. Command Navigation Standards, Standing Orders, operational bills and navigation checklists constitute pre-established long-term operational plans for safe and successful navigation. These plans provide a framework for executing a mission, and may be tailored to meet the unique requirements of each mission. The plan may be very elaborate, consisting of complete tracklines, piloting procedures, patrol areas, etc. or simply a brief to the crew before launching a boat.
  2. Reference Publications. Up-to-date nautical and hydrographic publications (or the electronic equivalents) should be consulted during the development of these plans. For example:
    - a. Coast Pilot.
    - b. Fleet Guides.
    - c. Sailing Directions.
    - d. Code of Federal Regulations, Title 33.
    - e. OPORDERS.
    - f. Coast Guard Navigation Center, Navigation Information Service.
    - g. Naval Operating Area Instructions.
    - h. Light List (s) and List of Lights.
    - i. Radio Aids to Navigation, PUB 117.
    - j. Notices to Mariners, Local Notices to Mariners, Broadcast Notices to Mariners, and Notices to shipping, as applicable.
    - k. NAVAREA, HYDROLANT, HYDROPAC Messages.
    - l. Tide Tables.
    - m. Tidal Current Tables.
    - n. Nautical Almanac.
    - o. Navigation Rules, International- Inland, COMDTINST M16672.2 (series)
    - p. Local weather resources.
    - q. Other local navigation guides.
- B. Chart Preparations. As per reference (a), the Navigator is charged with preparing a safe and prudent navigation plan for the movement of the cutter. The Navigator shall review all bridge and CIC charts to ensure hazards to navigation along the intended route, including overhead obstructions, prohibited areas and shoal water, are properly displayed and highlighted. Charts with tracklines in restricted waters shall be reviewed by both the Navigator and Assistant Navigator and presented for CO approval. The ship's intended route shall be identical on all paper and electronic charts used for

navigation and labeled with the true course of each track leg. Ships without a gyrocompass may label courses with only magnetic courses in all waters.

1. Paper Chart Preparations. All items included in sections (a) and (b) of this section must be the same on all bridge and CIC charts.
  - a. Paper charts in restricted waters. All tracklines on paper charts used in restricted waters shall be labeled with the following:
    - (1) True Course
    - (2) Magnetic Course
    - (3) Distance of each track leg.
    - (4) Danger bearings/ ranges to navigational hazards not marked by navigation aids.
    - (5) Turn bearings/ ranges.
    - (6) Slide lines for advance and transfer based on the ship's tactical data for the intended speed/ rudder combination.
    - (7) Visual and radar navigation points must be pre-marked and listed in a gazetteer as defined in Section E.8 of Chapter 8.
  - b. Paper charts in water other than restricted. All tracklines on paper charts used outside of restricted waters shall be labeled with the following:
    - (1) True Course.
    - (2) Magnetic Course.
  - c. Chart shifts.
    - (1) Chart shifts should be labeled on all charts.
    - (2) Bridge and CIC shall not shift paper charts at the same time, nor shall they shift during, or immediately prior to a turn. The bridge or CIC/CSC shall have a fix plotted before the next station shifts charts.
2. Electronic chart preparations.
  - a. Electronic Charts in restricted waters. If the system permits, all tracklines on electronic charts used in restricted waters shall be labeled with the following:
    - (1) True Course.
    - (2) Magnetic Course.
  - b. Electronic charts in all water. The Navigator shall consult electronic chart products available along the intended route to ensure all available updates for the area have been accounted for.
- C. Navigation Briefs. The Navigator is charged with preparing and presenting a navigation brief prior to getting underway, entering port and, if possible, prior to entering restricted waters. Navigation brief duration, content and attendance may be tailored to meet the requirements of safe navigation. The Navigator and Commanding Officer shall review and sign the navigation brief.

1. Required information. Navigation briefs shall include the following information, when applicable.
  - a. Anticipated time of setting the Special Sea Detail, Anchoring and Mooring Bills, Engineering Restricted Maneuvering Doctrine and Navigation Detail.
  - b. Assignment of Navigation Team positions and review of duties as outlined in Enclosure (3).
  - c. Paper chart selection and/or electronic chart selection, specific type (i.e. ENC, DNC, etc), and any known chart offset.
  - d. Chart shifts.
  - e. Review of charts and intended track including results of scanned route.
  - f. Restricted, prohibited, and cautionary areas along intended track.
  - g. Chart datum (i.e. WGS 84) and verification of positioning source datum
  - h. Planned fix interval.
  - i. Maximum allowable deviation from track and confirmation that electronic chart cross track warnings are aligned with max deviation from track, if applicable.
  - j. Planned speed of advance and maximum safe speed.
  - k. Intended speed/ rudder combination for turns, if different than specified standards.
  - l. IALA buoyage system and whether inbound or outbound.
  - m. Expected sightings and descriptions of key aids to navigation.
  - n. ATON discrepancies along track or other items of note from LNM or current BNM.
  - o. Navigation equipment status.
  - p. ECINS/ECS back up arrangement, if applicable.
  - q. Status of electronic position fixing systems (GPS/DGPS) to include expected accuracy and outages.
  - r. Engineering plant status.
  - s. Hazards to navigation, danger bearings/ranges, danger soundings, navigation warnings, bridge vertical clearances, bridge signals and radio capability.
  - t. Areas where the cutter can/cannot anchor in an emergency.
  - u. Anticipated traffic (cutters should avoid meeting Deep Draft vessels at turns or intersections). Traffic should be verified against AIS.
  - v. Traffic Separation Schemes.
  - w. Port or Vessel Traffic Service (VTS) requirements including speed limits, pilotage, and check in points.
  - x. Environmental considerations including tides, currents, weather, and environmentally sensitive areas (i.e. marine sanctuaries). NOTE: Tide and current data should be available at all conning stations and CIC, if applicable.

- y. Communication requirements.
  - z. Mooring or anchoring arrangements including time to moor/ unmoor and berth heading.
  - aa. Review of pertinent information from Fleet Guide and Coast Pilot.
  - bb. Ordnance disposal areas.
  - cc. AIS mode to be used (i.e. normal, receive only, encrypted, etc).
  - dd. Risk assessment (i.e. GAR) in accordance with reference (e).
2. Debriefs. Cutters are encouraged to conduct debriefs following navigation evolutions to evaluate and recognize performance.
- D. Boat Crew Briefs. A boat crew brief shall be conducted prior to getting underway and prior to entering restricted waters. Crew briefs shall be tailored to meet the requirements of the specific mission.
1. Requirements. Crew briefs shall include the following information, when applicable:
- a. Conduct risk assessment (i.e. GAR) in accordance with reference (e).
  - b. Crew position assignments.
  - c. Review of charts and intended track/ patrol area.
  - d. Safe speed for mission and/or conditions.
  - e. Hazards to navigation.
  - f. Anticipated traffic.
  - g. Environmental considerations including tides, currents, weather (e.g. winds, precipitation, visibility) and environmentally sensitive sea areas (e.g. marine sanctuaries).
  - h. Agreed-upon rendezvous/recovery point for cutter small boats.
2. Debriefs. A debrief shall be conducted post mission to evaluate and recognize performance.

## CHAPTER 8. CUTTER LOGS, RECORDS AND CHECKLISTS

A. General. This section outlines the procedures and requirements for maintaining navigational records.

a. Electronic Logs.

1. ECINS use. Units using an ECINS and an approved fluxgate (self-calibrating electro-magnetic compass) input as their primary means of navigation are authorized to use the system's voyage-recording feature in lieu of the Ship Position Log, Standard Bearing Book, and Navigation Data Sheet (CG-4380C) if the following information, at a minimum, is recorded by the system.

- a. Date/Time.
- b. Primary positioning source in use.
- c. Latitude/ longitude position from primary positioning system.
- d. Course over ground (COG)/ Speed over ground (SOG).
- e. True heading.
- f. Logged speed.
- g. Chart in use by the system.
- h. Visual/ Radar objects and LOPs used (if applicable).
- i. Depth.

2. Compass Checks and Deviation Tables. If the cutter meets the requirement of 8.A.1. above, compass checks normally recorded in the Navigation Data Sheet are no longer required. It is recommended that OODs verbally receive a compass check every half hour and on every course change. Additionally, cutters equipped with approved flux gate magnetic compasses are not required to post deviation tables but are required to ensure that the compasses and all remote repeaters are operating within the limits specified in the manufacturer's technical manuals. These compasses, at a minimum, should be calibrated in accordance with the manufacturer's instructions annually and immediately following major maintenance availabilities and be recorded in the unit's smooth log. The compasses should further be checked for accuracy before every underway period.

3. Maintenance.

- a. Electronic navigation records shall be printed out or saved on removable media and maintained locally for three years after the date of the final entry, then should be destroyed/ deleted.
- b. Removable media storage. Units storing records on removable media must ensure the records remain readable on the currently installed system throughout the three-year period.

- B. Deck Logs. The Deck Log (CG-4380A, CG-4380B and CG-4380C) shall be maintained in accordance with reference (j).
- C. Ship Position Log (OPNAV 3100/3). A Ship Position Log is a record of latitude and longitude positions and soundings from all positioning sources and shall be used during coastal and open ocean navigation. When visual or bearings and Radar ranges are used to determine the cutter's position, the Ship Position Log may be secured and the Standard Bearing Book may be used. This log shall be maintained locally for three years after the date of the final entry, and then should be destroyed.
- D. Standard Bearing Book (OPNAV 3530/2). The Standard Bearing Book is a record of the data obtained to determine the ship's position by visual bearings, sextant angles, radar ranges and electronic LOPs. It is available in the National Stock System and shall be maintained in accordance with the procedures described below. The Standard Bearing Book shall be kept locally for three years after the date of the final entry, and then should be destroyed. A bound log book may be used if the Standard Bearing Book is unavailable.
1. Chart number. The chart number in use shall be recorded at the top of the initial page each day. Each shift of charts shall be noted in the first available blank line.
  2. Time zone and date. The time zone and date shall be indicated.
  3. Radar ranges. Radar ranges shall be labeled YD (yards) or NM (nautical miles).
  4. Soundings. Soundings shall be recorded at the time each fix is obtained and labeled FT (feet), FM (fathoms) or M (meters).
  5. Bearings. All bearings are true, unless otherwise indicated by R (relative) or M (magnetic). When shifting to relative, the shift shall be noted on the first available blank line and the ship's heading shall be recorded with each fix.
  6. Abbreviations. All abbreviations shall be in accordance with reference (l).
  7. Gyro/Radar error. Gyro error shall be recorded at the top of the initial page each day. Any revised gyro error shall be noted in the first available blank line. Radar range error, if determined shall be entered at the top of the initial page each day.
  8. Navigation aids. A list of navigation aids must be maintained in the bearing book or maintained as part of a gazetteer containing lists of charted objects for all piloting charts. If a gazetteer is maintained, it must be kept in close proximity to the plotting station for ready reference. Object lists must include the chart number, proper object name, latitude and longitude, and alpha-numeric designation of the object. Object lists maintained in CIC and the Bridge must be identical.
  9. Signature. At the end of the watch or navigation detail the bearing recorder shall sign the Standard Bearing Book on the next available line.

- E. Navy Navigation Workbook (OPNAV 3530/1). The Navy Navigation Workbook is a record of observations and computations used for navigation of the ship. This shall include data relating to celestial lines of position, tides, currents and gyro error. In view of the large amount of data that may be recorded, ships may organize data into separate notebooks as directed by the CO/OIC. The Navigator shall review each computation and sign the workbook as appropriate. The workbook and all electronic records shall be kept locally for three years after the date of the final entry, and then should be destroyed.
1. Computer computations. When using software for computations, the results may be printed out and maintained with the navigation workbook or stored electronically, in a retrievable format.
  2. STELLA. Units using STELLA software to perform celestial computations must print out the STELLA navigation log after each celestial observation and attach the print out to the workbook.
  3. Strip forms. Locally prepared strip forms, if used, shall be affixed to or recorded in the workbook.
  4. Calculator use. If calculators are used, enough data must be recorded in the workbook to reconstruct the computation.
- F. Combat Information Center (CIC)/Combat Support Center (CSC) Navigation Log. The purpose of the CIC/CSC Navigation Log is to provide a record of the data obtained to determine the ship's position by radar when navigating on paper charts. When in use, it shall be maintained by CIC/CSC in accordance with the procedures described below. The CIC Navigation Log shall be kept locally for three years after the date of the last entry, and then shall be destroyed.
1. Page labeling. The date, chart number and gyro error shall be entered at the top of each page. Any revised gyro error shall be noted in the log. The radar range error, if determined, shall be entered at the top of the initial page each day.
  2. Fix recording. The following information shall be recorded at the time of each fix:
    - a. Identification of landmarks used.
    - b. Ship's position relative to track.
    - c. Recommended course and speed.
    - d. Nearest shoal water.
    - e. Distance to turn.
    - f. Time to turn.
    - g. Nearest aid to navigation.
    - h. Sounding at the time each fix is obtained, labeled FT (feet), FM (fathoms) or M (meters).
    - i. Set and drift (as required).
    - j. Any pertinent remarks (e.g. Conn does /does not concur).

3. Securing the log. When the navigation detail is secured, an entry shall be made on the next available line in the log. A single line shall be drawn through the remainder of the page with the log keeper's signature appearing on the line.
  4. Radar ranges. Radar ranges shall be recorded in yards (YDS) or nautical miles (NM).
  5. Abbreviations. All abbreviations shall be in accordance with U.S. Chart 1, Nautical Chart Symbols and Abbreviations, unless promulgated separately in the log.
  6. Navigation aids. Requirements are the same as those of 8.E.8 above.
- G. Captain's Night Orders. The Captain's Night Order Book has been traditionally maintained in a bound ledger or loose-leaf form. The orders for each night are written and signed by the commanding officer as required by reference (a). They include such items as courses and speeds to be maintained throughout the night, expected sightings, engineering data, the tactical situation, and supplementary orders to the Officer of the Deck (OOD). CO/OICs may optionally use electronic media to convey night orders to the crew. With either option, safeguards must be in place to ensure that the Deck Watch Officers and other key personnel acknowledge the orders. The Captain's Night Order Book shall be retained on board for three years after the date of the last entry, then should be destroyed. Classified Nightly Battles Orders or Fighting Intentions are optional and in addition to Night Orders. Their use depends upon the threats that may be encountered by a unit.
- H. Checklists. Getting underway and entering port/ approaching restricted waters checklists shall be created, maintained and completed in accordance with enclosures (7) and (8). Checklists shall be maintained locally for 90 days after completion of the evolution, and then destroyed.
- I. Record Retention. In accordance with reference (j), regardless of any authorization contained in this manual, records directly related to the following matters shall not be destroyed until final clearance or settlement:
1. Claim. An outstanding claim for or against the United States.
  2. Litigation. A case under litigation.
  3. Investigation. An incomplete investigation.

## CHAPTER 9. ANCHORING

- A. General. This section states the basic requirements for anchoring. Ships shall maintain navigational awareness while approaching an anchorage, while anchored, and while weighing anchor.
- B. Proficiency.
1. Cutter class. All cutters shall maintain proficiency in anchoring in accordance with reference (b). Precision anchoring drills may be tailored to the capabilities of each individual cutter class.
  2. Proficient. To be considered proficient, cutters must be able to:
    - a. Prepare appropriate charts or plotting sheets for a precision anchorage.
    - b. Approach an anchorage or precision anchorage.
    - c. Anchor the ship.
    - d. Determine ship's position while at anchor.
    - e. Weigh anchor.
  3. Opportunities. Weather and operations permitting, cutters shall take advantage of opportunities to maintain proficiency in anchoring.
- C. Requirements.
1. Documentation. The Ship's Log shall include: time of anchorage, depth of water, anchor used, scope of chain, type of bottom, ship's head, and bearings to objects designated by the Navigator. The anchor watch shall use the ship's Standard Bearing Book to record time, DGPS position, ship's head, bearings to objects designated by the Navigator, and depth of water.
  2. Calculations.
    - a. The Letting Go Circle is drawn around the center of the anchoring location with a radius equal to the distance from the hawsepipe to the pelorus or radar antenna.
    - b. The Swing Circle is drawn from the anchoring location with a radius equal to length of the vessel plus the length of anchor chain released.
    - c. The Drag Circle is equal to the distance from the hawsepipe to pelorus or radar antenna, plus the length of the anchor chain released.
  3. Navigation Team Responsibilities. (In addition to responsibilities listed in Enclosure 3 of this document.)
    - a. Determine Set and Drift as soon as possible when approaching the anchorage to account for it in course recommendations.

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- b. As the anchor is let go, the navigation team shall immediately mark a round of bearings, ranges and record the ship's head.
- c. After the fix is plotted, a line is extended from the fix in the direction of the ship's head, and hawsepipe to pelorus distance is marked along the line, thus plotting the position of the anchor at the moment that it was let go.
- d. The navigation team shall continue to take fixes until it is determined the anchor is holding.
- e. Various anchor dragging alarms and plotting options are in existence on approved ECINS and shall be used in lieu of paper chart/plotting sheet if the system is fully operational.

## Appendix A. Glossary of Terms

TERM	DEFINITION
<b>Anti-grounding Alarm</b>	A function within electronic navigation systems that uses hydrographic data contained in vector format electronic chart data to alert the mariner when the vessel is approaching any charted feature that is located at a depth less than the navigational draft set by the operator. (i.e. spot sounding/depth contour or land). Also <i>see sounding alarm</i> .
<b>Back-up Positioning Source</b>	A positioning source from the same category as the primary positioning source that does not rely on any elements in common with the primary positioning source (e.g., a second GPS/DGPS receiver is not an adequate back-up positioning source for a GPS/DGPS receiver). Examples of adequate back-up positioning sources for GPS/DGPS include visual and/or radar lines of position entered into ECINS or radar and/or chart matching on ECINS.
<b>Back-up System</b>	A fully integrated redundancy within the ECINS (e.g., an ECINS with multiple computers), dual-redundant ECINS, or a separate independent ECINS or ECS, providing adequate back-up arrangements that enable the continuous operation of essential ECINS functions during a failure of the ECINS to ensure that a failure does not result in a potentially dangerous situation. This includes a timely transfer of route monitoring functions.
<b>Digital Nautical Chart (DNC)</b>	A vector database produced by the National Geospatial-Intelligence Agency (NGA). A DNC contains all the chart information necessary for safe navigation, and may contain supplementary information in addition to that contained on a paper chart (e.g., fleet guide).
<b>Electronic Chart Display and Information System (ECDIS)</b>	A navigation information system which with adequate backup arrangements can be accepted as complying with the up-to-date chart required by regulation V/19 and V/27 of the 1974 SOLAS Convention, as amended, by displaying selected information from an ENC with positional information from navigation sensors to assist the mariner in route planning and route monitoring, and if required displaying additional navigation-related information.
<b>Electronic Charting and Integrated Navigation System</b>	Electronic navigation systems in use by the Coast Guard that are intended to meet or exceed international requirements for ECDIS, but, include some deliberate additions to, and deviations from, the standards governing those systems.  <i>Coast Guard requirements for ECINS functionality are primarily</i>

<b>TERM</b>	<b>DEFINITION</b>
<b>(ECINS)(cont.)</b>	<i>(cont.) derived from the international standards for Electronic Chart Display and Information Systems (ECDIS) and Integrated Navigation Systems (INS), with additional required capabilities taken from the U.S. Navy ECDIS Policy and the North Atlantic Treaty Organization (NATO) Standardization Agreement (STANAG) on Warship ECDIS (WECDIS).</i>
<b>Electronic Chart Manager</b>	USCG Navigation Center (NAVCEN) is designated to approve electronic chart data for navigation and procure and distribute approved electronic chart data for electronic navigation systems employed within the Coast Guard.
<b>Electronic Chart System (ECS)</b>	Electronic navigation systems that are based upon recognized requirements. ECS in use by the Coast Guard include some deliberate additions to the international standards governing those systems.
<b>Electronic Navigational Chart (ENC)</b>	<p>A vector database, standardized as to content, structure and format issued by or on the authority of a government authorized hydrographic office or other relevant government institution, and conforming to relevant IHO standards. An ENC contains all the chart information necessary for safe navigation, and may contain supplementary information in addition to that contained in a paper chart (e.g., sailing directions), which may be considered necessary for safe navigation.</p> <p><i>In U.S. coastal waters, official ENC data is produced by the National Oceanic and Atmospheric Administration (NOAA) National Ocean Service (NOS) Office of Coast Survey (OCS). In U.S. inland waters, official Inland ENC (I-ENC) data is produced by the US Army Corps of Engineers (USACE).</i></p>
<b>Modes of Navigation</b>	<p>Mode I-Operating ECINS as primary navigation IAW Chap 4.B verifying GPS/DGPS with radar overlay, chart matching, or VIS/RAD LOPs.</p> <p>Mode II-Operating ECINS as primary navigation IAW Chap 4.B. entering VIS/RAD LOPs. This mode is largely used as back-up or in the event primary positioning is lost.</p> <p>Mode III-Traditional paper navigation using approved positioning source with VIS/RAD LOPs to verify.</p>

<b>TERM</b>	<b>DEFINITION</b>
<b>Raster Format</b>	<p>The real world is portrayed by a scanned image, essentially a digital picture of a paper chart. The image is made up of a rectangular grid comprised of color and position information for each location on the grid. Such a location is often referred to as a picture element or pixel.</p> <p><i>Examples of raster format electronic chart data used in the Coast Guard include BSB format (used by contractors to produce the NOAA RNC product and the Canadian Hydrographic Service (CHS) RNC product), Hydrographic Chart Raster Format (HCRF) (used by the United Kingdom Hydrographic Office (UKHO) for their Admiralty Raster Chart (ARCS) product and Australian Hydrographic Service for their Seafarer RNC product).</i></p>
<b>Raster Navigational Chart (RNC)</b>	<p>A facsimile of a paper chart produced by or issued on the authority of a government authorized hydrographic office.</p> <p><i>In the U.S., official RNC data is produced by the National Oceanic and Atmospheric Administration (NOAA) National Ocean Service (NOS) Office of Coast Survey (OCS).</i></p>
<b>Scalable Integrated Navigation System (SINS) for Boats</b>	<p>Navigation systems that are intended to meet international requirements for small craft radar. SINS include additional chart plotting and limited navigational functionality but do not meet the standards for ECS.</p>
<b>Slide line (Wheelover)</b>	<p>A line plotted on the paper chart parallel to the next track leg, used to account for cross-track error when determining wheel-over point.</p>
<b>Sounding Alarm</b>	<p>A function, using the fathometer, which alerts the mariner when the vessel encounters a specific depth beneath the keel. <i>Also see Anti-grounding alarm.</i></p>
<b>Turn Bearing</b>	<p>A bearing to a charted object marking a specific point along the track-line at which the vessel should begin its turn (wheel-over point).</p>
<b>Turn Range</b>	<p>A range to a charted object marking a specific point along the track-line at which the vessel should begin its turn (wheel-over point).</p>
<b>Up-To-Date Paper Charts</b>	<p>Paper Charts are considered to be up-to-date if all available corrections from Notice to Mariners, Local Notices to Mariners, and other applicable sources have been applied.</p>

<b>TERM</b>	<b>DEFINITION</b>
<b>Up-To-Date Electronic Charts</b>	<p>Electronic Charts are considered up-to-date if they have been corrected within the last forty five days using one of the following methods:</p> <ol style="list-style-type: none"> <li>1. Full-file replacement of the electronic chart data (e.g. cell, library, chart and chartlet).</li> <li>2. Applying official updates (e.g. ENC updates, VPF Database Updates, raster updates (patches)).</li> <li>3. Manual corrections, using information provided by:               <ol style="list-style-type: none"> <li>a. The cognizant hydrographic office (e.g. NOAA, CHS, UKHO, etc).</li> <li>b. Local Notice to Mariners.</li> <li>c. Broadcast notifications (e.g. Broadcast Notice to Mariners, HydroLants, etc.)</li> </ol> </li> </ol> <p>Note: For SINS equipped vessels, an electronic chart is considered up-to-date if it has been corrected or replaced within six months of a permanent chart change.</p>
<b>Vector Format</b>	<p>The real world is portrayed as points, lines and polygons, with text labels. This representation is derived from objects and attributes in a database. This database can be queried and can be used for such functions as Anti-Grounding alerts.</p> <p><i>Examples of vector format electronic chart data used in the Coast Guard include ENC, Inland ENC, DNC®, TX-97 (a proprietary format of Transas), NTX (a proprietary format used by OSI) and CM93 (a proprietary format of C-Map).</i></p>

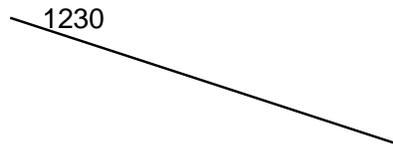
**Appendix B. List of Acronyms**

<b>ACRONYM</b>	<b>DEFINITION</b>
AOR	Area of Responsibility
ATON	Aids to Navigation
CHS	Canadian Hydrographic Service
CIC	Combat Information Center
CO/OIC	Commanding Officer/Officer- in-Charge
COMDAC-INS	Command and Display Control Integrated Navigation System
CSC	Combat Support Center
DGPS	Differential Global Positioning System
DNC	Digital Nautical Chart
DoD	Department of Defense
DR	Dead Reckoning
ECDIS	Electronic Chart Display and Information System
ECINS	Electronic Charting and Integrated Navigation System
ECS	Electronic Chart System
ENC	Electronic Navigational Chart
EP	Estimated Position
GPS	Global Positioning System
IALA	International Association of Lighthouse Authorities
IHO	International Hydrographic Organization
LNTM	Local Notice to Mariners
LOP	Line of Position
MOB	Man Overboard
NATO	North Atlantic Treaty Organization
NGA	National Geospatial-Intelligence Agency
NOAA	National Oceanic and Atmospheric Administration
NSB	Non-standard Boat
NTM	Notice to Mariners
OPCON	Operational Commander
OSI	Offshore Systems International
PPS	Precise Positioning Service
RNC	Raster Navigational Chart
SA	Selective Availability
SINS	Scalable Integrated Navigation System
SIRVSS	Shipboard Infrared Visual Sensor System
SMEF	System Management & Engineering Facility

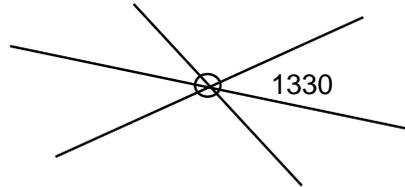
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<b>ACRONYM</b>	<b>DEFINITION</b>
SOLAS	Saving Of Lives At Sea
SPS	Standard Positioning Service
STANAG	Standardization Agreement
STELLA	System To Estimate Latitude and Longitude Astronomically
UKHO	United Kingdom Hydrographic Office
VPF	Vector Product Format
WAAS	Wide Area Augmentation System
WECDIS	Warship Electronic Chart Display and Information System

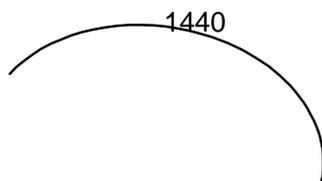
## Navigation Plotting Symbols



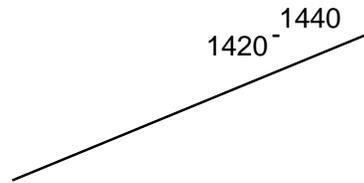
Single line of position  
(Same for visual and electronic LOP)



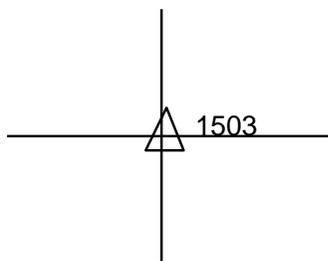
Visual fix



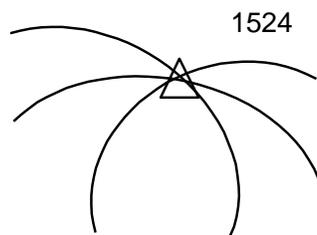
Distance arc or range



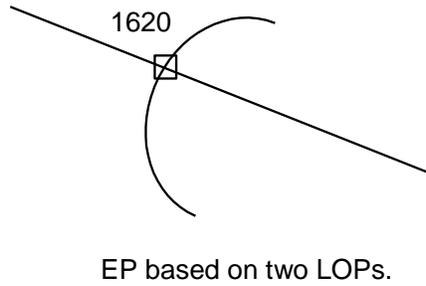
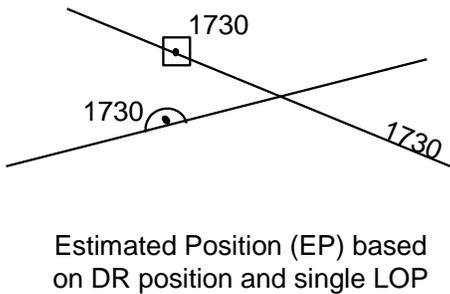
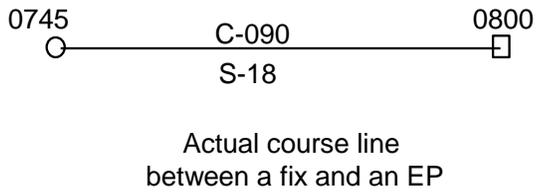
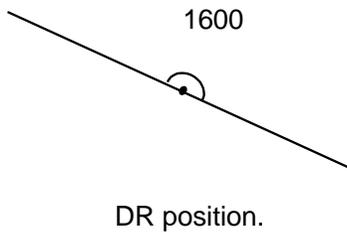
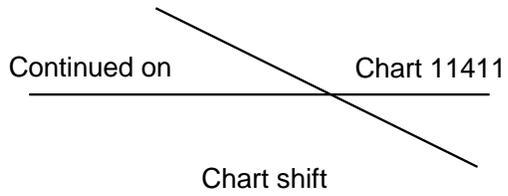
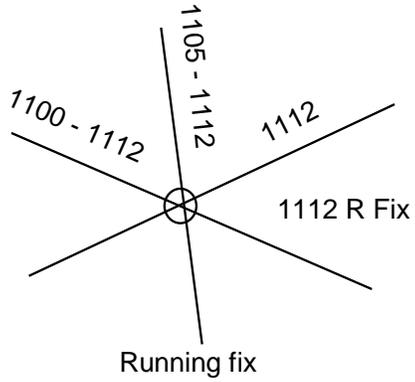
Advanced LOP  
Original time and time LOP advanced to

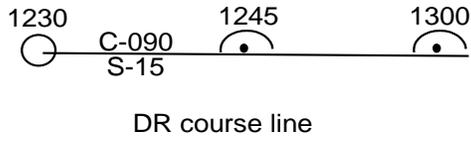


Electronic fix

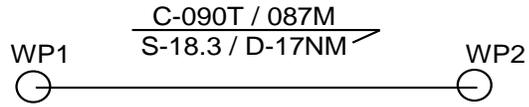


Electronic fix  
using radar ranges

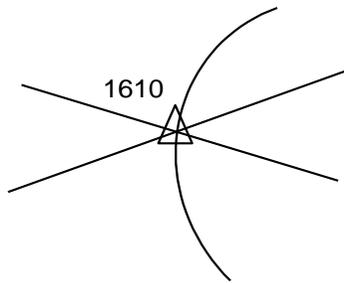




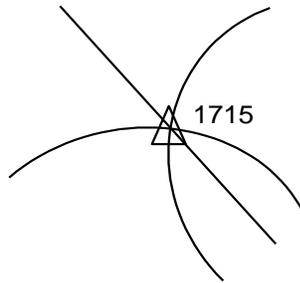
DR course line



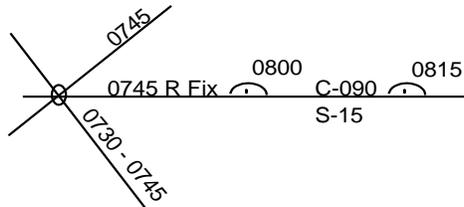
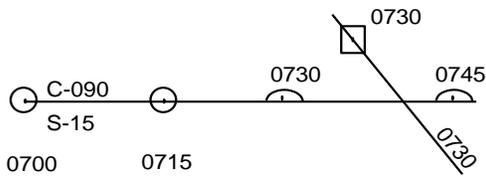
Trackline. Used between intended waypoints.



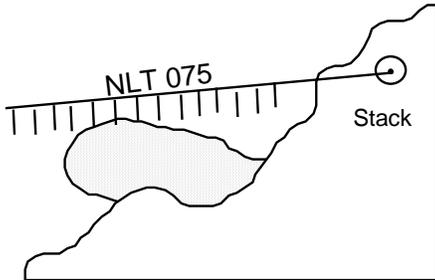
Two visual bearings and one radar range



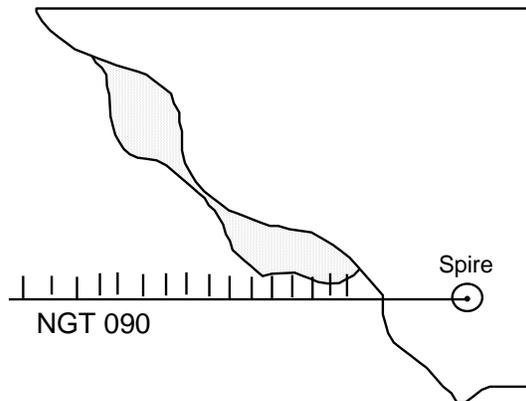
Two radar ranges and one visual bearing.



Examples of a DR course line with an EP and a DR course line with a running fix



Danger bearing No Less Than 075 Deg T



Danger bearing No Greater Than 090 Deg T

## Line Handling Commands

This enclosure provides a list of standard line handling commands and may be tailored as appropriate to meet the requirements of Chapter 1.

<u>COMMAND</u>	<u>ACTION</u>
PUT OVER/PASS (line number)	Pass the specified line to the pier and provide enough slack to allow line handlers to place the line over the bitt, cleat or bollard.
HOLD (line number)	Do not let any more line out even though the risk of parting may exist.
CHECK (line number)	Hold heavy tension on the specified line but render it as necessary to prevent parting the line.
SURGE (line number)	Hold moderate tension on a line but render it enough to permit movement of the ship.
EASE (line number)	Let a line out until it is under less tension, but not slacked.
SLACK (line number)	Take all tension off a line.
TAKE THE SLACK OUT OF (line number)	Take all the slack out of a line, but do not take a strain.
SHIFT (line number)	Move a line to the specified location.
HEAVE AROUND ON (line number)	Take a strain on a line.
TAKE (line number) TO POWER	Take the specified line to the capstan or gypsy head and make ready to heave around (DO NOT heave around until told to do so).
SINGLE UP (line number)	Take in all but one bight so there remains a single part to the line. May also be used to single up all normal mooring lines.
DOUBLE UP (line number)	Pass an additional bight on the specified line so there are three parts to the line. This may also be used to double up all normal mooring lines. Cutters without sufficient mooring line for three parts should just pass the bitter end of the single up to the pier.

**COMMAND**

**ACTION**

AVAST or AVAST  
HEAVING

Stop taking a strain on a line with capstan.

TAKE IN (line  
number)

Allow the pier line handler enough slack to take the line off the fitting and bring the line aboard. Used when secured with your own line.

CAST OFF (line  
number)

When you are secured with another ship's lines, it means to cast off the ends of their lines.

## **Cutter Navigation Teams.**

- A. Bridge Navigation Team Organization. Bridge Navigation Team members shall complete applicable sections of reference (f) and/or cutter specific Job Qualification Requirements (JQR) for their assigned billets in accordance with reference (b). Navigation Team positions shall be assigned as appropriate for the method of navigation in use. The following are standard navigation team positions and duties:
1. Navigation Evaluator. If not the Navigator, this person is responsible to the Navigator and shall:
    - a. Coordinate the actions of all bridge navigation team members.
    - b. Use all available information to ensure the safe passage of the vessel including electronic fixes plotted on a paper chart, or displayed on an electronic navigation system.
    - c. Evaluate fix accuracy from the Bridge and Combat Information/Support Center (CIC/CSC) (if equipped).
    - d. Evaluate ship's projected movements.
    - e. Make reports to the Conning Officer as specified by the Command Navigation Standards.
  2. Navigation Plotter. The Navigation Plotter should not be the same individual as the Navigation Evaluator unless cutter personnel strength precludes this. The Navigation Plotter shall maintain the navigation plot as follows:
    - a. Paper chart navigation:
      - (1) Plot and label each fix on the chart in use.
      - (2) Extend the DR at least two fix intervals.
      - (3) Compute set and drift since last fix.
      - (4) Identify nearest hazard to navigation.
      - (5) Determine time and distance to the next course change.
      - (6) Revise turn bearings.
      - (7) Complete other tasks as directed by the navigator/navigation evaluator.
    - b. Electronic navigation:
      - (1) Plot various types of fixes as applicable, based on the installed electronic navigation system.

- (2) Complete other tasks as directed by the Navigator/Navigation Evaluator.
3. Bearing Book Recorder. When the cutter is navigating with paper charts, the recorder shall:
    - a. Maintain the Standard Bearing Book (OPNAV 3530/2 or equivalent) in accordance with this Manual.
    - b. Maintain communications with the Bearing Takers.
    - c. Mark fixes at intervals specified by the Navigation Evaluator.
    - d. Pass pertinent information to the Navigation Plotter/Navigation Evaluator.
  4. Bearing Takers.
    - a. Obtain accurate bearings to navigation aids designated by the Navigation Plotter/Navigation Evaluator.
    - b. Advise the Navigation Plotter regarding the navigation aids available for use, including when navigation aids are acquired visually or lost from sight.
  5. Bridge Radar Observer.
    - a. Provide all radar navigation data as directed by the Navigation Plotter/Navigation Evaluator.
    - b. Perform the duties of Shipping Officer/Radar Operator on cutters without a CIC/CSC.
  6. Leadsman. Pass soundings to the bridge navigation team for comparison with the fathometer and charted depth.
- B. CIC/CSC Navigation Team Organization. CIC/CSC Navigation Team members shall complete applicable sections of reference (f) and/or cutter specific JQR for their assigned billets in accordance with the reference (b). On cutters without a CIC/CSC, some sections of this PQS may be applicable for the Bridge Navigation Team (e.g., shipping officer, shipping radar operator). On cutters without an appropriately equipped CIC/CSC, a secondary Navigation Team shall be positioned on the bridge or other suitable location designated by the commanding officer. The following are recommended CIC/CSC navigation team positions:
1. Piloting Officer. Supervise the Navigation Radar Operator, Navigation Plotter and Navigation Recorder. The Piloting Officer shall:
    - a. Evaluate fix accuracy.
    - b. Make recommendations to the navigation evaluator based on CIC/CSC's navigation plot.
    - c. Keep the Shipping Officer advised of course/speed changes.

2. Shipping Officer. Evaluates the surface picture. The Shipping Officer shall:
  - a. Designate contacts to be watched or tracked in accordance with ship's directives.
  - b. Verify that the recommended course is clear of all surface contacts.
3. Shipping Radar Operator. Provides all radar data as directed by the Shipping Officer.
4. Navigation Radar Operator.
  - a. Provide all navigation radar data as directed by the Piloting Officer.
  - b. Maintain communications with, and keep the Navigation Plotter informed of designated points available for use.
5. Navigation Plotter. Maintains CIC/CSC's navigation plot.
  - a. Paper chart navigation:
    - (1) Plots and labels each fix on the chart in use.
    - (2) Extends the DR at least two fix intervals.
    - (3) Computes set and drift since last fix.
    - (4) Identifies nearest hazard to navigation.
    - (5) Determines time and distance to the next course change.
    - (6) Revises turn bearings.
    - (7) Completes other tasks as directed by the Piloting Officer.
  - b. Electronic navigation:
    - (1) Plots various types of fixes as applicable, based on the installed electronic navigation system.
    - (2) Completes other tasks as directed by the Piloting Officer.
6. Navigation Recorder.
  - a. Logs all Piloting Officer recommendations as well as the standard fix report.
  - b. Assumes responsibility from the Bearing Book Recorder for designating times of fixes when CIC/CSC has been designated as the primary navigation plot.

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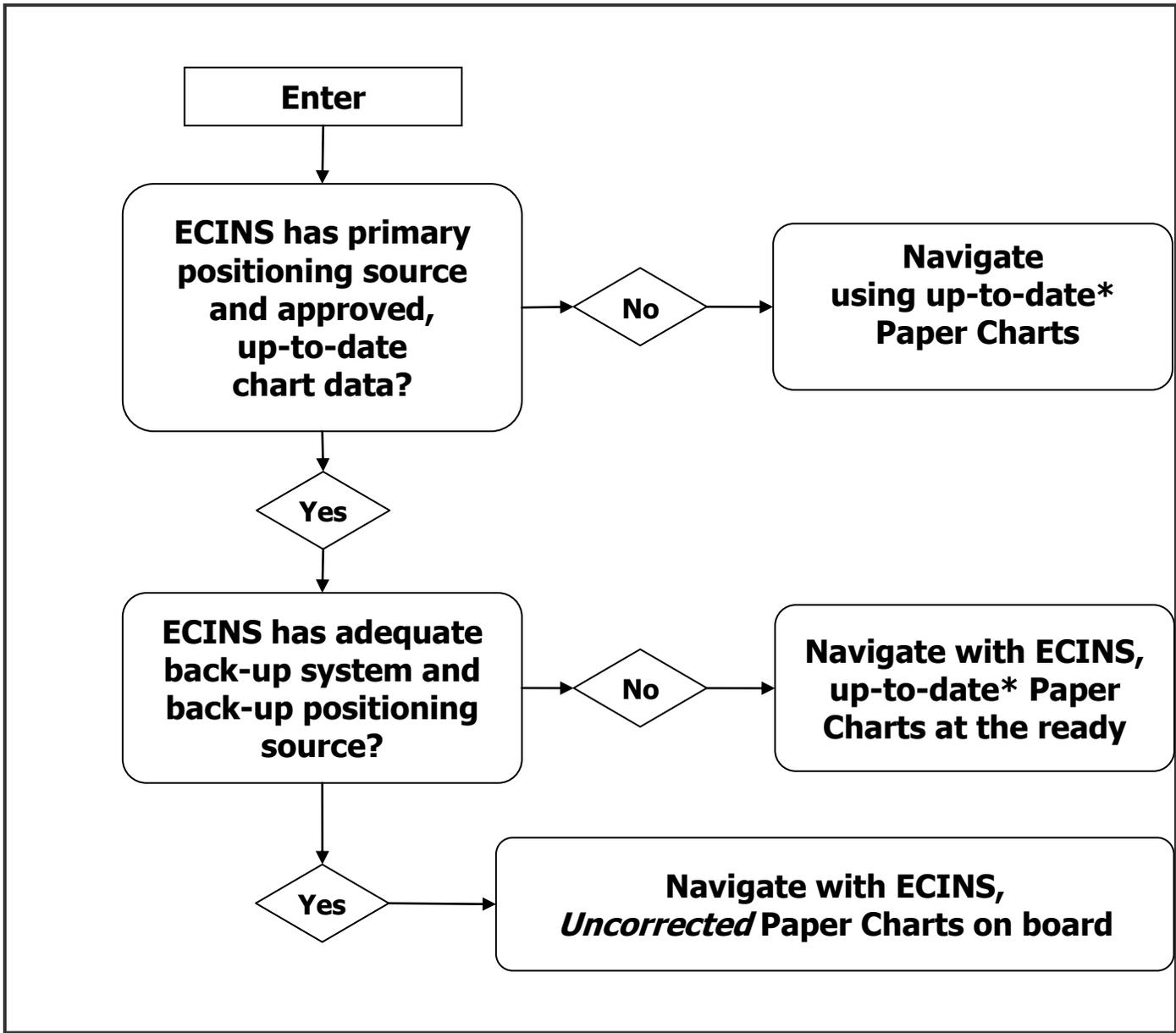
## Helm Commands

This enclosure provides a list of commonly used helm commands and may be tailored as appropriate to meet the requirements of Chapter 1. Standard phraseology governing orders to the helmsman is required to ensure orders are understood and promptly executed. The helmsman shall repeat each command word-for-word and shall report when the ordered action is complete. The conning officer/coxswain shall acknowledge the helmsman's responses with "VERY WELL."

<u>COMMAND</u>	<u>ACTION</u>
RIGHT (LEFT) STANDARD (FULL) RUDDER	Apply the ordered rudder. Standard rudder is the amount required to turn the ship on its standard tactical diameter. The rudder angle varies from ship to ship. Full rudder is normally the amount required for reduced tactical diameter.
RIGHT (LEFT) ## DEGREES RUDDER	Apply the ordered rudder. This order may be followed by a new course for the helmsman to steer, such as "STEADY ON COURSE 256" or another rudder command. If no course is specified the helmsman shall call out the heading at 10 degree increments, such as "PASSING 150, PASSING 160," until a course is ordered by the conning officer.
INCREASE YOUR RUDDER TO RIGHT (LEFT) ## DEGREES	Increase the rudder angle the amount specified to cause the ship to turn more rapidly. This order may be followed by a new course for the helmsman to steer or another rudder command. If no course is specified the helmsman shall call out the heading at 10 degree increments until a course is ordered by the conning officer.
EASE YOUR RUDDER/EASE YOUR RUDDER TO RIGHT (LEFT) ## DEGREES	Decrease the rudder angle by half the amount currently applied or by the amount ordered. This order may be followed by a new course for the helmsman to steer or another rudder command. If no course is specified the helmsman shall call out the heading at 10 degree increments until a course is ordered by the conning officer.
RUDDER AMIDSHIPS	Place the rudder at zero degrees.
MEET HER	Use the rudder as necessary to check the swing of the ship without steadying on any specific course.
STEADY, STEADY AS SHE GOES, STEADY ON COURSE ###	Steer the course on which the ship is currently headed or the ordered course. If the ship is turning and the command STEADY or STEADY AS SHE GOES is given, the helmsman notes the heading and brings the ship back to the heading. The helmsman should then reply "STEADY; COURSE ###."

<b><u>COMMAND</u></b>	<b><u>ACTION</u></b>
SHIFT YOUR RUDDER	Move the rudder to the same angle in the opposite direction from where it is currently ordered. This order may be given only when a specific rudder angle is in effect.
NOTHING TO THE RIGHT (LEFT) OF COURSE ###	Steer nothing to the right (left) of the course specified.
HOW'S YOUR RUDDER	This is a query from the conning officer to ascertain the current rudder placement. The helmsman replies, "MY RUDDER IS RIGHT(LEFT) ## DEGREES."
MARK YOUR HEAD	Respond "MARK ###." A command to the helmsman to state the heading of the ship at the moment the command was given.
COMMAND	The helmsman's response to the conning officer if he/she did not hear a command, misunderstood a command or believes a command is improper.
STEER ON	The helmsman steers on a range or object identified by the conning officer.
MIND YOUR HELM	A command issued by the Conning Officer, CO, Officer of the Deck (if separate), or the Navigator to the Helmsman to pay closer attention to his/her steering.

### ECINS and Paper Chart Use Flow Chart



(\*) Per Command Navigation Standards

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## **Guidance for Boat Forces Units Command Navigation Standards**

### **A. Unit preparations for navigation should:**

1. Navigation kit. Discuss Coxswain's personal navigation kit (if required as a supplement to the boat outfit).
2. Master chart. Discuss creation of a master chart (known by various names, i.e. compass card) of the local area by each Coxswain.
3. Navigation Petty Officer. Discuss Navigation Petty Officer responsibility to maintain a master corrected paper chart for the unit and the need to provide a like copy to the Sector or Operational Commanders Command Center.
4. GPS waypoints. Discuss unit standardization of GPS waypoints that will be used and maintained on the unit boats.
5. AOR key waypoints. List unit AOR key waypoints. Name or Description (LAT - LONG)

### **B. Unit qualification and certification should:**

1. Key operating areas. Discuss key operating areas frequented during normal unit operations. Relate them to the area familiarization requirements of the U.S. Coast Guard Boat Operations and Training (BOAT) Manual, Volume I, COMDTINST M16114.32 (series). CO/OIC may specify increased trips in certain areas to reinforce knowledge necessary to safe navigation.
2. Crew relationships/training. Discuss the local knowledge level relationships between all boat crew and communications watchstanders. Discuss the unit boat crew examining board and unit training program role in reinforcing thorough knowledge of these "key areas" as an important element in reducing risk (basis for Operational Risk Management (ORM), and principles of Team Coordination Training (TCT)).

### **C. Underway navigation expectations:**

1. Planning. Discuss expectations for pre-sortie navigation planning, plotting, and electronics input. This preplanning will reduce the underway work load, make immediate reference information available, establish waypoints that may be required for the sortie, and allow an opportunity to conduct ORM.
2. Navigating in AOR. Discuss expectations for navigating in the key operating areas within the unit AOR. This would involve use of pre-established track lines or operations within well-marked channels as the normal means of determining position verified by visual observations, GPS and/or radar. This encompasses the use of all-available information and tools. The Coxswain must remain constantly cognizant of the boat's position and keep it in safe water and out of danger.

3. Navigating outside key areas. Discuss expectations for navigating outside the above listed key areas. This could involve requirements for an active plot maintained on a chart or with the electronic chart plotter. This may be as simple as using Estimated Positions (EP's) as validation of the pre-planned DR tracks or as difficult as paper plotting of positions depending on circumstances. The Coxswain must execute the proper level of team coordination to ensure safety and mission success.
4. Surf environment. Discuss navigation expectations in the surf environment. Surf operations are inherently dangerous so prudent use of ranges, depth sounder, sound seamanship, and teamwork is required. The heavy weather Coxswain/surfman must use the electronic tools and visual cues available to determine the boat's current position with verifiable accuracy. They must also accurately recognize the effects of leeway, swell, and current on relative boat movement making proper compensation to allow for a safe transit. This must often be accomplished without additional paper plotting.
5. Communications. Discuss boat to shore communications as it might relate to navigation. The navigation demands on the boat crew may be tempered through prudent teamwork with shore side assets (i.e. tower, beach party, or vehicle).
6. Restricted visibility. Discuss operations at night or during periods of restricted visibility.
7. Questionable boat position. Whenever the position of the boat is in question or the information available is conflicting, discuss the immediate prudent measures to resolve. Normally, this will involve a reduction in speed, station keeping or anchoring long enough to get an accurate plotted fix.

D. Caution or danger areas:

1. Significant dangers. Describe areas that pose significant dangers to a boat. A command may direct Coxswains to avoid transit in these areas if not necessary to the sortie and always use extreme caution in piloting when operations require work nearby.
2. Wake/speed restrictions. Describe areas where unit boats must adhere to no wake zones or speed limits during operations. It is typical that unit boats will observe the no wake requirement as well as take extra caution to lower speed and wake near marina entrances and in areas with high-density traffic. Instruct coxswains to consistently conduct routine operations or transits at reasonable and safe speeds.
3. Hazards. Discuss operating in areas of hazards or increased risks (wash rocks, crab pots, low visibility etc.).
4. Communications gaps. Describe areas where known communications gaps exist in the area of responsibility. Command may require alternatives to operations and position reports when missions take boats into those areas to ensure safety.

## Sample Getting Underway Checklist

This enclosure provides a sample checklist containing common actions that must be taken prior to getting underway. This checklist may be tailored as appropriate to meet the requirements of Chapter 9.

<u>Time prior to</u>	<u>Event</u>
48 Hours	<p>Establish getting underway schedule covering: propulsion plant light off, shift from shore to cutter power, disposal of cutter vehicles, light off and testing of electronic suite, U.S. and Guard Mail dispatch and receipt.</p> <p>Release MOVREP.</p>
24 Hours	<p>Conduct navigation brief</p> <p>Verify arrangements for tugs/pilots/line handlers.</p> <p>Verify schedule for lighting-off power plant.</p> <p>Energize gyrocompasses.</p> <p>Check navigation lights for proper operation (Preferably at night).</p> <p>Ascertain schedule of other vessel movements in harbor on underway day.</p>
4 Hours	<p>Energize all radars except those prohibited by local electromagnetic emissions restrictions.</p> <p>Energize and configure ECINS/ECS, if so equipped.</p> <p>Validate accuracy of fluxgate(electro-magnetic compass) if so equipped.</p> <p>Validate DGPS/GPS datum.</p> <p>Reconfirm tugs/pilots/line handlers.</p> <p>Verify arrangements for terminating shore services.</p> <p>Verify removal of floats, barges, containment booms</p>
2 Hours	<p>Ascertain from the executive officer/executive petty officer any anticipated deviations from the Plan of the Day.</p> <p>Promulgate underway time to all hands.</p> <p>Energize and initialize all electronic navigation equipment. (Coordinate with shift from shore to cutter power.)</p> <p>Energize and calibrate all radar repeaters. (Post errors at each repeater and for navigation plotters.)</p>

	Determine and post gyro, steering, and navigation repeater errors and enter into electronic navigation system, as applicable. Check/energize all other electronic equipment (e.g. fathometer, etc.).
	Conduct radio checks on all required circuits. (Include bridge-to-bridge radiotelephone)
1 Hour	Set condition Yoke. Tune and optimize radars. Post tide/current/aids to navigation information on the bridge and CIC/CSC.
45 Minutes	Fix ship's position using all available positioning sources. Record draft of cutter fore and aft in cutter's deck log.
30 Minutes	Station the Special Sea Detail and Anchor Detail. In reduced visibility: <ol style="list-style-type: none"><li>1. Station the low visibility detail.</li><li>2. Set material condition Zebra on main deck and below.</li></ol> Embark pilot. Display CODE HOTEL. Check steering in all available modes. Test sound-powered phone circuits in use. Receive department reports for readiness to get underway. Test anchor windlass. Prepare anchor(s) for letting go. OOD shift watch to the bridge.
15 Minutes	Obtain CO/OICs permission to shift to pilot house control (when equipped) and test main engine(s). Direct engineering control accordingly after ensuring that the screw(s) are clear. Test cutter's whistle/general alarms. Single up lines. Make SECURITE calls. Take in the brow and break all shore connections. Conduct time check. Report when "ready for getting underway" to the executive officer/executive petty officer.

10 Minutes	Warn engineering control to standby to answer all bells or of impending pilothouse control maneuvers.
Zero Time	Underway. Shift colors/close up international call sign (if appropriate). Make SECURITE calls. Report underway to VTS if appropriate.
After U/W	Return checklist to navigator for filing.

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## Sample Entering Port/Approaching Restricted Waters Checklist

This enclosure provides a sample checklist containing common actions that must be taken prior to Entering Port/Approaching Restricted Waters. This checklist may be tailored as appropriate to meet the requirements of Chapter 9.

<u>Time prior to</u>	<u>Event</u>
24 Hours	Conduct navigation brief.
3 Hours	Determine and post gyro, steering, and navigation repeater errors and enter into electronic navigation system, as applicable.
1 Hour	Pass the word, "Make all preparations for entering port. Cutter will anchor (berth _____ side to) at about _____. All hands shift into the Uniform of the Day."  Lay out mooring lines if required.  Set up and check all harbor and tug radio frequencies.  Check into VTS when appropriate.  Ascertain schedule of other vessel movements in harbor.
45 Minutes	Test cutter's whistle/general alarms.  Station the Navigation Detail.  Prior to approaching restricted waters, check steering in all available modes.  Test backing bells.  Hoist international call sign when entering inland waters (if applicable).
30 Minutes	Station the Special Sea Detail and Anchor Detail.  Make anchor(s) ready for use.  Inform the Anchor Detail of depth of water at anchorage, type of bottom, ready anchor, and scope of chain to be used.  Inform first lieutenant as to range of tide and time of high water.  Receive readiness reports for entering port.  Make SECURITE calls.  Request permission to enter port from the proper authority.
15 Minutes	If mooring to a buoy, lower boat with buoy detail as directed.  Station line handlers.
Upon Mooring	Secure main engines on _____ hour standby.  Secure gyros and navigational radars as directed.  Check out of VTS as appropriate.

If anchored, obtain navigation bearings and ranges, and determine swing and drag circles.

Record draft of cutter fore and aft.

Shift watch to quarterdeck.

Return checklist to navigator for filing.

Release arrival MOVREP