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30 Aug 2010
COMNAVSURFPAC/COMNAVAIRPAC/COMNAVAIRLANT/COMNAVSURLANTINST 3530.4C
Code CNAP N7/CNSP N7/CNAL N7/CNSL N7

COMNAVSURFPAC/COMNAVAIRPAC/COMNAVAIRLANT/COMNAVSURFLANTINST 3530.4C

Subj: SURFACE SHIP NAVIGATION DEPARTMENT ORGANIZATION AND REGULATIONS MANUAL

Ref:
(a) OPNAVINST 3120.32 (Series), Standard Organization and Regulations of the US Navy (SORM)
(b) U.S. Navy Regulations, 1990
(c) COMPACFLTINST 3140.3/COMLANTFLTINST 3140.9 (Series), Nautical Chart and Publication Allowances
(d) OPNAVINST C3000.8
(e) NAVPUB 9, The American Practical Navigator
(f) Navigation, Seamanship, and Shiphandling Training Requirements Document (NSS TRD)
(g) OPNAVINST 9420.2 (Series), Implementation of the Electronic Chart Display and Information System (ECDIS-N) Certification Process
(h) NAVSEAINST 9420.4 (Series), Certification of Navigation Systems (NAVCERT)
(i) COMPACFLT/COMLANTFLTINST 3530.1 (Series), Surface Ship and Submarine Seamanship and Navigation
(j) CJCSI 6130.01 (Series), CJCS Master Positioning, Navigation, and Timing Plan
(k) OPNAVINST 3100.7 (Series), Preparing, Maintaining, and Submitting the Ship's Deck Log
(l) CNSFINST 3502.1 (Series) Surface Force Training Manual
(m) CNAFINST 3500.20 (Series) Aircraft Carrier Training and Readiness Manual

1. Purpose. To publish Type Commander (TYCOM) minimum navigation policies, procedures, and organizational standards to be implemented by Commander, Naval Air Forces, U.S. Pacific Fleet (CNAP), Commander, Naval Surface Forces, U.S. Pacific Fleet (CNSP), Commander, Naval Air Forces, U.S. Atlantic Fleet (CNAL), and Commander, Naval Surface Force, U.S. Atlantic Fleet (CNSL) vessels.

2. Cancellation. COMNAVAIRFORINST/COMNAVSURFORINST 3530.4B.

3. Revision. Changes are extensive, and individual paragraphs where changes have been made have been marked. However, it is necessary to review this instruction in its entirety. Forward recommendations for changes, additions or deletions to your respective TYCOM. This instruction incorporates CNSF message 092319Z Sep 09- REVISED SQUADRON/GROUP STAFF NAVIGATION ASSESSMENT GUIDELINES. This is a joint CNAP, CNAL, CNSP and CNSL instruction.

4. Action.

a. Effective upon receipt, personnel assigned responsibility for navigation duties, including those assigned in the Pilothouse (Bridge), Combat Information Center (CIC), Combat Direction Center (CDC), or Tactical Operations Plot (TOP), are required to read and demonstrate knowledge of the contents of this instruction before assuming their duties. Additionally, watchstanders charged with navigation duties shall review this document and the ship’s Navigation Bill quarterly and acknowledge their review on a ship-generated form.

b. Commanders are advised to become thoroughly familiar with the accuracy and use of available methods for determining position.

c. Immediate Superiors in Command (Squadron/Group Staff s) are required to conduct Navigation Assessments once per MOB-N certification (SURFOR)/FRTP (AIRFOR). Consolidated and sanitized reports of common deficiencies discovered during navigation assessments shall be forwarded to the appropriate TYCOM using Appendix A, “Squadron/Group Staff Navigation Assessment Checklist.” The Navigation assessment will also be reported as an exercise in TRAREPs, CV-SHARP, and TORIS/TFOM. A ship that

fails the Squadron/Group Staff Navigation Assessment, or one who's assessment is out of periodicity, will require direct supervision of the Navigation team by their Squadron/Group Staff. Guidelines are provided in Appendix A.

d. Each Commanding Officer (CO) will tailor chapters two, three, and four for non-ECDIS-N authorized ships and two, three, and five for ECDIS-N certified ships of this instruction (plus Appendices C, I and J, as applicable) as necessary to adapt them to the ship's navigation sensors and data distribution system configuration and organization; and status of transition to electronic charting. The resulting instruction will be issued as the ship's Navigation Bill and will be considered current until a change of command, or superseded, whichever comes first.

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https://www.surfor.navy.mil/directives/CNSF%20Directives%203000%20%203999/Forms/AllDir.aspx

Distribution:(COMNAVAIRFOR)

https://www.portal.navy.mil/comnavairfor/default.aspx

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CHAPTER 1

INTRODUCTION

1. Background. While special significance must always be placed on piloting in restricted waters, the establishment of Over-the-Horizon Targeting (OTH-T), increasing use of Direct Support (DS) operations, and routine rendezvousing under Emission Control conditions has caused increased emphasis to be placed on precision navigation. Complex tactical operations that combine surface forces with submarines and long-range aircraft now demand more accurate navigation. Studies have shown that navigation accuracy can be adversely affected by a number of factors, including:

a. Accumulation of errors in information flow.

b. Lack of proper emphasis on navigation accuracy.

c. Improper determination of set and drift and failure to properly apply set and drift to Dead Reckoned positions.

d. Improperly calibrated electromagnetic (EM) log and inaccurate or improper azimuth reference.

e. Lack of user knowledge regarding the capabilities and limitations of Global Positioning System (GPS) positional data.

f. Lack of awareness of the limitations and requirements of electronic charting systems used for Situational Awareness.

g. Lack of compliance with established navigational procedures.

h. Not properly following Combat System Operational Sequencing System procedures when initializing and aligning the WSN-5 or WSN-7 Inertial Navigation System, and not verifying proper alignment through the use of checklists.

In light of a greater demand for navigational accuracy in both open ocean and restricted waters, it is essential to stress proper training of Navigation Team personnel and strong management of the navigation picture. This instruction was revised and implemented by Type Commanders to provide uniform standards and comprehensive instruction to achieve these ends.

2. Navigation Team Organization. The Navigator must organize the Navigation Team so it is flexible enough to meet the demands and complexities of the ship's missions.

3. Hostile or Uncertain Environment. The Navigation Team is faced with additional duties when higher conditions of readiness are required. The Navigation Team must provide the CO and Tactical Action Officer (TAO) with timely geodetic positioning data. This data may be required to position the ship, acquire targets and employ all required weapons and tactics while fighting the ship. Numerous exercises have shown that position data supplied automatically from the Global Positioning System results in the most geodetically accurate data. However, the Navigator must constantly compare GPS positions to fix information obtained from all other sources, including other ships in company, and take positive action to de-select/mark as unusable any data source determined to be less accurate than his/her Navigation Team's required positional accuracy. The ship’s Battle Bill will describe procedures to ensure the Navigator's role in tactical situations is clearly defined.

4. Training. Maintaining proficiency of basic navigation skills through training and practice is critical to safe navigation. Additionally a thorough understanding of principles of operation, equipment use, and limitations of installed equipment is also essential to safe navigation. Individual unit training programs must provide for accurate assessment and the necessary training to educate, qualify, evaluate and periodically re-qualify assigned personnel. Appendix G details some of the resources available to assist Navigators and Training Officers in developing a training curriculum.

NOTE: Requalification standards may vary from ship to ship, but mandatory requalification is required for: arrival at a new sea command; more than six (6) months has passed since standing a particular watchstation; or when documented deficiencies have resulted in disqualification from a particular watchstation.

5. Transition to Electronic Charting. The CNO-directed transition from paper standard nautical charts (SNC) to the use of electronic charts is moving forward. The National Geospatial Intelligence Agency (NGA) has delivered a world-wide set of Digital Nautical Charts certified ‘Safe for Navigation’ and installation of approved electronic chart systems continues. This instruction will continue to be modified as experience with systems meeting Electronic Chart Display and Information System

– Navy (ECDIS-N) increases and additional fleet feedback is received.

a. To support this transition to electronic navigation, all ships who are authorized ECDIS-N as the Primary Navigation Plot may cease correcting paper charts as of 01 July 2010. Paper chart carriage requirements must still be maintained until ref (c) instructions are changed.

b. All ships may continue to use approved encrypted GPS IAW Ref (j) as their primary fix source in all waters. This does not preclude the navigation team from ascertaining the ship's position by other means (visual, radar, etc.) as required and at no greater than every third fix interval in restricted waters. No one fix source should be solely relied upon. If GPS Figure Of Merit (FOM- see App. F) or Estimated Position Error (EPE) exceeds those limits established in Table 3-A, the ship's navigation team will shift to an alternate fix source as the primary fix source. GPS datum must be set according to the chart in use. Commercial GPS (e.g., FURUNO, GARMIN, etc.) is not authorized for navigational use unless other fix sources are not available. As with other position sources, commercial GPS positions must be compared with other available position sources at prescribed intervals, see Chapter 3, para 3.3.d.

b. Shipboard testing of equipment and the associated Voyage Management System (VMS) electronic charting application has been performed to verify it conforms to the ECDIS-N requirements identified in reference (g). Currently, no other installed systems have successfully completed the ECDIS-N certification process. Other electronic charting systems may be used only to enhance situational awareness. Required upgrades to existing systems or installation of new systems will be accomplished over the next several years, limited only by funding constraints and ship availability.

CHAPTER 2

DUTIES AND RESPONSIBILITIES

1. Duties and Responsibilities. With respect to navigation, the following duties and responsibilities exist as stated in references (a) and (b), and as amplified below:

a. Commanding Officer. The CO is responsible for the safe navigation of the ship. As stated in reference (a), "The presence of a pilot on board will not relieve the CO or any subordinate from his or her responsibility for the proper performance of the duties with which he or she may be charged concerning the navigation and handling of the ship." COs must be especially dutiful in maintaining the safety of the ship when evaluating the recommendations of an embarked pilot, especially when the pilot recommends deviating from the planned track. COs will use all available means of fixing (establishing) the ship's position. Individual ship's Navigation Bills will delineate the Primary, Secondary and Tertiary means of fixing the ship's position, similar to Table 2-A and based upon the reliability of the ship's equipment. The CO shall establish the proper role for the use of any Situational Awareness (SA) system installed on the ship and ensure that the SA system meets the requirements of this instruction.

Table 2-A

SAMPLE FIX SOURCE PRIORITY[1]

	Bridge	**CIC/TOP**
Primary	GPS1	GPS2
Secondary	GPS2	GPS1
Tertiary	Visual/Composite/ Radar	Radar/Composite/ Visual
Last Resort (Open Ocean)	INS1	INS2

1 At any given time the Primary and Secondary plots shall utilize a different fix source. For ECDIS-N ships, the availability of a second authorized GPS source, even if not selected, is sufficient.

b. Executive Officer (XO). The XO will be readily available to assist the CO and Navigator during all restricted water transits and shall not normally be assigned to a specific

watch station so that he/she is free to supervise all aspects of the transit. The XO will review the navigation brief, and, on SURFOR ships, the charts and route plans (e.g. Track Data Sheet, ECDIS-N Navigation Plan) for completeness as outlined in Appendix B. On all SURFOR ships, the XO is responsible for direct supervision of the Navigator and Navigation Team while in Restricted Waters unless otherwise directed by the Commanding Officer. If the CO assigns the XO to fill another critical supervisory position, e.g. Wet Well Debark Control Officer, then another senior officer should be assigned as the Navigation Team supervisor. This does not relieve the XO of his Navigation responsibilities.

c. Navigator. The Navigator will be designated in writing by the CO and is responsible, under the CO, for the safe navigation of the ship. The Navigator will receive all orders relating to his/her navigational duties directly from the CO and will make all reports in connection therewith directly to the CO. Additional duties of the Navigator include:

(1) Advising the CO, TAO and OOD as to the ship's movements. To this end, he/she will:

(a) Maintain or cause to be maintained an accurate plot of the ship's position utilizing Global Positioning System (GPS), visual, RADAR, Inertial Navigation Systems (INS), and other approved means. While underway, fixes from all available sources will be compared to determine fix uncertainty. When the uncertainty is considered excessive per CO’s Standing Orders, the Navigator will investigate and resolve the problem. Conditions permitting, the same procedure will be employed before entering restricted waters, including prior to getting underway.

(b) Establish a close liaison between CIC/CDC/TOP and the Bridge for comparison of navigation information on non-ECDIS-N ships.

(c) Notify the CO, OOD, Conning Officer, and XO immediately when the determination is made that the ship is standing into danger. Ensure this report is acknowledged, and make course and speed recommendations to prevent the ship from entering dangerous waters. Recommendations will be recorded in the Ship’s Deck Log.

(d) Give careful attention to the ship's course and speed and available depth of water when approaching land or shoals.

(e) Maintain records of all observations and computations made for navigating the ship, with results and dates included. Such records will form a part of the ship's official records.

(f) At CO's discretion, report in writing to the CO, with copy to embarked staff, when underway, the ship's position at 0800, 1200, and 2000 each day and at such other times as the CO may require. Electronic reports via e-mail are authorized.

(g) Procure, maintain and ensure adequate inventory control and destruction procedures for all products listed in Appendix G and/or others required by the CO and higher authority.

(h) Review chart and publication requirements and allowances annually, and provide any requests for new products or changes to unit allowances to the TYCOM via the chain of command. All units will submit/update AMPS access for N/R/V accounts (as applicable) annually, or when an account point of contact changes, whichever is shorter. See Appendix E for more information.

(i) Recommend to the CO which ready charts (paper/DNC®) and paper/electronic publications are to be kept continuously up to date.

(j) Ensure records of corrections affecting such charts (paper/DNC®) and paper/electronic publications are maintained. Such records need not be more than a correction tree on any corrected paper chart or an updated record of corrections page in hard-copy publication.

(k) Ensure corrections to charts (paper/DNC®) and publications are made prior to use.

(l) Personally supervise navigation of the ship when the ship is in restricted waters or at battle stations, unless specifically designated by the CO to stand another watch. In this case, another officer qualified to serve as Navigator will be directed in writing by the CO to perform these duties.

1. In order to standardize safe navigation practices and document deficiencies while conducting restricted waters transits, the Navigator should ensure that Seamanship Training Team (STT)/ Seamanship and Navigation Training Team (SNTT) is in place whenever manning permits. To this end, the senior QM/OS or other designated member acting as STT/SNTT shall observe all actions by the Navigation Team while in restricted waters, and document any notable item, including good and bad practices or procedures. All areas noted shall be reviewed as soon as feasible after each evolution as part of Lessons Learned 'Hot Wash' as well as in a formal STT/SNTT debrief. Additionally, these lessons learned should be added to future briefs for similar evolutions, and be retained for review during future SQUADRON/GROUP STAFF/ATG evaluations.

(m) Before entering restricted waters, study all available sources of information concerning navigation of the ship therein.

(n) Prior to anchoring, ensure the appropriate chart and/or electronic display showing the ship's anchorage position and all navigation aids to be used are identified to the OOD and CIC/CDC/TOP. Upon anchoring, plot the anchor’s position, swing and drag circles. Determine if the anchor is holding and establish fix intervals according to ship's Navigation Bill or CO’s Standing Orders. Ensure comparison with swing and drag circles between all sources and navigation plots.

(o) Prepare the CO’s Night Orders in such a format as prescribed by the CO. At a minimum, include operating areas, night steaming instructions, aids to navigation, and fix interval (if other than prescribed in the standing orders or Navigation Bill).

(p) For nuclear-powered ships, verify the ship will moor or anchor at an approved berth or anchorage according to reference (d).

(2) Ensuring proper operation, care and maintenance of navigational equipment. To this end, he/she will:

(a) Establish the requirement to determine and record gyrocompass heading and repeater error(s) at least once daily and before restricted maneuvering situations. Log and report the results to the CO. He/she will direct comparisons of the master gyrocompass, auxiliary gyrocompass, and Digital Fluxgate Magnetic Compass (DFGMC)/Navy Standard Magnetic Compass (NSMC)

to be made and recorded for every course change over 10-degrees, or at least half-hourly. He/she will train for and practice alternative methods of determining gyrocompass error. Reference (e) contains numerous methods of determining compass error.

(b) Adjust and compensate the magnetic compass per required PMS and Chapter 3, paragraph 4.(d): 'Ships with a DFGMC are required to conduct an intentional compass calibration within 24 hours of conducting any special evolution'. For this purpose, DFGMC compensations are not part of PMS scheduling.

(c) Ensure UTC(USNO) (i.e., GPS-based) time checks are passed throughout the ship before any special evolution and logged in the Ship's Deck Log.

(d) Ensure navigation equipment assigned to him/her is maintained and properly adjusted in accordance with the Preventive Maintenance System (PMS) and, if appropriate, that calibration curves or tables are maintained and checked at prescribed intervals. Any degradation to navigation equipment will be reported to the CO.

(e) Coordinate with ship's EMO to ensure appropriate CSOSS procedures are followed when setting up navigation equipment. Train ship's navigation personnel on proper equipment setup to ensure correct operation.

(3) Advise the CO, OOD/Conning Officer, and CIC/CDC/TOP Watch Team of expected effects on the ship's maneuvering characteristics caused by casualties to the main propulsion or steering systems. To this end the Chief Engineer and/or Reactor Officer is responsible for keeping the Navigator informed as to the capabilities and/or limitations of such systems.

(4) Ensure the proper preparation, accurate entries and timely submission of the Deck Log. The Navigator will daily, and more often when necessary, inspect the Deck Log and take such corrective actions as may be necessary and within his/her authority.

(5) Ensure the Special Navigation Evolution Checklists contained in Appendix C are completed as required; log the commencement and completion of all checklists in the Ship's Deck Log.

(6) Prepare reports and records as required in connection with his/her navigational duties, including those pertaining to

the compasses, hydrography, oceanography, meteorology, and electronic navigation systems.

(7) Ensure required navigational training is conducted for all appropriate personnel, such as junior officers, navigation watchstanders, boat coxswains and boat officers.

(8) Relieve the OOD as authorized or directed in writing by the CO.

(9) Report to the CO in all matters about the navigation of the ship and to the XO in matters concerning the administration of navigation and the training of deck and watch officers. (He/she may report to the Senior Watch Officer for the training of deck and watch officers.)

(10) Maintain the ship's Navigation Bill.

(11) Establish a generic navigator email address (nav@ship.navy.mil). This will allow NGA to provide relevant information directly to the navigation department regardless of the individual assigned.

d. Assistant Navigator (ANAV). The Assistant Navigator will assist the Navigator in all aspects of navigation, piloting, and administration of navigation. He/she will ensure proper preparation of the various reports required by higher authority. The Assistant Navigator will be formally designated in writing by the CO.

e. Navigation Team. In addition to the CO, XO, Navigator, and Assistant Navigator there are other key crewmembers responsible for safe navigation. Listed below are the duties and responsibilities of the Navigation Team.

(1) Bridge.

(a) Navigation Evaluator. Evaluates the accuracy of the ship's position as determined by electronic and visual means. If not the Navigator, this person is responsible to the Navigator for evaluating fix accuracy and making fix reports as specified in this instruction. He/she supervises and coordinates the actions of all Navigation Team members. If the Navigator is not the Navigation Evaluator, the Assistant Navigator or Senior Quartermaster/Operations Specialist should stand this watch. The Navigation Evaluator shall have no additional duties during Navigation Detail.

(b) Navigation Plotter. Maintains the navigation plot. He/she will plot and label each fix on the chart in use. He/she will extend the dead reckoning (DR) at least two fix intervals (non-ECDIS-N), compute or relay set and drift and evaluate ship's projected movements. He/she will make recommendations to the Navigator/Navigation Evaluator. He/she will compute or relay such items as distance right or left of proposed track, time and distance to the next course change, revised turn bearings, and any other tasks directed by the Navigator/Navigation Evaluator. The Navigation Plotter will plot and compare visual, RADAR or composite positions as necessary not to exceed every third fix interval, even if using GPS as the primary fix source. On ECDIS-N certified ships, the ECDIS-N Display Operator (Navigation Plotter) will be a qualified VMS Operator.

(c) Bearing Recorder. Acts as the Navigator's talker on the designated sound-powered or internal telephone circuit, relays information received to the Navigation Plotter or ECDIS-N Display Operator, maintains the Standard Bearing Book (OPNAV Form 3530/3) according to current directives, and gives "marks" to the bearing takers, as directed by the Navigator/Navigation Evaluator. In addition, the Bearing Recorder will log GPS position and the Figure Of Merit (FOM) at every mark in the Bearing Book or Position Record Book. He/she will also report the FOM to the Navigation Plotter. The Bearing Recorder will record soundings at each mark.

(e) Bearing Takers. Obtain accurate bearings, compensating for known pelorus errors, to navigation aids designated by the Navigator and provide them to the Bearing Recorder. Advise the Bearing Recorder about navigation aids available for use, including the gain and loss of navigation aids from sight. They will keep the aids in sight between shots. Additionally, they will know the location and use of pelorus benchmarks.

(f) Fathometer Operator. Operates the fathometer on a scale commensurate with the depth soundings of the plotting chart (feet/meters/fathoms) or as directed by the Navigator. Advises the Navigator whenever the scale is shifted and reports soundings to the Bearing Recorder. The minimum sounding expected should be known and reported if reached. The Navigator must be advised if difficulty is experienced in obtaining a sounding. During restricted water transits the fathometer paper trace (if

installed) will be recording and annotated with the time of each mark.

(f) Quartermaster of the Watch (QMOW). The QMOW is the direct representative of the Navigator and provides a continuous navigational watch on the bridge outside Navigation Detail. He/she will assist the Navigator and OOD in navigating the ship and will immediately inform the Navigator, OOD, Assistant Navigator, and Senior Quartermaster/Operations Specialist when discrepancies arise. The QMOW has numerous duties, including the keeping of various records, logs, and weather observations and obtaining fix information. The OOD must recognize this and if fix taking encumbers the QMOW from performing all other duties, the Senior Quartermaster/Operations Specialist, Assistant Navigator, and/or Navigator will be requested to provide additional assistance to the QMOW. This instruction cannot possibly cover all situational requirements that may arise. However, he/she is charged with the following minimum responsibilities:

1. Assist the OOD, Navigator, and Assistant Navigator in plotting the ship's position. Maintain a DR and Estimated Position plot (not applicable to ECDIS-N certified ships). Immediately notify the Navigator of any discrepancies noted during the watch.

2. Maintain the Ship’s Deck Log, Magnetic Compass Record, and weather observation sheet.

3. Compare CIC/CDC/TOP derived positions and ship’s relation to track and Position of Intended Movement (PIM) with the bridge position and determine if differences exist. (Not applicable to ECDIS-N certified ships.)

4. Compute and log set and drift. If ECDIS-N authorized, monitor and log system calculated set and drift.

5. Calculate when an aid to navigation or RADAR landfall should be sighted and report whether or not it is detected as specified in the CO’s Standing Orders.

6. Note when a change in weather or the visibility decreases to less than the distance specified in the CO’s Standing Orders. Make log entries as required.

7. Determine the master/auxiliary gyrocompass errors daily and before entering restricted waters, recording

any errors in the Bearing Book, Magnetic Compass Record Book, and Deck Log.

8. Ensure compass comparisons between the bridge gyrocompass/Inertial Navigation System (INS) repeaters and magnetic compass are made every time a new course is set (over 10-degrees) and at least every 30 minutes, recording comparison data in the Magnetic Compass Record Book or Deck Log.

9. Note malfunctions of any electronic navigation systems including speed and heading inputs. Inform the Navigator and OOD of any change in the status of such equipment and log in the Ship's Deck Log the time and nature of such.

10. Obtain soundings using the fathometer at each fix, or as directed by the CO, EMCON conditions permitting.

11. Calculate sunrise/sunset/moonrise/moonset daily and determine gyro error as directed by the Navigator.

12. Record 0800, 1200, and 2000 positions in the Ship’s Deck Log. If required by the CO, prepare the ship's 0800, 1200, and 2000 Ship's Position Reports for submission to the Navigator. Electronic reports via email are authorized.

13. Prepare notes for CO's Night Orders notebook as directed by the Navigator.

14. Before special evolutions, ensure UTC(USNO) time checks are conducted on the 1MC and logged in the Ship's Deck Log.

15. Monitor the Helmsman/Lee Helmsman for compliance with ordered course and speed.

16. Conduct a watch turnover using a checklist such as that detailed in Appendix C.

(2) Combat Information Center (CIC)/Combat Direction Center (CDC)/Tactical Operations Plot (TOP).

(a) Piloting Officer. Evaluates the accuracy of the ship’s position as determined by electronic means. Maintains direct communications with Navigation Evaluator and Shipping Officer. Supervises and coordinates the actions of all CIC/CDC/TOP Navigation Team members. Keeps the Shipping Officer advised of impending course and speed changes in order to

determine which contacts should be prioritized. On ECDIS-N certified ships the Piloting Officer is not required.

1. Ensures the CIC/CDC/TOP Team obtains ship's position. Fixes from various sources will be compared to determine fix uncertainty. When uncertainty is considered excessive per the CO's Standing Orders, the Piloting Officer will recommend all stop until the problem is resolved.

2. Gives careful attention to ship's course and speed, and available depth of water when approaching land or shoal water.

3. Ensures all required information is logged in the RADAR Navigation Log and passed to the Bridge Navigation Evaluator.

(b) Navigation RADAR Operator. Provides all RADAR ranges as directed by the Navigation Plotter, Piloting Officer, or ECDIS-N Display Operator. Keeps the Navigation Plotter and Bearing Recorder (through the Navigation Recorder) informed of designated points available for use.

(c) Navigation Plotter. Maintains CIC/CDC/TOP's navigation plot. He/she will plot and label each fix on the chart in use. He/she will ensure the DR is extended at least two fix intervals; compute and/or relay set and drift since last fix; and evaluate ship's projected movements. He/she will compute and/or relay such items as time and distance to the next course change, revised turning ranges, and any other tasks directed by the Piloting Officer. He/she will make recommendations to the Piloting Officer. On ECDIS-N certified ships the Navigation Plotter is not required.

(d) Navigation Recorder. Performs as a phone talker and monitors the Bridge Bearing Recorder and Fathometer Operator on the designated phone circuit. Maintains the CIC/CDC/TOP Navigation Log to coincide with Bridge Bearing Recorder "Mark" for non-ECDIS-N ships.

(e) Bridge CIC/CDC/TOP Phone Talker. If required, provides smooth flow of navigation information to Navigator/ Navigation Evaluator, CIC/CDC Piloting Officer, and, depending on ship procedures, the Shipping Officer. Ensures reports and recommendations from the Piloting Officer (and Shipping Officer) are received and acknowledged by the Navigator/Navigation Evaluator and that the stated intentions of the CO, Navigator,

OOD, and Conning Officer are reported to and acknowledged by the Piloting Officer. As manning permits, the Bridge CIC/CDC/TOP Phone Talker should be manned by an OS who is experienced in all aspects of restricted water transiting and piloting. Communications between Bridge Evaluator and Piloting Officer are not restricted to Sound-powered phones. Any communication method that provides for immediate and accurate sharing of navigation information, including use of radios by the two watchstations, is authorized.

(f) Shipping Officer. (May be located in CIC/CDC/TOP or on the bridge). Maintains direct communications with Piloting Officer and a Bridge Phone Talker, if assigned. Responsible for providing the evaluated surface display reports to the Conning Officer. Supervises and coordinates the CIC/CDC/TOP contact management team and the Lookouts. He/she will recommend proper actions to be taken according to the Rules of the Road. Additionally, ensures a record of all surface contacts encountered are logged and/or recorded. Depending on ship design/configuration, reports to the Conn may occur separate from the Navigation Evaluator/Piloting Officer circuit.

2. Qualifications.

a. Minimum qualifications for Navigator/ANAV, Senior Quartermaster and Quartermaster of the Watch are:

Table 2-B

QUALIFICATION REQUIREMENTS

Requirement	NAVSURFOR Navigator	NAVAIRFOR (NON-11XX) Navigator/ ANAV	Senior QM	QMOW
BUPERS Assigned	No	Both	No	No
Qualified OOD Underway	Yes[2]	Both [1]	No	No
Successful completion of the following:				
SWOS Advanced Shiphandling	No	Both[3]	No	No
Navigator/Senior QM Refresher course (K-2G-2207)	Yes	Both	Yes[2]	No
VMS Operator Course (A-061-0042)[4]	Yes	Both	Yes	Yes

Requirement	NAVSURFOR Navigator	NAVAIRFOR (NON-11XX) Navigator/ ANAV	Senior QM	QMOW
RADAR Operator PQS[5]	Yes[2]	Both[2]	Yes[2]	No
Navigator/Assistant Navigator PQS (NAVEDTRA 43492-2)	Yes	Both	Yes	No

1 If BUPERS assigned, must complete OOD qualifications within six months of reporting.

2 To be completed not later than six months after reporting to a ship. Qualification may be completed up to six months prior to reporting.

3 Will be conducted as part of pipeline training in BUPERS orders for carrier NAV/ANAVs.

4 Recommended if installed; required if Crew Certified ECDIS-N. (3 VMS Operator graduates required for PC/MCM; 5 VMS Operator graduate required for all other classes of ships)

5 e.g. NAVEDTRA 43398-13(Series) CG 47/DDG 51 CLASS AN/SPA-25 OPERATOR; 43496-7(series) NAVIGATION SCOPE OPERATOR

Note: Requests for waivers of any of the above requirements will be considered on a case-by case basis and will be addressed to the ship's TYCOM via the Squadron/Group Staff.

b. Navigation Team (Bridge and CIC/CDC/TOP).

(1) The Navigation Team (Bridge and CIC/CDC/TOP) must complete RADAR Navigation Team Refresher Course (J-221-0344) once per Navigation (MOB-N for CNSF) certification. Additionally, for CNSF ships, Navigator, CICO, and Piloting Officer are required to attend. COs are required to attend the final day of training. For CNAF ships, ANAV and Piloting Officer must attend. Ships authorized ECDIS-N as Primary Plot do not have to complete course, but must have at least one qualified RADAR Operator.

(2) Each Navigation Team Member must have completed or be interim qualified (in writing) in the applicable PQS for assignment to watch stations.

(3) Watchstation training requirements identified in Appendix A must be met for ships authorized for unrestricted navigation operations using ECDIS-N.

(4) For ships certified to navigate using ECDIS-N, two technicians per ship must have completed the NAVTECH maintenance training COI and hold NEC 96XX. Maintenance training for ECDIS-N technicians will consist of AN/WSN-7(INS), AN/SSN-6(NAVSSI) , IBNS, DHSL, DDRT/CADRT, AIAS, Moriah Wind, Fathometer, and DFGMC and systematic troubleshooting of the Navigation suite. This will culminate in a technician with an intermediate to advanced level of knowledge of all components and their integration within the navigation suite. They will be able to identify, troubleshoot and repair faults with minimal or no external assistance. Training will be available with modifications and updates via the Center for Surface Combat Systems learning site at Dam Neck, Virginia.

(5) Watchstation re-qualification will be required to ensure all qualified watchstanders are maintaining an adequate level of knowledge. Re-qualification for a watch station, in accordance with the PQS Manager's Guide (NAVEDTRA 43100-1 (Series), will be required when changes in procedures, equipment, or watch stander performance demand re-qualification in the judgment of the Senior Watch Officer, Navigator, or CO. Also newly reporting personnel, and watchstanders that have not stood the watch for more than 6 months, will requalify.

3. Navigation Team Organization. The composition of the navigation team, as shown in tables 2-C and 2-D, is determined by the ship’s distance in nautical miles (NM) from land and/or shoal water and whether or not the ship has been certified to navigate using ECDIS-N. Each CO is authorized to tailor his watchbill as necessary, via Standing Orders, to meet the objective of navigating safely in all conditions and waters.

[DELIBERATELY LEFT BLANK]

a. Minimum required watchstations for ships NOT CERTIFIED to use ECDIS-N for navigation are:

Table 2-C

REQUIRED WATCHSTATIONS FOR SHIPS** NOT **CERTIFIED TO USE ECDIS-N

	Open Ocean/ Coastal Waters	Piloting Waters	Restricted Waters
distance from land or shoal water	>10 NM	2-10 NM	<2 NM
Watchstations			
Bridge			
Navigation Evaluator	No	Note 1	Yes
Navigation Plotter	No	Note 1	Yes
Bearing Recorder	No	Note 1	Yes
Bearing Takers	No	Note 1	Yes
Fathometer Operator	No	Note 1	Yes
QMOW	Yes	Yes	Yes
Bridge/CIC/TOP Phone Talker/Communicator [2]	No	Note 1	Yes
CIC/CDC/TOP			
Piloting Officer	No	Note 1	Yes
Navigation RADAR Operator	No	Note 1	Yes
Navigation Plotter	No	Note 1	Yes
Navigation Recorder	No	Note 1	Yes
Shipping Officer	No	Note 1	Yes

Notes:

1. IAW CO’s Standing Orders

2. Communications between Bridge Evaluator and Piloting Officer are not restricted to sound-powered phones. Any communication method that provides for immediate and accurate sharing of navigation information, including use of radios by the two watchstations, is authorized.

[DELIBERATELY LEFT BLANK]

b. Minimum Required watchstations for ships CERTIFIED to use ECDIS-N for navigation are:

Table 2-D

REQUIRED WATCHSTATIONS FOR SHIPS CERTIFIED TO USE ECDIS-N

	Open Ocean/ Coastal Waters	Piloting Waters	Restricted Waters
distance from land or shoal water	>10 NM	2-10 NM	<2 NM
Watchstations			
Bridge			
Navigation Evaluator	No	Note 1	Yes
ECDIS-N Display Operator (Navigation Plotter)	No	Note 1	Yes
Bearing Recorder	No	Note 1	Yes
Bearing Takers	No	Note 1	Yes
Fathometer Operator	No	Note 1	Yes
QMOW	Yes	Yes	Yes
Bridge/CIC/TOP Phone Talker/Communicator[3]	No	Note 1	Note 1
CIC/CDC/TOP			
Navigation RADAR Operator[2]	No	Note 1	Yes
Shipping Officer[2]	No	Note 1	Yes
Piloting Officer	Note 1	Note 1	Note 1

1 IAW CO's Standing Orders.

2 May be stationed on the Bridge or in CIC/CDC/TOP.

3 Communications are not required if there is not a Piloting Officer stationed. Shipping considerations may require this line of communications.

CHAPTER 3

STANDARD POLICIES, REQUIREMENTS, AND PROCEDURES

1. General. This chapter provides guidance on standard policies, requirements, and procedures that serve as the basis for development of each ship's routine. This guidance is equally applicable to all ships, regardless of the method authorized to maintain the navigation plot.

2. Policy. The navigation plot maintained on the Navigator's chart table (NAV 1 for certified ECDIS-N ships) on the Bridge is designated as the Primary navigation plot. The accuracy of navigation depends on a knowledgeable assessment of all position data. Each source and fix technique is subject to some error. Therefore, the Navigation Evaluator must assess each position determination and evaluate it with respect to all others. The decision to select a single source of positioning data or an averaging approach is based on his/her analysis of the factors that influence navigation sensor accuracy and the time available to gather and analyze the data. Navigation watchstanders will plot all fixes and will compare fix information from the available sensors.

a. The OOD will keep himself/herself informed of the position of the ship and all other particulars that may be used to keep the ship out of danger. He/she will employ all means available for detecting and avoiding danger. The Junior OOD, QMOW, and other watch standers responsible to the OOD should never hesitate to request additional watch personnel or recommend stationing the full Navigation Team if a situation warrants.

b. The ship's Navigation Bill will establish the precedence of specific fix sources (e.g., GPS, INS, visual, Radar) for each of the areas identified in Table 3-A. See Chapter 5, paragraph 5.2.i(1).

3. Requirements. The Navigation Team must satisfy the following requirements while the ship is underway.

a. Properly maintain the ship's DR. The Navigation Team must rely upon DR as the foundation for maintaining an acceptable estimate of the ship's position between fixes.

(1) The following are general rules used in constructing and maintaining the Navigator's DR plot:

(a) Plot a DR position at least every hour on the hour while 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) Label each fix with course, speed, and time. Draw a new course line from each fix or running fix as soon as it has been determined and plotted on the chart. This is accomplished whether the ship is on track or not. The DR plot should cover at least the next two fix intervals; ECDIS-N generates this automatically but the display must be properly set up, see Appendix J.

(2) When using a geographic position table (DRT, DDRT, or CADRT), ensure position inputs or updates are provided from an accurate fix source or method.

(3) Ensure all speed changes are entered in the dummy log as soon as they are ordered when the dummy log is providing speed data to the navigation system.

b. In certain situations, such as trailing or locking a shaft, the QMOW cannot utilize the ordered speed, as the inherent error compounds over time. In open ocean, with sufficient availability of GPS or other fixing methods available, the error may not become a problem. However, in piloting waters, or during a prolonged period where GPS or other fixing methods are limited or unavailable, the DR will not allow the ship to maintain required positional accuracy or properly calculate set and drift. In these cases the Rules of Dead Reckoning speed cannot be strictly applied and must be modified by one of two methods, Compensated and Uncompensated.

(1) Compensated RPM Order. If a ship has a Trailing/Locked Shaft RPM Table, and orders up a specific RPM to offset the thrust lost by a trailing or locked shaft, then the DR shall be laid out in accordance with the desired—not ordered—speed. For example, if the table shows that ordering RPMs for 18 knots with

a trailing shaft is equal to both shafts rolling at 15 knots ordered, then the DR is laid out at 15 knots.

(2) Uncompensated RPM Order. If the ship does not have a Trailing/Locked Shaft RPM Table, or does not order compensation RPMs, then the QMOW must DR for a lower-than-ordered speed. If time and equipment allows, fixing the slowing ship at three-minute intervals for 15 minutes after the casualty and then averaging the speed over the last six minutes can discover this lower speed. If there is not sufficient time, or the equipment does not support this fix interval, then the DR should be laid out for three knots less than the ordered speed until a more correct speed is deduced. Any error during this period will become part of the set and drift.

NOTE: To simplify this situation, every ship will create and maintain a Trailing/Locked Shaft RPM Table. Care should be taken that two runs in reciprocal directions (+/-1 degree) in the same area are done and averaged for each combination tested to minimize the effect of currents. Also the ship should be steady on course at the ordered RPM for at least 1.5nm with the last mile used for the speed calculation. 'Autopilot' should not be used, and rudder movement should be minimized.

c. When insufficient data is present to fix the position of the vessel accurately, generate an estimated position by combining incomplete data from a variety of sources. The estimated position may combine the DR position with a single line of bearing, set and drift, tactical data, or represent a combination of these and other factors. Since DR positions are plotted for ordered courses and speeds and do not compensate for known values or tactical characteristics of the ship, their relationship to the geodetic position may not always be accurate. To reduce the magnitude of error between the DR position and the geodetic position, the DR plot must be refined during the interval between fixes with a plot of Estimated Positions.

(1) To produce an accurate estimated position the following guidelines are recommended:

(a) Use the largest scale chart practical to enhance plotting accuracy.

(b) Include the last DR position in any calculation leading to an estimate of the ship's position.

(c) Combine all available LOPs of questionable quality with DR position data in the absence of a fix.

(d) Determine set and drift and apply this data to current work on the Navigator's plot.

(e) During high speed maneuvering, compensate for tactical characteristics, interpolating for other than listed speed and rudder angles.

(f) Use bottom contour charts, bathymetric navigation planning charts (BNPC) or Tactical Ocean Data (TOD®) and the fathometer, when appropriate, to further develop the ship’s estimated position through Bottom Contour Advancement.

d. Use available resources to establish a fix in accordance with the guidelines in Table 3-A. Evaluation of inputs from GPS, RADAR, visual, and DR/EP computations provides the basis for knowledgeable evaluation of the ship's position. The CO shall establish the emergency use of any installed COTS GPS, including the position from an AIS receiver, while minimizing the known risk of spoofing. NAVSSI/COMDAC provides GPS positions ('GPS1' and 'GPS2', or 'GVRC1' and 'GVRC2') as well as direct Estimated Positions (EP) which are generated by the inertial navigation system (INS1 OR INS2) and the RTS1 and RTS2 'blended' solutions (a 'blended' solution is a weighted average of all position sources - GPS1, GPS2, INS1, and INS2). Neither the INS nor RTS POSITS are to be utilized except when the ship’s GPS is not functioning, and then only in open ocean.

(1) The minimum fix precedence is:

Open Ocean: GPS, visual/radar/composite, INS, RTS
Coastal: GPS, visual/radar/composite
Restricted: GPS, visual/radar/composite
Piloting: GPS, visual/radar/composite

(2) Each source of a fix has accuracy limitations. The navigation team must understand the amount of position error each fix source is subject to and apply that knowledge, combining multiple sources to obtain the best position. This type of application will also be useful in identifying a fix source that has a significant error. By integrating as many sources of fix information as is reasonably possible, including commercial GPS positions to check the accuracy of GPS1/2, mutually supportive fixes will improve position accuracy and raise the confidence in data produced.

e. The integration of all navigation sensors to derive a most probable position involves:

(1) Understanding those factors influencing the day-to-day or seasonal variation and effectiveness (see ref (e), Articles 1108-1112).

(2) Precise data collection, plotting, and analysis at the precise time set for fixing the ship's position as required by Table 3-A.

(3) Noting variation in fix clusters in successive plots and remaining alert to the first indication of accuracy degradation in the data.

(4) Flagging all geodetic positioning data provided to the users of navigation information with an assessment of fix quality (excellent, good, or poor).

Table 3-A

FIX ACCURACY AND FIX INTERVAL GUIDELINES[1]

Area	Distance from Land or Shoal Water	Fix Accuracy/ GPS FOM	Maximum Fix/Fix Comparison Interval[2]
Restricted Waters[3]	Less than 2 nautical miles	50 yards/ FOM ≤ 2	3 minutes[4,5]
Piloting Waters	2-10 nautical miles	100 yards/ FOM ≤ 4	3-15 minutes as conditions warrant[4]
Coastal Waters	10-30 nautical miles	500 yards FOM ≤ 6	15-30 minutes as conditions warrant
Open Ocean (En Route Navigation)	Over 30 nautical miles	1500 yards FOM ≤ 7	30 minutes or as conditions warrant

1 Fix definition is provided in Appendix H. Minimum accuracy standards for fixing the ship’s position and the interval between these fixes are, to some extent, situation dependent.

2 A good rule of thumb for fix intervals is, “if a hazard to navigation falls within a circle whose radius is that of two DR intervals,” then either the fix interval or ship’s speed requires adjusting.

3 Restricted Waters are defined as any waters less than the ship's Navigation Draft/Safety Depth, and any position within two nautical miles (2nm) of these waters.

4 All ships using GPS as the primary fix source are required to log Figure of Merit and to obtain a visual and/or RADAR fix at 3 times the intervals indicated (i.e., every nine minutes in restricted waters). If GPS FOM exceeds those limits listed in Table 3-A, GPS will not be used as the primary fix source, except in cases where no other fix source (excluding celestial) is available.

5 CO's may increase fix periodicity as required by the navigational situation.

f. Ensure charts and publications (paper and electronic) in use, or ready to be used, are certified safe for navigation by NGA and corrected/ updated using all available information (i.e., Notice to Mariners, Local Notice to Mariners, Broadcast Notice to Mariners, NAVAREAs, HYDROPAC/LANTs, Vector Product Format Database Update (VDU)) and all charts covering the area of operations, regardless of scale, are compared to ensure that hazards to navigation are properly displayed and highlighted on all charts in use. In rare cases this may require transferring a possible hazard from one chart to another. In the event the Navigator determines the largest-scale chart obtainable from NGA is insufficient for use during the transit, he/she shall take action as early as possible to obtain NGA-sanctioned foreign produced charts. In the event a ship is unexpectedly tasked to pilot in waters not covered by sufficiently large-scale NGA charts, Navigators must make every effort to obtain corrections via immediate message (or VDU) from NGA for the chart being used. Navigators must verify the geodetic system on which the chart is based and ensure adjustments are made to the GPS equipment to match the chart datum. The Navigator must also determine the scale, units of measurement, and other pertinent characteristics of the chart prior to its use and take appropriate action to ensure the chart is safely and properly used.

(1) Ensure a correction "Tree" consisting of the number and year of each Notice to Mariners from which corrections have been made, the date the correction was applied, and the initials of the individual making corrections shall be entered in ink: On the paper chart(s), either outside the chart margin or on the front; in publications, on the correction record page. If the correction is from a Local Notice to Mariner (LNM), NAVAREA,

HYDROLANT, or HYDROPAC, it should be annotated as such. Temporary changes will be annotated in pencil. This correction tree is a vital part for verifying chart corrections. For DNC libraries, the equivalent verification is done by querying each library in use to see which VDU has been applied. For electronic publications, the latest correction is automatically displayed via a pop-up window upon opening the cover page.

NOTE: Units are not authorized to order non-NGA (e.g. British Admiralty (BA)) charts from NGA, United Kingdom Hydrographic Office (UKHO), or commercial suppliers directly. Per reference (i) USFF/CPF approval will only be granted when NGA cannot provide adequate chart coverage in time to satisfy the operational requirement. Forward requests for foreign chart support to USFF (N37) or CPF (N3WX) as appropriate, see Appendix E.

g. Ensure all required navigation equipment is on board, maintained in accordance with PMS requirements, and operating properly. The status of equipment pertaining to the safe navigation of the ship will be reviewed by the Navigator. The appropriate department head will provide Estimated Time of Repair (ETR) for any navigation equipment that is not operating properly.

h. Ensure all navigation pre-underway or entering port checks are completed according to the ship's standard operating procedures, navigation department check-off lists, individual equipment operating procedures, Engineering Operational Sequencing System (EOSS), and Combat System Operational Sequencing System (CSOSS). Completion of EOSS or CSOSS checks shall be documented in the Underway or Entering Port/Restricted Waters checklists, even if documented in another departmental checklist.

i. Determine gyrocompass heading error at least daily underway (i.e. Mk 19/27, WSN-2) or before any evolution (WSN-5/7). Determine gyrocompass repeater errors, including benchmark checks, before getting underway, going alongside, or entering restricted waters and ensure they are checked against available navigational ranges. Enter changes to gyrocompass and/or repeater errors in the standard bearing record book and deck log, and the magnetic compass record book if maintained, and ensure repeater errors are applied to all applicable LOPs.

(1) Gyrocompass repeater error must also be updated daily on all ship control and navigation repeater placards. At a

minimum, this includes all bridge repeaters, all repeaters used by the Bearing Takers, CIC/CDC/TOP repeaters, and all aft steering repeaters, including the emergency steering pump station.

j. For ships equipped with an Inertial Navigation System (INS), the Navigator will establish the reset criteria and ensure the INS is configured to conform to those criteria.

k. Maintain close communication with the TAO/CICWO/CDCWO/CSO to:

(1) Be alert to the quality of the fix in his/her tactical evaluation to reduce errors in tactical warfare situations. For ECDIS-N ships the oversight of the ship's position that is fed to the warfare suite is still a critical role for the CIC/CDC watch team.

(2) Ensure any position data the TAO/CICWO/CDCWO/CSO requires from the Navigator is compared with the current combat system position. Any data that does not constitute a logical extension of previous fixes and estimated positions, in relation to time, must be brought to the attention of the Navigator and CIC/CDC watch supervisor to coordinate a resolution of the error. (The Navigator will provide final verification and correction, if required.)

4. Requirements Prior to Entering Restricted Waters.

a. The Navigator is charged with preparing a navigation brief as a plan for safe and prudent passage, including piloting. The Navigator will brief all members of ship control stations before getting underway or entering port and restricted waters transits. This briefing will conform to Appendix B and shall be conducted no more than 24 hours prior to the planned evolution. This plan will be reviewed and approved by the CO. Any changes from the printed brief/watchbill must be initialed by the CO and included with the file copy. A signed muster sheet of all ship control personnel will be included as part of the signed navigation brief. The original signed navigation brief will be kept on file no less than twelve months. In preparing this plan, consider the following in addition to the information identified in Appendix B:

(1) Consult the navigation publications identified in Appendix E, available port visit after-action reports (Navy Lessons Learned System (NLLS) see Appendix G), and other

resources as appropriate. All references must be current editions and corrected to date.

(2) Determine, with concurrence of the CO, when the Engineering Restricted Maneuvering Doctrine will be initiated.

(3) Tide and currents will be determined for each reference station passed along the track. The use of tide or current sub-stations along the track will be determined as directed by the Navigator.

(a) If not using an authorized electronic tide/current program, or the NOAA web site to printout, a graph of tides/currents. Graph tides using the "Quarter Tenth" method as described in the tide tables will be used. Graph currents using the “Straight Line” method based on slack, high, and low water ratios. Record all tide and current computations in the navigation workbook. Ensure that all ship control stations (Pilothouse- CO, OOD, JOOD, Nav Evaluator, Navigator; CIC/TOP-Piloting Officer, Shipping Officer) have copies of these products as described in Appendix B, para B.2.c.

(b) The only electronic tide/current programs the CO may authorize are the NOAA tides/currents or NOAA tides and current online for U.S. waters (under the PRODUCTS header at this URL: http://tidesandcurrents.noaa.gov/ports.html) and the use of Admiralty TotalTide for all other areas of the world to compute tides and currents. For real time U.S. tide and current data utilize this NOAA URL: http://tidesonline.noaa.gov/geographic.html . A copy of graphs or printouts produced by any program will be maintained for twelve months as part of the signed navigation brief. Only these above systems are authorized for use.

b. The Navigator will ensure the following paper chart preparations are completed (sample restricted waters and open ocean checklists are available in Appendix C):

(1) The ship's proposed track and navigation information are identical on all charts and displays used for navigation, including those used by CIC/CDC/TOP. On all tracks, the following items shall be accurately plotted:

(a) Turn bearings in true and relative, turn ranges (in yards), and slide bars will be plotted allowing for the ship's advance and transfer tactical data on paper charts.

(b) A notation for each turn stating "Turn based on ____ knots and _____ rudder" combination to ensure that the plotted advance and transfer is known. If all turns on a chart use the same combination, only one clearly legible notation is required.

(c) Bridge and CIC/CDC/TOP will indicate chart shift points (on paper charts) so both plots are not shifted at the same time and so they do not require shifting during, or at the time of, an impending turn. The points should be approximately one fix interval apart. The bridge or CIC/CDC/TOP will have a good fix plotted before the other station shifts charts.

(d) An extended range scale will be placed on paper charts to facilitate laying of RADAR ranges or distances.

(e) A speed triangle will be placed on paper charts to facilitate the efficient and accurate application of a DR plot and the computation of Set and Drift.

(f) Sound signal and light characteristics of all navigation aids will be determined and their specific characteristics labeled next to each NAVAID the ship will pass if not already labeled on the chart.

(g) Restricted water charts are annotated for shoal water, points of hazards, or dangers; including overhead obstructions, with danger bearings or ranges laid out for hazards which are not identified by a navigation aid.

(h) Indicate position along the track where the PIT SWORD will be raised and/or lowered, if required.

c. Charts will be reviewed, signed, and dated, prior to initial use. All subsequent changes will be addressed in the Navigation Brief. At a minimum, the following information will appear on every paper chart displaying a restricted water track:

_____ Prepared by:
_____ Reviewed by: (Senior QM/Senior OS)
_____ Reviewed by: (ANAV/Piloting Officer) (AIRFOR)
_____ Submitted by: (NAV)
_____ Reviewed by: (XO) (SURFOR)
_____ Approved by: (CO)
Date: _____

d. Ships with a DFGMC shall conduct an intentional compass calibration within 24 hours of conducting any special evolution (e.g., UNREP, NAV Detail, Restricted Waters Transit, and Anchoring). Ships getting underway shall conduct an intentional calibration no later than 48 hours after getting underway. While the applicable PMS MRC will be used to achieve a proper calibration, the purpose of this intentional calibration is to remove any partial calibration data to prevent auto-compensation during the evolution. After the intentional calibration the DFGMC is taken out of 'CAL' or 'AUTO-CAL'. Completion of this intentional compass calibration will be logged in the deck log. The DFGMC heading displays will ONLY be MAGNETIC COMPASS HEADINGS without variation compensation. The only compensation which may be electronically applied to the compass is to correct for an incorrect alignment ('Alignment Offset' value) for a sensor not parallel to the centerline of the ship. Refer to Appendix F, paragraph (3) for additional DFGMC information.

e. All ships must meet the following MINUMUM requirements to safely get underway:

(1) The following equipment must be operable aboard ship prior to getting underway:

a. One fully functional gyrocompass, or inertial navigation system with gyrocompass functionality, with less than 1-degree of gyrocompass error.

b. Fully functional gyrocompass repeaters for all of the following stations: helm, centerline pelorus, after steering, with less than 1-degree of repeater error.

c. One fully functional military grade GPS unit (i.e. WRN-6, GVRC, PLGR, DAGR) with crypto loaded and using PPS, with a FOM of 1, 2 or 3. Use of a commercial GPS receiver in lieu of military receiver for EMERGENCY operations only, e.g. hurricane evasion, must be approved by TYCOM prior to underway.

d. A surface radar suitable for radar navigation feeding associated functional radar repeater in Bridge/CIC/TOP, or ECDIS-N for LCS.

e. Approved ECDIS-N (hardware/software) must be fully functional at one node, and one functional display on the bridge, for ships approved for ECDIS-N as primary plot.

f. A fully functional fathometer with at least one functional display on the bridge, preferably at/near the chart table. A depth display through ECDIS-N, VMS, COMDAC, NAVSSI, ICE, COGENT, or other situational awareness system, is acceptable.

g. A fully functional digital fluxgate or navy standard magnetic compass. For ships getting underway, the DFGMC must have been calibrated prior to pulling into port. For ships who have been pierside longer than 90 days, the DFGMC will be automatically considered 'out of calibration' and not fully functional, para (2)a below applies.

(2) Business rules and associated guidelines for ships unable to achieve the above MINIMUMS:

a. If any of the equipment listed above is OOC then SQUADRON/GROUP STAFF permission is necessary for underway operations and TYCOM must be informed.

b. Any of the above equipment that is not part of the ships official configuration is considered not applicable.

c. Any ship that has an approved waiver to remove a requirement for use of specific equipment in para (1) does not have to request a separate waiver to meet the requirements of this paragraph.

5. Requirements While in Restricted Waters.

a. The navigation team shall adhere, in so far as possible, to the following fundamental piloting principle: an optimum balance between accuracy and speed must be achieved while piloting. When operating in close proximity to shoal water or hazards to navigation, accurate, present and projected ship position information is required. In addition, such fix information must be updated as necessary to provide timely warning if the ship is standing into danger. This is particularly true in restricted waters.

b. The Navigator will ensure:

(1) The ship's position is fixed at an interval that ensures safe navigation (not to exceed intervals listed in Table 3-A). The interval between fixes may be adjusted by the Navigator as a function of water depth, current, bottom contour, ship's draft,

track, assessed position accuracy, width of channel, and other factors; or as set forth in the CO's Standing Orders.

(2) Set and drift are accurately determined. Set and drift will be determined at least once on each leg less than 1500 yards and every third fix for legs greater than 1500 yards. Set and drift should be computed more often if conditions dictate. Set and drift automatically calculated by an approved ECDIS-N satisfies this requirement.

(3) Every fix has a DR track properly labeled with course, speed, and times projected far enough ahead to include DR positions for at least the next two fix intervals, including beyond any turns encountered. The DR track of the recommended course is clear of navigational hazards and does not endanger the ship. An ECDIS-N's auto-generated DR line meets this requirement.

(4) Course changes take into consideration advance and transfer, set and drift, and the intersection of the DR and slide bar.

(5) A fix is plotted as soon as the ship is steady on a new course. The CO will be notified when a "no fix" situation occurs at the primary or secondary plot. The CO will verbally acknowledge (i.e., "Very Well"). An immediate attempt to fix the ship's position shall be made. If required fixes cannot be obtained, apply set and drift to the DR to obtain an estimated position (EP). Adherence to prudent navigation practices for the existing circumstances will be maintained until the ship's position is accurately determined.

(6) Visual, radar and composite fixes are obtained from fixed aids to navigation and charted structures rather than buoys, whenever possible. When buoy positions have been verified, bearings to buoys may be used to help clarify the navigation picture when no other objects are available. However, Navigators must be highly circumspect in their use of this practice.

(7) If a fix appears to be inaccurate, take another fix immediately to determine the ship's position, followed by a second fix after one minute. Make a recommendation to slow down, turn away from danger, or stop the ship until an accurate fix is obtained and ensure all recommendations are recorded in the ship's deck log.

(8) The fathometer is energized and recording when in restricted waters. Whenever possible, the fathometer will be set to coincide with the depth scale of the chart being used. Whenever soundings are less than the minimum value(s) predicted, notify the Navigator immediately. Compare soundings with charted depths on each fix and report to the OOD. Log all soundings in the standard bearing book or ship's position log. Figure 3-1 shows the relationships of drafts, depths and soundings; Figure 3-2 should be posted at the fathometer displays and ship control stations.

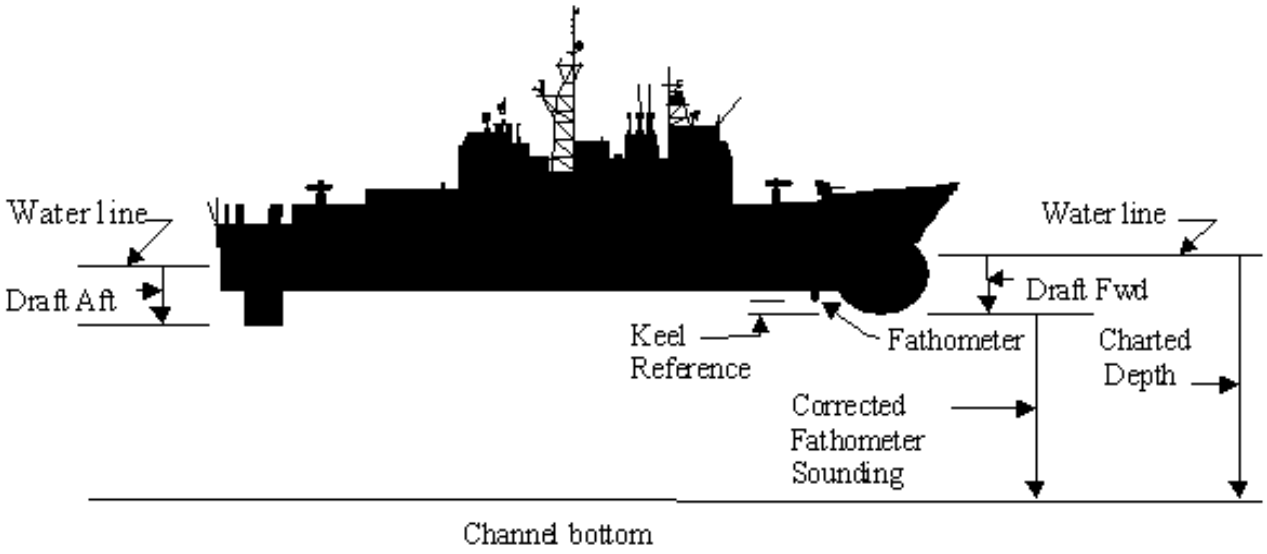

Figure 3-1

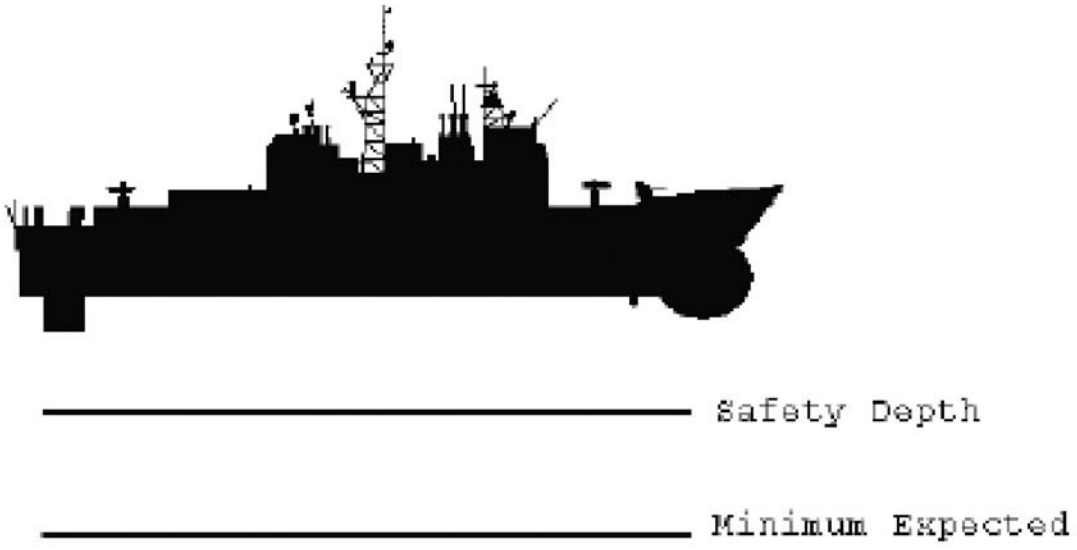

Figure 3-2

(9) Accurate records and logs are maintained. Complete reconstruction of the ship's track, orders to the helm and lee helm, and recommendations made by the Navigator to the CO, OOD, and Conning Officer must be possible at any time. Records and logs can be used when evaluating the performance of the navigation team, assessing the cause(s) of navigation incidents, and training.

(10) Use of checklists in navigation evolutions (e.g., Low Visibility, Entering/Leaving port, Swept Channel)shall be kept for twelve months after completion of the evolution. See sample checklists in Appendix C.

(11) Pilots, as advisors to the CO and the navigation team, should be made familiar with ship's characteristics and planned navigation track prior to beginning the proposed transit. A 'Pilot Book' with current information, including a basic ship diagram showing dimensions in feet, yards and meters, is extremely useful. Items for discussion with a Pilot should include:

(a) Maneuvering characteristics of the ship and lowest depth projection.

(b) Allowable deviation from track.

(c) Unpublished hazards to navigation.

(d) Bridge-to-Bridge radio communications.

(e) Port requirements for Automatic Identification System (AIS).

(f) Ship-specific piloting and conning procedures.

(g) Use of tugs.

(h) Material casualties that may affect maneuverability of the ship.

(i) Material condition of ship (oil leaks, steering system, navigation sensors, ECDIS-N, AIS, etc.).

(j) Safe speed for all legs of proposed transit.

(k) Correction status of charts (paper and/or electronic).

c. Special measures during low visibility. Carry out CO's Standing Orders for low visibility

6. Requirements While in the Open Ocean.

a. Set and drift will be computed/recorded and logged in the Ship's Deck Log every three hours. A recommended course to compensate for set and drift will be given by the Navigator or the QMOW.

b. At least hourly, compare all fix sources and determine the ship's position. At least hourly, or after each fix, report this navigation information users such as CIC/CDC to allow them to validate their tactical system position.

c. If weather permits, determine gyrocompass error by azimuth/amplitude of the sun or other celestial body at least once daily.

d. Make deck log and weather log entries for any significant change in weather per ref. (k) and NAVMETOCCOMINST 3144.1(series).

e. Conduct compass comparisons between the bridge gyrocompass/INS repeaters and magnetic compass every time a new course is set (over 10-degrees) and at least every 30 minutes, recording comparison data in the magnetic compass record book or deck log

7. Validation of Reference Parameters.

a. The proper functioning of many, if not all, of a ship's navigation sensors depend on the correct implementation of reference parameters. In it's simplest form, this refers to setting the AN/UQN-4/4A 'Keel Reference Switch' thumbwheel(s) to the proper value. At the most complex level it involves accounting for the physical separation of the GPS antennas (Lever Arm Offsets) and the milliseconds of delay as the signal travels from the antenna to the receiver. A failure of these parameters to be properly loaded into the systems can cause significant, potentially dangerous, errors.

b. The Navigation Certification (NAVCERT) program managed by Naval Sea Systems Command per reference (h) provides the basis for validating all of these critical parameters. Similar to the Navigation Light Certification, a complete

NAVCERT will verify the correct values for all Own Ship's Reference Point (OSRP) values, which include, but are not limited to, all lever arm and timing corrections.

c. A routine verification of these values and other similar settings prior to restricted rater transits will be defined by the CO's standing orders or the navigation bill.

d. While the original NAVCERT paperwork should remain with the ship's Combat Systems organization, a copy should be kept by the Navigator for ready reference.

8. Map Account Maintenance.

a. Effective 6 July 2010, Mapping Customer Operations implemented a new inventory management system called Mapping Enterprise Business System (MEBS). Map accounts will be requested and managed through the Account Management and Provisioning System (AMPS) site: https://amps.dla.mil and MEBS. Map customers presently holding accounts will be converted from the current Map System (DADMS and RMF Portal) and do not have to do anything except reset their URL in your web favorites or desk top link.

b. Commands requiring chart products from DLA's Richmond Map Facility are required to maintain a current AMPS account to receive charts and access the MEBS Customer Portal. All mapping, charting and geodesy (MC&G) products required by ref (c) are controlled through this account. For accountability and safety of navigation concerns, the Leading Quartermaster should always be the primary account custodian. The secondary alternate account custodian should come from one of the other end-user divisions (e.g. Intel, CIC/CDC, Carrier Air Traffic Control Center) and have a PRD at least a 12-months later than the primary account holder. Failure to maintain a valid 1832 on file will result in account suspension and could impede the shipment of charts to a command, including FLIP and strike products.

c. The primary account custodian should ensure that a yearly chart inventory is conducted by downloading the command's map subscriptions. You can also add, delete, or change your ship-controlled subscription requirements. Minimum chart allowances established by ref (c) can not be changed online.

d. Each ship needs to ensure that it is using only an "R" (Pacific Fleet) or "V" (Atlantic Fleet) DODAAC account. "N"

accounts are used for shore or new construction ONLY, and must be converted over once the ship is commissioned. Contact Mapping Customer Operations, Defense Supply Center Richmond for assistance.

CHAPTER 4

SUPPLEMENTAL POLICIES, REQUIREMENTS, AND PROCEDURES FOR SHIPS NOT CERTIFIED TO NAVIGATE USING ECDIS-N

1. General. This chapter provides guidance on policies, requirements, and procedures that supplement and amplify those contained in Chapter 3 for ships NOT AUTHORIZED to navigate with ECDIS-N.

2. Policy. Ships with an installed Situational Awareness (SA) system, but NOT CERTIFIED for unrestricted navigation operations using ECDIS-N, must maintain a paper plot.

3. Requirements While in Restricted Waters. The Navigation Team must satisfy the following additional requirements while in restricted waters.

a. Navigation information maintained in CIC/CDC/TOP, designated as the Secondary Navigation Plot, will supplement the Navigator's Primary Navigation Plot. The CO may authorize a shift in the location of the primary plot to suit a particular situation. This transfer shall be announced on the Bridge and in CIC/CDC/TOP, and an entry shall be made in the ship’s deck log. Other navigation plots may be utilized or required aboard a ship (e.g., Secondary Control Station, Zulu Module/SubPlot, Flag Plot, or a “training plot” in the chartroom or elsewhere) however, the location of the PNP and SNP shall always be explicitly defined.

b. The Navigation Evaluator will ensure every fix determined from the Primary Navigation Plot is compared to the fix obtained at the Secondary Navigation Plot. Reporting requirements can and should change depending on the situation. The ship’s familiarity with the port, the material condition of Situational Awareness tools (e.g. VMS, COMDAC), and the specific desires of the CO and/or OOD should all be factored into tailoring what and when information is reported. At a minimum, every verbal position report made by the Navigation Evaluator to the Navigator, Conning Officer, and CO will include the following information for each fix:

(1) Fix time

(2) Fix/EP Quality (excellent, good, poor) as determined by the Navigation Evaluator based on these standards

and CO's established guidance as clearly delineated in the ship's Navigation Bill.

Note: For GPS fixes, the CO may assign fix quality based on Figure Of Merit (FOM), Estimated Position Error (EPE) or request that GPS fixes be identified with FOM (see Appendix F). The preference shall be clearly delineated in the ship's Navigation Bill.

(3) Fix method (GPS, visual, RADAR, composite, running fix, etc.)

Note: If GPS is used as the primary fix source, the Navigation Evaluator will report FOM.

(4) Fix position in relation to proposed track

(5) Any recommendation to regain/maintain proposed track

Note: It is a good practice to pause the report at this point to allow the CO/OOD/Conn to report their concurrence or disagreement with the recommendation.

c. Supplemental information should also be included, when appropriate, to enhance navigation safety. Such items include:

(1) Nearest hazard to navigation (Appropriate when a hazard falls within a radius equal to the next two fix intervals).

Note: When following a buoyed channel, this report may be omitted provided that the danger NOT lay within the marked channel.

(2) Nearest aid to navigation

(3) Corrected fathometer sounding, and comparison to charted depth

(4) Distance and time to next turn (minimally at the beginning of each track leg, updated as necessary, and with each fix report at least 2 fixes prior to the turn).

(5) Next course (reported at least once each leg and updated as changes occur)

(6) Set and drift (once on each leg when less than 1500 yards and every third fix for legs greater than 1500 yards).

d. The phrase "CIC/CDC/TOP concurs," "CIC/CDC/TOP does not concur," or "CIC/CDC/TOP has no fix," as appropriate, will conclude any report. If the Bridge Team is maintaining the Secondary plot, the Navigation Evaluator will report concurrence/non-concurrence after the CIC/CDC/TOP report.

(1) The phrase "GVRC1/2 concurs/GVRC1/2 does not concur with Visual/RADAR fix" will also be reported when appropriate.

e. The Conning Officer shall acknowledge the Navigation Evaluator's report. The OOD shall ensure the Conning Officer has acknowledged the Navigation Evaluator's report and has indicated whether he/she intends to comply with the course and speed recommended by the Navigation Evaluator and immediately report non-concurrence to the CO. Any non-concurrence shall be acknowledged by the Navigation Evaluator and logged in the ship's Deck Log.

f. The Navigation Evaluator shall acknowledge all course and speed changes made by the Conning Officer. The Navigation Evaluator shall provide a report as to whether the new course is safe from hazards to navigation and for what distance it is deemed safe. The Shipping Officer shall similarly report whether the new course is safe from shipping hazards. Any reports that a new course is not safe shall be acknowledged by the Conning Officer and Commanding Officer verbally, and the reports shall be logged in the ship's deck log.

g. The Piloting Officer (if stationed) will report to the Navigator all navigation fix information derived by RADAR or any other source at each fix. The format for this report should follow the same format as in chapter 4 paragraphs 3.b/c.

4. Requirements While in Open Ocean. The Navigation Team must satisfy the following requirements while in open ocean.

a. All items in paragraph 3.6.

5. Incident procedures

a. After an incident (grounding, collision, etc.) the CO, or the Investigating Officer, will take custody of both sets of navigational charts and any logs in use at the time of the incident. If the chart is required for a period of time to

safely complete the ship's movement, the chart shall be immediately signed on its margin by the CO and XO in a distinct and noticeable manner. This shall be logged in the Deck Log, and the chart collected as soon as it is no longer required for navigation. Watchbills, evolution briefs, checklists, and any other pertinent documentation will be collected as well.

(1) Any logs collected will be copied, and such copies returned to the Navigator as soon as possible to prevent loss of these documents.

b. To meet expected Uniform Code of Military Justice requirements for Courts-Martial, the following electronic data collection methods will be utilized as soon as possible after the incident:

(1) The Navigator and either the Investigating Officer or one other Officer not part of the Bridge or Navigation Detail at the time of the incident will observe the Navigation Technician or other knowledgeable person make two copies of the Situational Awareness system files for the period of time beginning two hours before the incident to no more than two hours after the incident (time based upon the Deck Log entry) to two suitably labeled, portable storage mediums, preferably CD-ROM's. Flash drives, or other media are authorized if necessary. Both copies will be placed into a suitable container, which will be sealed in a tamper-proof manner. All present shall then sign and date a custody sheet for witnessing the data collection and container sealing. The CO, or his designated representative, will take custody of the sealed containers and statement sheets, which will be turned over to the incident investigators as required.

(2) The same process will be used to extract similar data from any other electronic system, such as any NAVSSI logs, AN/WSN-7, etc., installed aboard.

5. Situation Awareness ECDIS-N use.

a. If an OPNAV-approved ECDIS-N has been installed, an electronic plot must be maintained for situational awareness (SA) and navigation team training purposes, even if the ship is not authorized ECDIS-N as primary plot.

b. Any other product used as a situational awareness tool must be capable of displaying the current edition of the DNC®; must be capable of updating the DNC®; must have an input

from an approved Precise Positioning System (PPS) GPS receiver (AN/WRN-6, GVRC, or Defense Advanced GPS Receiver (DAGR) only) with crypto loaded; and must have an input from an approved gyrocompass or INS. Updates must be accomplished by application of the appropriate Vector Product Format Database Update (VDU); or downloading of the applicable library with the VDU incorporated; or manually entering non-integrated Notice to Mariner updates to the System Digital Nautical Chart (SDNC).

c. VDUs will be applied prior to any DNC library use, including route planning.

CHAPTER 5

SUPPLEMENTAL POLICIES, REQUIREMENTS, AND PROCEDURES FOR SHIPS CERTIFIED TO NAVIGATE USING ECDIS-N

1. General. This chapter provides guidance on additional policies, requirements, and procedures that supplement and amplify those contained in Chapters 2 and 3 and ref (g) for ships CERTIFIED to navigate using ECDIS-N.

a. Once an approved ECDIS-N is installed, the ship must complete the certification process. Specific steps are required for TYCOM Certification before a ship can operate with ECDIS-N as the primary navigation plot.

b. ECDIS-N certified ships must maintain all applicable training requirements per their TYCOM training manual.

c. Ships with an approved ECDIS-N system are required to immediately begin the authorization process. An early dialogue with SQUADRON/GROUP STAFF, TYCOM and ATG will help ensure in a smooth authorization process.

d. ECDIS-N authorization requires successful completion of two separate certifications: ECDIS-N certification of navigation systems (ECDIS-N NAVCERT) and Squadron/Group Staff Navigation Assessment (Crew Cert). ECDIS-N NAVCERT will be completed within 6 months from the date of installation and Crew Cert must be completed within 6 months from the date of the ECDIS-N NAVCERT. If ships are unable to meet these requirements, or are already past due, Squadron/Group Staffs will report reasons for non-completion and provide a plan for compliance via message to the appropriate TYCOM N7.

e. The ECDIS-N NAVCERT is conducted by SPAWARSYSCEN Charleston, incorporating performance requirements and test methods. (NAVCERT must be completed prior to attempting Crew Cert.)

f. In order to attain crew proficiency in the use of ECDIS-N prior to Crew Cert, ships will request an interim certification through their Squadron/Group Staff. TYCOM is the approval authority for interim certifications. The interim certification will allow ships to operate with ECDIS-N as the primary plot for up to 90 days prior to Crew Cert.

(1) Ships are required to complete an ATG inport ECDIS-N MOB-N LTT prior to requesting an interim certification. The LTT will review proficiency and ensure the ship is on track to achieve Crew Cert. The following items are reviewed during the inport LTT:

(a) An OPNAV N8 approved ECDIS-N configuration (correct hardware and software version) installed with a certification of navigation systems (NAVCERT). ATG will also verify equipment operation.

NOTE: Installation of any software on any ECDIS-N node, or modification of any ECDIS-N hardware, by any agency other than the ISEA (Naval Surface Warfare Center, Ship System Engineering Station, Philadelphia) invalidates the hardware/software integrity of the shipboard installation and invalidates the approved configuration and requires a CASREP. This also invalidates any authorization for use of the ECDIS-N as the Primary Navigation Plot, which will require the ship to revert to paper chart plots at both the Bridge and CIC/CDC/TOP. The ISEA will determine and execute the appropriate level of repair to restore the system to the 'as approved' status. SQUADRON/GROUP STAFFs shall keep appropriate TYCOM informed of the problem and resolution.

(b) Verify all VMS/NAVSSI advisories for specific ship build are maintained onboard and checked for compliance.

(c) A draft ECDIS-N navigation bill prepared and ready for CO's signature. Once final TYCOM authorization is granted to navigate using ECDIS-N, the ECDIS-N navigation bill will be signed and will supersede the traditional navigation bill.

(d) Proper number of VMS operator school Graduates- 3 for PC/MCM; 5 for all other classes of ships).

(e) A navigation watchbill with PQS qualified watchstanders to include Seamanship Training Team (STT).

(f) Operator level of knowledge (LOK) verified IAW check list provided in Appendix A.

(2) Once the inport LTT is complete and an interim certification is granted, an ATG ECDIS-N underway NAV LTT must

be scheduled for the ship's first underway period under the new interim certification. This LTT will concentrate on the training of the ship's crew using ECDIS-N as the primary plot in restricted waters.

(3) Once an interim certification is granted, the following requirements apply:

(a) A paper plot will be maintained separately in CIC/CDC/TOP and will serve as a safety back-up. Additionally, CIC/CDC/TOP will plot ship position using GPS, visuals, and/or radar lines of position and compare position with the navigation primary plot (NAV-1). The CIC/CDC/TOP Watch Officer shall consult the CIC safety paper plot as necessary to ensure safe navigation.

(b) On the bridge, paper chart requirements are IAW non-ECDIS-N ship guidance. Paper charts will be on station, updated, and ready for safe navigation prior to getting underway and prior to entering restricted waters. The navigation team is required to lay one fix on the paper cart and compare it with the ECDIS NAV-1 Console plot. If the fixes match, additional plots on the paper chart are not required and ECDIS-N becomes the primary plot on the bridge. If there is a failure of the ECDIS-N or the CO is not comfortable with the ECDIS-N plot, the ship shall revert to requirements for maintaining the primary navigation plot using paper charts until the casualty/situation has been resolved.

g. If a ship fails navigation assessment while under the 90-day interim certification, the waiver will be automatically cancelled and the ship will revert to paper charts as primary and secondary plots. Another interim certification will not be approved until the ship completes an additional ATG ECDIS-N MOB-N LTT and provides an updated plan to certification.

h. No interim certification extensions will be granted. If not assessed during the term of the interim certification, the ship must revert to paper charts as primary and secondary plots. Another interim certification will not be approved until the ship completes an additional ATG ECDIS-N MOB-N LTT and provides justification for inability to certify under the initial waiver.

i. Upon completion of crew certification, the ship's Squadron/Group Staff will provide a message via the chain of command to the TYCOM N7 recommending unrestricted navigation

operations including use of ECDIS-N with digital nautical charts (DNCs) certified safe for navigation. Once a ship is certified to use ECDIS-N as its Primary Plot, this certification is required to be maintained for the life of the ship.

2. Policy. The Commanding Officer is responsible for establishing the standards for ECDIS-N set-up and use, to include, but not limited to:

a. Ownship Safety Zone Configuration.

(1) The Ownship Safety Zone is three dimensional box constructed around Own Ship and extended ahead of Own ship for a specified look-ahead time. The configuration is done through the ECDIS-N/VMS SYSTEM: SAFETY CONFIG menu, from which parameters for Ownship Safety Zone may be set. The minimums are:

- Lookahead Time: 6 minutes
- Safety Depth: Equal to the Navigation Draft/Safety Contour on the paper chart. See Table 5-A for proper metric values.
- Safety Height: Value equal to the masthead height plus 25 feet.
- ALARM ON NEW DANGERS: Always selected 'ON' to ensure that users are notified of new dangers outside of the Voyage Plan Leg Safety Checking box.

(2) The Voyage Management System (VMS) software allows the user to select a safety depth value that results in highlighting of specific depth curves available in the Digital Nautical Chart (DNC) and Tactical Ocean Data (TOD) libraries. If the safety contour value selected by the operator is not contained in the DNC or TOD, or if the safety contour in use becomes unavailable due to a change in the source data, the safety contour defaults to the next deeper depth curve. At all times, the safety contour shown is the depth curve specified by the operator or the next deeper depth curve, if the specified depth curve is not available. To ensure VMS highlights the desired safety contour, the VMS user must enter the desired safety depth in meters equal to the desired safety depth in feet, in accordance with the below table:

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Table 5-A

VMS SAFETY CONTOUR METRIC CONVERSIONS

20ft=06.1m, 21ft=06.4m, 22ft=06.7m, 23ft=07.0m, 24ft=07.3m, 25ft=07.6m, 26ft=07.9m, 27ft=08.2m, 28ft=08.5m, 29ft=08.8m, 30ft=09.1m, 31ft=09.4m, 32ft=09.7m, 33ft=10.0m, 34ft=10.3m, 35ft=10.6m, 36ft=10.9m, 37ft=11.2m, 38ft=11.6m, 39ft=11.9m, 40ft=12.2m, 41ft=12.5m, 42ft=12.8m, 43ft=13.1m, 44ft=13.4m, 45ft=13.7m, 46ft=14.0m, 47ft=14.3m, 48ft=14.6m, 49ft=14.9m, 50ft=15.2m.

b. Determination and reporting of the minimum sounding(s) expected along a restricted water track outside of a maintained channel (reporting of a sounding inside a maintained channel is necessary only if the sounding is less than the channel project depth). This may be done through a Mariner Object Point, Line, or Area to highlight the sounding.

c. Procedures for approving Navigation Plans.

d. The ECDIS-N software provides for CO approval of Voyage Plans and PIM Plans, and of the chart portfolios and layer portfolios that are associated with them. In addition to the individual approval of these plans and their components, the VMS also provides for overall review and approval of plans and portfolios for use during a specified time period. The overall approval status of the system is visible at all times, in the approval status indicator at the top of the main menu. The indicator is green when the status is APPROVED, and it is red when the status is UNAPPROVED. In either case, the operator can obtain more information about the overall system approval status by selecting the indicator.

(1) Utilizing similar procedures as with paper charts, the CO shall clearly establish who is required to review and then RECOMMEND the Navigation Plan and included Chart Layer(s), Chart Portfolio(s), Voyage Plan(s) and PIM Plan(s) for CO’s approval. On SURFOR ships, this process must include the XO. Standard ECDIS-N installation includes a QM, QMC, Navigator, and XO account with RECOMMEND authority; only the CO account has APPROVAL authority. These accounts are set up through a Windows Operating System function, and may be added to (i.e. OSC or CDO Underway account) or customized (i.e. change passwords). It is highly recommended that the Navigator and a generic CDO UNDERWAY (AIRFOR ONLY) login have APPROVAL authority, with the specific procedures for using this authority detailed in CO’s Standing

Orders or the ship's Navigation Bill. It is highly recommended, that ships visiting foreign ports, have voyage plans approved for leaving port upon arrival, in case of emergency sortie.

(2) At a minimum, all Restricted Water transits must be APPROVED by the CO. This requirement corresponds to the paper charts the CO has to sign. The CO may designate APPROVAL authority to the Navigator for all other transits to avoid having UNAPPROVED routinely appear.

e. Procedures for the use of the Tactical Layer.

(1) The Tactical Layer is a special layer that may be modified at any time, and is approved by the CO. This layer is always used for safety checking. Each ship may have specific items placed in this layer as authorized by the CO.

(2) At a minimum, Mariner Objects which are established for navigational safety reasons (e.g. a safety buffer around Bishop's Rock, TACTS towers, or Chesapeake Light) should be placed on the Tactical Layer.

f. Procedures for verifying chart and track changes after application of VPF Database Updates (VDU).

(1) VDUs apply corrections to the base DNC Library, but these changes are not highlighted.

(2) At a minimum, each Navigation Team needs to follow post-update plan validation procedures to ensure that changes have not adversely impacted the current track, or any routinely used Navigation Plan (e.g. the entering /departing homeport plans). The results of this review shall be reported to the CO; on SURFOR ships, this process must include the XO.

g. A tailored display set up to include alarm settings. Each ECDIS-N display has the ability to load a different display feature set. Pre-evolution checklists shall include verification of the displayed feature set, required at each ECDIS-N display per ships navigation bill.

(1) Appendix J shows the minimum display requirements. The CO may establish more restrictive settings when desired, but the ships settings shall be included as an enclosure to the ship's Navigation Bill. The 'Default' display feature set shall be converted to the settings in the 'Restricted' display feature set to prevent loosing important

features during restricted water transits. To accomplish this, open the Feature control panel and select 'Default'. Use Appendix J and CO's Standing Orders to tailor the set to 'Restricted', then save the set. The new settings will overwrite the Default settings. Ships shall also establish distinctive 'Piloting,' 'Coastal,' and 'Open Ocean,' settings follow (even when if local, more restrictive feature setting guidance makes any two or more of these feature sets identical).

h. Procedures for loading, starting, ending, and changing Navigation and Voyage plans.

(1) The current version of ECDIS-N software allows several voyage/PIM plans and chart/layer portfolios in each navigation plan. However, an item in an APPROVED plan cannot be modified without requiring re-approval, and anything in a loaded navigation plan cannot be modified. Charts being modified through the VDU process are an exception. In practice this means that each navigation plan will contain only as much as necessary to execute the plan, giving the navigation team the flexibility to make changes up to the CO's approval deadline. Additionally, the software does not append follow-on tracks, therefore there will be a practical requirement to end a plan, unload the navigation plan, then load and start the next navigation plan. To simplify this process, each voyage plan shall have at least one leg (the last two waypoints) in common with the first leg (first two waypoints) of the next plan.

(2) The CO shall designate who is authorized to start, stop, load and unload a navigation plan, and designate the requirements and procedures for changing a current navigation plan, or any of its components, in the ships navigation bill.

i. Fix source precedence and use.

(1) The acceptable ECDIS-N position sources are: GPS(PPS) from a WRN-6, GVRC, DAGR, or subsequent military-grade receiver; visual, radar, or composite fixes in the ECDIS-N; and INS (open ocean only). If a ship has two similar sources (e.g. GPS1 and GPS2) the order of selection should be based upon known issues with the systems, such as consistent errors or problems in maintaining a position.

NOTE: Refer to Chapter 3 Table 3-A for GPS Fix accuracy and Fix interval guidelines.

j. Appropriate fix intervals at anchor.

(1) The ECDIS-N software takes water depth into account when calculating the swing and drag circles, such that the length of chain is the hypotenuse of a right-triangle. Thus its drag circle is smaller than what is normally plotted on a paper chart, and will generate an alarm as the ship approaches the edge of the drag circle.

(2) A visual/radar/composite fix must be taken at least once an hour at a minimum or upon receiving a position alarm (e.g. Position Uncertainty- "POS discrepancy between [sensor a] & [sensor b]"; position sensor failure/timeout- "Timeout: Position Manager GPS-1"; Anchor Drag- "Anchor Drag Possible – Check Position"; etc)."

k. CO's Ready List of DNC libraries.

(1) There is not a requirement, nor is it recommended, for all libraries on a DNC to be loaded at the same time; this helps preserve the speed of the ECDIS-N. For this reason there is also a need to remove libraries as the ship moves into a new operating area for a length of time, such as an overseas deployment.

(2) The minimum chart libraries to be kept loaded should be based upon the paper chart standard- needed charts corrected and loaded; nearby charts available if needed. This equates to: Harbor and Approach libraries for the ship's homeport and surrounding waters; local Coastal libraries; local General libraries; and TOD0 OPAREA overlays for the local OPAREAS. Proper management of the ECDIS-N chart catalog is a critical part of maintaining a healthy system.

(3) Vector Product Format Updates (VDUs) must be downloaded (one-quarter of all DNCs are updated weekly) or obtained off the monthly VDU CD-ROM and applied prior to any use of a DNC Library. The minimum requirement is to do a weekly download of any updated VDU for the area(s) of the ship's operations from the NGA website (see Appendix E). Until the most recent VDU available has been applied to a DNC library, it may not be used except in an emergency. If connectivity issues prevent receiving a recent VDU, the DNC may be utilized for planning but the problem must be briefed to the CO, and the ship must make every effort to get the missing VDU prior to actual DNC use. If the ship is not able to obtain the VDU in time, the

CO must be briefed and a Deck log entry made detailing the issue.

l. Non-navigation procedures to support ECDIS-N.

(1) The CO shall designate the appropriate command relationships and responsibilities between the Combat Systems Officer (CSO), Electronic Maintenance Officer (EMO) and Navigator in the ships navigation bill. They must work together to keep all navigation-critical systems (e.g. ECDIS-N, NAVSSI, DMS, GEDMS, GVRC, INS) operational at all times. This may require dual-reporting of problems by the EMO to the CSO and Navigator. The Navigator, ANAV and Senior QM must be familiar with the CSOSS for bringing up, maintaining, and securing the navigation systems so they have the basis for knowing how long these procedures take and possible conflicts, such as resetting an INS while crossing a continental shelf. The EMO must ensure that he/she has adequate resources to repair and maintain the equipment, and the CSO should work within his SQUADRON/GROUP STAFF and Strike Group to pass on and acquire any 'lessons learned' as well as establishing any emergency part support which is prudent.

(2) ECDIS-N software, computer, LAN, display and equipment troubleshooting and maintenance is partially supported through PMS (i.e. Cruiser IBS PMS 5600/020); however, there are known basic maintenance actions which must be done regularly which are listed in the technical manuals (Administrators Guide) provided by NSWCCD Philadelphia. At a minimum the hard disk shall be DEFRAG'd at least quarterly, and the CPU and display fans and filters, as well as the CPU, shall be cleaned quarterly.

(3) Besides the ECDIS-N playback logs, both the NAVSSI and WSN-7 CDU have the capability to log navigation source data. Investigations have shown that these alternate logs are valuable in troubleshooting navigational problems, and can provide back-up in the event of loss of ECDIS-N logs.

(A) The CO shall establish when this additional logging shall be required and the minimum frequency and method of backing up these additional logs.

3. Requirements. The Navigation Team must satisfy the following additional requirements while the ship is underway.

a. Use of Digital Charts.

(1) Digital Nautical Charts (DNC®s) produced by NGA are the only approved charts for ECDIS-N use. All DNC libraries have been certified 'Safe for Navigation' by NGA. DNCs are 'LIMDIS' and when no longer required, must be destroyed. Due to past issues with mis-aligned DNC tracks, retain the most recent DNC, plus the previous edition, to ensure that production issues do not prevent loading a DNC Library. The Navigator must inform NGA of any issues with a new DNC as soon as they are discovered.

(a) Per Reference (g), Electronic Navigational Charts (ENCs) produced by National Hydrographic Offices or their approved contractor may be used under the following conditions:

1. When DNCs are not available for a specific geographic area, or

2. When DNCs for the area are more than 90 days out of date, or

3. When required by joint operations governed by Warship ECDIS (WECDIS).

(2) Ships operating with Situational Awareness (SA) tools must also download and maintain current Vector Product Format Data Updates (VDUs) to update DNC®s. These updates must be applied prior to any use of a DNC, including route planning.

(a) Corrections from Notice to Mariners (NTM), Broadcast Notice to Mariners (BNTM), Local Notice to Mariners (LNM), and NAVAREA/HYDROLANT/HYDROPAC messages may be associated to the chart by using Mariner Objects. However, these products are designed to be used with paper charts, not DNC Libraries. Caution must be used as a DNC may not have the same source data as a paper chart, and/or may already have the correction applied through the VDU. Any manual correction applied should be reviewed after the next VDU to verify if it is still required as a Mariner Object.

(3) Tactical Ocean Data (TOD) provides additional data for Navy-specific requirements, and comes in different levels. TOD data must be displayed with the appropriate DNC library(s), thus the final display will be both DNC and TOD. There are four which are applicable to surface ships:

(A) TOD0 (LIMDIS). OPAREA, Range and Exercise charts (AOA, XNR). TOD0 has been developed to provide a digital

portrayal of hardcopy operational area charts as an overlay to the Digital Nautical Chart (DNC). The concept is to display the proper scale DNC library(s) (usually DNC Coastal libraries) and then the appropriate TOD overlay. TOD0 data cannot be displayed on any navigation system as a sole entity. As of April 2010 there were (12) DNC Regions with TOD0 sets.

(b) TOD1 (Confidential). Bottom Contour (BC). TOD1 has been developed to portray the seafloor configuration, particularly in areas deeper than 200 meters, and non-submarine contacts data in a format suitable for computerized subsurface navigation. In libraries where TOD2 data is available TOD1 will be phased out. ASW platforms may desire to use TOD1. As of April 2010 there are (28) DNC Regions with TOD1 sets.

(c) TOD2 (Secret). Bathymetric Navigation Planning Charts (BNCP). TOD2 has been developed to portray the seafloor configuration, particularly in areas deeper than 200 meters, and non-submarine contact data in a higher resolution than TOD1. ASW platforms may desire to use TOD2. As of April 2010 there are (28) DNC Regions with TOD2 sets.

(d) TOD3 (Secret). Shallow water bathymetry. TOD3 is a product that portrays seafloor configuration, particularly in shallow water areas between 20 meters and 200 meters along with non-submarine contact data in a format suitable for computerized subsurface navigation. TOD3 is designed to be used in conjunction with the Digital Nautical Chart (DNC) and Tactical Ocean Data Level 1 and/or Level 2 for complete navigation information. In addition, the TOD3 product portrays strategic information to support naval operations. Littoral combatants may desire to use TOD3 as they become available. As of April 2010 there are no DNC Regions with TOD3 sets.

b. Reference (g) requires that an ECDIS-N provide a standard legend that includes the scale of the display. The operator is given the ability to use intermediate display scales or zoom in between scales with an indication whenever the information is displayed at a larger scale than that contained in the DNC® or TOD0. Caution must be exercised by the navigation team when using the zoom in feature to prevent possible misinterpretation of the inherent accuracy of the data presented in the overscale display.

c. Rigorous maintenance and update of digital charts, portfolios, layers, and mariner objects are significant

requirements for the success of this system. Appendix I has examples for creating and managing mariner objects, layer and chart portfolios, and navigation plans.

(1) All objects/layers/portfolios must be distinctly named. Adoption of a consistent naming convention will simplify reviews and allow for rapid building of layers. Each ship's navigation bill must specify their naming conventions.

(a) A Mariner Object may have a different name and label, which, for instance, allows a dual-use NAVAID to be named 'FWD RNG' and Labeled 'RDR 2'.

(b) The paper chart number is usable in the class field.

(2) All Mariner Objects should be reviewed for correctness and applicability on a regular basis.

(a) Mariner Objects which are established for navigational safety reasons (e.g., a safety buffer around Bishop's Rock, TACTS towers, or Chesapeake Light) should be placed on the Tactical Layer, which is always displayed and therefore less likely to be missed.

(b) Mariner Object NAVAIDs should be saved to a Chart Data Layer for a specific chart. A no-wake zone, or other area or chart-specific item (i.e., Pilot pick-up, pitsword raise/lower, swept-channel, etc.) should also be placed in the Chart Data layer. Major NAVAIDs which would be useful when approaching land (i.e., Chesapeake Light Tower, Point Loma Lighthouse) can be placed in a Display Layer so that they appear regardless of which chart is selected.

(c) All other Mariner Objects can be placed in a Display Layer so that they appear regardless of which chart is selected.

(d) For VMS version 7.7.1 and earlier, deleting a Layer DOES NOT delete any Mariner Objects in that layer; for version 8.1 and higher, a pop-up message will ask to delete the objects in a layer being deleted . Mariner Objects must be deleted separately when not needed any more; failure to do so may overload the M.O. Database and prevent use of new Mariner Objects. This situation leads to an 'orphaned object'; ECDIS-N ISEA message 081813Z OCT 09 "IN SERVICE ENGINEERING (ISE) ADVISORY NO. 037-09" refers.

(3) Objects added as a chart addition (i.e., Notice to Mariner correction) automatically display with the chart, and only with that chart, and are independent of display layers.

(4) Voyage Plans intended to be used in sequence (one after the other) should both contain at least the final leg of the first plan to allow for a smooth transition between two sets of Navigation and Voyage Plans.

4. Requirements Prior to Entering Restricted Waters.

a. The Navigator is charged with preparing a navigation brief and a voyage plan for safe and prudent passage, including piloting. The voyage plan will be electronically reviewed and approved by the CO in accordance with procedures outlined in the ECDIS-N operator's manual and the ship's Navigation Bill.

(1) Any paper charts required as a back-up, such as the CIC/CDC/TOP charts used during the practiced and assessment periods, must be corrected, prepared and approved as defined in Chapter 3.

(2) To allow for review of inadvertent changes to an approved ECDIS-N navigation/voyage plan, it is recommended that the Navigator utilize the Appendix I 'Navigation Plan Management' sheet which lists plan basics for reference. Additional sheets for managing a part of the Navigation Plan (Voyage and PIM plans, Chart and Layer Portfolios) are also available.

5. Requirements While in Restricted Waters.

a. Due to its simultaneous display of the ship's position at all ECDIS-N stations, the Navigation Evaluator does not need to provide a Navigation Report. Abbreviated reports may be provided as required by the CO's Standing Orders. Shipping Reports will be provided as necessary. Safe for navigation reports are still required.

b. The ship's position, utilizing all sensors, will be plotted/displayed and correlated within the ECDIS-N prior to getting underway and prior to entering restricted waters. Each sensor's difference when compared to the ship's primary position source (e.g. range and bearing from GVRC1 position) shall be logged in the Bearing Book and Deck Log prior to the underway or entering restricted waters.

c. Visual and/or radar fixes shall be plotted at least every third fix interval using the ECDIS-N. It is recommended that both types of LOPs be used frequently enough to maintain familiarity with visual and radar plotting procedures. This standard comprises the Primary back-up for the loss of GPS inputs to the ECDIS-N.

d. Experience has shown that the ECDIS-N functions best with a redistribution of Navigation Team assets. The following watchstations are recommended:

(1) The Navigation Evaluator, an ECDIS-N phone-talker and CIC/CDC/TOP Phone Talker (if needed) should be stationed at the NAV-1 display and maintain contact with the Shipping Officer and Bearing Recorder. In the event of a NAV-1 failure, the Navigation Evaluator and ECDIS-N phone-talker should be able to rapidly relocate to another node in order to maintain the plot. The ship's Navigation Bill must have this casualty procedure in place for use.

(2) The ECDIS-N Display Operator/Navigation Plotter and the Bearing Recorder should be stationed at the closest ECDIS-N display off the Bridge. This will allow for receiving and plotting visual/radar LOPs without tying up the NAV-1 display, and help minimize noise on the Bridge. In the event their ECDIS-N node fails, the ECDIS-N Display Operator/ Navigation Plotter and Bearing Recorder should be able to rapidly relocate to another node in order to maintain the plot. The ship's Navigation Bill must have this casualty procedure in place for use.

(3) The Navigation Radar Operator may be stationed on the Bridge, or in CIC/CDC/TOP, and must have communication with the Bearing Recorder.

(4) If the DFGMC does not provide a direct input to ECDIS-N, the ship must develop procedures to pass Magnetic Heading to the Bearing Recorder if a relative-bearing plot is required. The ship's Navigation Bill must have this casualty procedure in place for use.

6. Use of Inertial Navigation System without GPS inputs.

a. The Inertial Navigation System (INS) receives constant position updates from the GPS which are critical for the proper functioning of the INS. If the GPS input to the INS

is not available, the INS is not authorized to become the primary position source except in open ocean. Without a GPS input in restricted waters, a proper visual and/or RADAR plot must be maintained on the ECDIS-N, or the ECDIS-N devolves to a situational awareness tool. However, the INS may be used to drive the ECDIS-N Course over Ground (COG) or Speed over Ground (SOG) functions to improve the SA capability of the degraded system.

7. Special Logging Requirements.

a. After an incident (grounding, collision, etc.) the CO, or the Investigating Officer, will take custody of both sets of navigational charts and any logs in use at the time of the incident. If the chart is required for a period of time to safely complete the ship's movement, the chart shall be immediately signed on its margin by the CO and XO in a distinct and noticeable manner. This shall be logged in the Deck Log, and the chart collected as soon as it is no longer required for navigation. Watchbills, evolution briefs, checklists, and any other pertinent documentation will be collected as well.

(1) Any logs collected will be copied, and such copies returned to the Navigator as soon as possible to prevent loss of these documents.

b. To meet expected Uniform Code of Military Justice requirements for Courts-Martial, the following electronic data collection methods will be utilized as soon as possible after the incident:

(1) The Navigator and either the Investigating Officer or one other Officer not part of the Bridge or Navigation Detail at the time of the incident will observe the Navigation Technician or other knowledgeable person make two copies of the Situational Awareness system files for the period of time beginning two hours before the incident to no more than two hours after the incident (time based upon the Deck Log entry) to two suitably labeled, portable storage mediums, preferably CD-ROM's. Flash drives, or other media are authorized if necessary. Both copies will be placed into a suitable container, which will be sealed in a tamper-proof manner. All present shall then sign and date a custody sheet for witnessing the data collection and container sealing. The CO, or his designated representative, will take custody of the sealed containers and statement sheets, which will be turned over to the incident investigators as required.

(2) The same process will be used to extract similar data from any other electronic system, such as any NAVSSI logs, AN/WSN-7, etc., installed aboard.

CHAPTER 6

RECORDS, LOGS, AND FORMS

1. Purpose. The importance of keeping complete, concise, and accurate navigation records, logs, and forms cannot be overemphasized. Besides providing the recorded history of the ship, they become a basis for analysis, evaluation, and correction of material, operational, and personnel deficiencies in warfare. Should it ever become necessary, they comprise the legal records examined by courts of inquiry and official investigations.

2. Corrections. Erasures are strictly forbidden in all navigation logs and records except the Navigation Workbook. Neatly line out and initial an entry to make corrections. Ballpoint pen with non-water soluble black ink will be used throughout, except in the Navigation Workbook in which pencil is authorized for recording and computations.

3. Ship's Deck Log

a. Purpose. The Deck Log will be a complete daily record, by watches, in which will be described every circumstance and occurrence of importance or interest which concerns the crew, the operation or the safety of the ship or that which may be of historical value. When underway, the oncoming OOD and QMOW will review the Deck Log from the previous watch before relieving.

b. Instructions for Maintenance. The Deck Log will be kept according to ref (k). A copy of this instruction will be placed in the front of the log, if not provided by preprinted format. The following entries, in addition to those required by ref (k) will be included as appropriate:

(1) Draft (forward, aft, mean) and displacement as computed and reported in the ship’s daily draft report.

(2) Set and drift (when determined)

(3) Time checks

(4) Commencement of and the completion of all special evolutions and of any checklists.

(5) All recommendations made by the Navigator, QMOW, or CIC/CDC/TOP concerning the maneuvering of the ship.

(6) If the CO removes the requirement to maintain the Magnetic Compass Record (NAVSEA 3120/3), all true and magnetic headings will be logged in the ship's Deck Log (OPNAV 3100/99), to include gyrocompass error, daily navigational/conning gyrocompass repeater error, and magnetic checking courses. Recording the results of the DFGMC in the ship's Deck Log ensures a record of accuracy and reliability.

(7) The passing of all channel markers during a restricted water transit.

c. Responsibility for Review and Approval. The Navigator will review the Deck Log daily and submit the record to the CO at the end of the month for signature.

d. Retention. The original Deck Log will be forwarded to the Naval Historical Center no later than the tenth (10th) day of each month. Duplicate Deck Logs will be kept onboard for one year.

4. Ship's Position Log (OPNAV Form 3100/3)

a. Purpose. A Ship's Position Log will be a record of positions and soundings from all sources used. In addition, GPS FOM and fathometer soundings will be recorded. In light of different ship configurations and missions, specific codes to indicate type of fixes and fix accuracy will be determined by the Navigator, written into the Navigation Bill and included in the log.

b. Instructions for Maintenance. Whenever a fix is determined and at least every half-hour, a position from the primary approved source (GPS(PPS)) will be recorded. The 'Fix Source' column will be labeled in accordance with the ship's Navigation Bill. The 'Accuracy' column will contain the FOM.

(1) All GPS sources will be logged at least hourly even if not authorized as a primary position source [see page 3-4, para 3.d]. By recording all fix and EP sources in the log and comparing them, confidence can be gained regarding the accuracy of the primary source. Additionally, any deficiencies in the primary or back-up source position will become immediately apparent.

(2) The Ship's Position Log may be secured with the concurrence of the Navigator or Assistant Navigator whenever the Standard Bearing Book is used in piloting waters. When entering restricted waters from the open sea, the initial piloting fix will be recorded in both the Ship's Position Log and Standard Bearing Book. The same is true of the last piloting fix when leaving restricted waters. Upon relief or when secured, the watch or Bearing Recorder will sign his/her name across columns 18-41.

c. Responsibility. The Ship's Position Log will be kept during coastal and open ocean navigation.

d. Retention. This log will be kept for twelve months after the date of the final entry.

5. Navigation Workbook (OPNAV Form 3530/1)

a. Purpose. The Navigation Workbook is the record of all observations and computations used for navigation of the ship.

b. Instructions for Maintenance. The Navigation Workbook will be kept according to OPNAVINST 3530.3 (series). The Navigator is responsible for the proper maintenance of this log. In view of the large amount of data that may be recorded, ships may organize data into separate notebooks as directed by the CO in the Navigation Bill. Locally prepared strip forms will be affixed to or recorded in the workbook. If calculators are used, enough data must be recorded in the workbook to reconstruct the computation. When using computer software (i.e., STELLA, Admiralty TotalTides, NOAA website), documentation of work must be maintained in a loose-leaf binder.

c. Responsibility for Review and Approval. The Navigator will review and sign the workbook weekly.

d. Retention. This record will be kept twelve months from the last entry.

6. Standard Bearing Book (OPNAV Form 3520/2)

a. Purpose. The Standard Bearing Book is a record of the data obtained to determine the ship's position by visual bearings, sextant angles, RADAR bearings, and/or RADAR ranges. Locally-produced forms meeting all requirements are authorized,

but their use and retention must meet these standards and be defined in the Navigation Bill.

b. Instructions for Maintenance. The Standard Bearing Book will be kept according to OPNAVINST 3530.3 (series).

(1) Record the chart number in use at the top of the initial page each day. Each shift of charts will be noted in the first available blank line of the log.

(2) The time zone and date will be indicated.

(3) Label RADAR ranges YD (yards) or NM (Nautical Miles). Label stadimeter ranges "STAD."

(4) Soundings will be in column 7 at the time each fix is obtained and labeled FT (feet), meters (m), or FM (fathoms).

(5) All bearings are true, unless otherwise indicated by R (relative) or M (magnetic) for helmsman's heading. During loss of gyrocompass and when shifting to R (relative), the shift will be noted on the first available blank line of the log. An additional column will be utilized to log “Ship’s Magnetic Head.”

(6) All abbreviations must be according to Chart No. 1, "Nautical Chart Symbols and Abbreviations."

(7) Record the current gyrocompass error and gyrocompass/INS repeater errors for the peloruses being used for navigation fixes or ship control at the top of the initial page at the beginning of a detail or each day if at anchor. Any revised gyrocompass error will be noted in the first available blank line of the log. Enter the RADAR range/bearing error and/or heading error(s) of each navigation RADAR in use at the top of the initial page at the beginning of a detail or each day if at anchor.

(8) A list of NAVAIDs (“Gazetteer”) must be permanently maintained in the book and will include the abbreviation, noun name, and latitude/longitude. Visual/radar NAVAIDs such as tank or tower will have an alphanumeric designation. Other named NAVAIDs such as Point Loma Light or Chesapeake Light need not be alphanumerically designated.

(9) GPS positions and FOM will be logged at every fix, or may be logged in the Ship's Position Log if all columns are being used.

c. Responsibility. At the end of his/her watch or Navigation Detail, the Bearing Recorder will sign the Standard Bearing Book after the last entry on the next available line.

d. Retention. The Standard Bearing Book will be kept on board for twelve months after the date of the last entry.

7. Chart/Publication Corrections

a. Purpose. These files serve as a record of all corrections required for the current allowance of NGA charts, DNC's and publications established by the current edition of the Nautical Chart and Publication Allowance. The electronic Catalog of Maps, Charts and Related Products produced and distributed by Defense Logistics Information Service shall be used to verify the availability of any chart or DNC.

b. Instructions. As a result of the inclusion of applicable corrections being published in the Notice to Mariners and available through the NGA web site, Chart/Publication Correction Cards (NGA Form 8660/9) are no longer required to be maintained. Any corrected paper chart or publication shall have a complete and accurate 'Correction Tree' as specified in Chapter 3, which should be validated against the corrections list printed in the NtM's or from the NGA website prior to use.

(1) Charts and publications, both paper and electronic, designated by the CO (CO's Ready List) will be kept current at all times.

(2) The current and previous edition of electronic corrections to DNC's (VDU) and electronic publications (PDU) shall be kept onboard to prevent errors in the most recent edition from preventing use of the DNC or publication. These corrections should be validated against the corrections list printed in the NtMs or from the NGA website prior to use.

c. Responsibility for review and approval. The Senior Quartermaster/Operations Specialist is responsible for reviewing the ship's charts, publications, and correction files to ensure their proper maintenance. During audits, the Senior QM/OS will ensure applicable allowance lists, DLA R05 lists/AMPS updates,

as well as lists of effective corrections are reviewed during the inventory.

8. Notice to Mariners/Summary of Corrections

a. Purpose. Notices to Mariners, Summary of Corrections, and use of the Automated Notice to Mariners (ANMS)(INFONET) and Local Notice to Mariners (LNM) will be used to enter appropriate information on appropriate charts or publications.

b. Instructions for Maintenance. The Chart and Publications Custodians, under the cognizance of the Assistant Navigator and CIC/CDC Officer, will keep separate files as follows:

(1) Electronic Notice to Mariners. Notice to Mariners is now exclusively distributed in an electronic (.PDF) format. A server-based file of Notice to Mariners will be kept by the Navigation work center with a separate local file as a back-up. These electronic files must be retained on board for the date of the last correction applicable in the Summary of Corrections.

a. NGA corrections are available on their website:

Paper charts: http://www.nga.mil/portal/site/maritime/

DNC VDU's: http://www.nga.mil/portal/site/dnc/

b. If using NOAA-produced charts, validate corrections using their website: http://ocsdata.ncd.noaa.gov/nm/

(2) Electronic Local Notice to Mariners. Local Notice to Mariners is now exclusively distributed in an electronic (.PDF) format available on the USCG Navigation Center website (http://www.navcen.uscg.gov/). To be handled the same as Notice to Mariners File and will be held on board for at least one year or longer, as required.

(3) Summary of Corrections. A series of publications that incorporates a historic record of corrections dating from the most recent edition date for NGA products, back to July 1975. The most current version for all editions is on the Digital Nautical Publications - Quarterly Update CD produced by NGA.

(4) Classified Notice to Mariners. Provides the same information as the Notice to Mariners and Summary of Corrections except that the information is for classified charts and publications.

c. Responsibility. The Chart and Publications Custodian will maintain the Notice to Mariners File.

d. Retention. Notice to Mariners records will be kept until issued in a summary document.

9. Navigational Safety Warning Messages Including, but not limited to: HYDROPAC/LANT, NAVAREAS, NAVTEX, NAVINFONET, SAFETYNET, and Coast Guard Local Broadcast Warnings and their web site (http://www.navcen.uscg.mil/lnm/default.htm), as applicable. Arctic Maritime Safety Information (AMSI) Warnings are issued for the Arctic region not covered by HYDROLANT and HYDROPAC messages. Special Warnings and MARAD Advisories are issued infrequently and contain information about potential hazards caused by the global political climate. The Daily Memorandum is issued each weekday and contains a summary of all Broadcast Warnings and Special Warnings promulgated during the past 24-72 hours. The Atlantic Edition contains HYDROLANT and NAVAREA IV Warnings while the Pacific Edition is comprised of HYDROPAC and NAVAREA XII Warnings. Both editions include Special Warnings issued during the same period.

a. Purpose. To review the latest navigational aid discrepancies and hazards to navigation notices.

b. Instructions for Maintenance and Review. Retain an electronic file copy of all Safety Warning Messages (Daily Memorandum). Provide copies to each work center keeping charts.

(1) At sea, the Navigator, Assistant Navigator or Senior Quartermaster, will review the Daily Memorandum to determine pertinent information that should be immediately brought to the attention of the OOD and Navigation Team.

(2) The Navigator will brief the CO on pertinent information from Safety Warning Messages during navigation briefs and at any other time deemed relevant.

c. Retention. Safety Warning Messages will be kept until they are superseded by their inclusion in the Notice to Mariners.

10. Magnetic Compass Record (NAVSEA 3120/3)

a. Purpose. The Magnetic Compass Record is a complete record of all magnetic compass readings and comparative true headings. It is also a record of gyrocompass errors. At the CO's discretion, ships with the DFGMC installed are exempt from maintaining the Magnetic Compass Record. However, ships with DFGMC problems may need or be asked to maintain the Magnetic Compass Record to provide data to troubleshoot the issue.

b. Instructions for maintenance. While the ship is underway, compute gyrocompass error and navigational/conning gyrocompass repeater errors daily and record in the remark column of each page. Enter LAT/LONG of current position when practicable.

(1) A separate log for the computation of repeater error may be used, but this log does not obviate the requirement to record computed gyrocompass errors in the Magnetic Compass Record or Deck Log.

(2) Compass comparisons between the magnetic compass and the helm repeater in use for steering will be made and recorded every half hour and every time a new ordered course of ten degrees or more is steered, when practicable. If the Magnetic Compass Log is not used, the ordered course/checking course entries satisfy this requirement.

(3) Make compass checks and log errors any time a gyrocompass alarm is received.

(4) If the steering repeater and the heading source do not correspond within 1.0 degree at the time of obtaining a compass check, immediately repeat the check for possible error in reading. If there is in fact an error, immediately inform the OOD, Navigator, Assistant Navigator, and leading IC technician. Additionally, if the INS and gyrocompass repeater do not agree within 1.0 degree, inform the OOD and Navigator immediately.

(5) For Standard Magnetic Compasses, prepare a table of deviations, making sure that copies are posted at the appropriate conning and plotting stations and included in the Magnetic Compass Log, inside front cover. Ships using digital flux gate magnetic compasses are not required to post deviation tables but are required to ensure that digital electronic

compasses and all remote repeaters are operating within limits contained in the appropriate technical manuals.

c. Responsibility for review and approval. If being maintained, the Navigator will review and sign the Magnetic Compass Record weekly and submit the record to the CO on the last day of each quarter for signature.

d. Retention. The Magnetic Compass Record will be kept on board for twelve months after the date of the last entry as part of the ship's official records.

11. Ship's Position Reports (NAVSHIP 9240/1)

a. Purpose. To provide a means of reporting the ship's position.

b. Instructions for Maintenance. Ship's Position Report, NAVSHIPS Form 9240/1, an e-mail or electronic report, or locally prepared forms may be used if containing, as a minimum, that information provided on the NAVSHIPS form (see Appendix D). If directed by the CO each day at sea, before 0800, 1200, and 2000, the Navigator will prepare, or cause to have prepared, a Ship's Position Report. After the Navigator has signed the Ship's Position Report, deliver the original copy to the CO and embarked staff at the appropriate time. A copy will be placed in a file kept in the chart house. CIC/CDC will also receive a copy. Additionally, the 0800, 1200, and 2000 position will be logged in the Ship's Deck Log. Ensure that correct security classification of the report is indicated. When a senior officer is embarked, provide a copy of each position report to him/her unless otherwise directed.

c. Responsibility for review and approval. The Navigator (or Assistant Navigator if authorized by ship's Navigation Bill) is responsible for reviewing the Ship's Position Reports and will approve them by signature before submission to the CO.

d. Retention. The duplicate Ship's Position Report will be kept by the Navigator as may be convenient, but will not normally be kept beyond the end of the month or duration of the voyage, whichever is greater.

12. Captain's Night Order Book.

a. Purpose. Captain's Night Order Book contains the orders of the CO for the operation and safe navigation of a ship underway during the night.

b. Instructions for Maintenance. The Night Order Book is kept in bound ledger or loose-leaf form. The orders for each night are written on a separate sheet and signed by the CO. They include such items as courses and speeds, expected sightings, engineering data, the tactical situation and composition of the formation, and supplementary orders to the OOD. This book forms a permanent part of the ship's records and shall be kept in a binder with the CO's Standing Orders and other required reading sheets (to be reviewed monthly). Ships may generate a computer copy tailored to their individual characteristics (e.g., Ship's engineering plant/weapons systems).

c. Responsibility. The Navigator is responsible for preparing and submitting the Captain's Night Order Book to the CO for approval.

d. Retention. Keep for twelve months after the last dated entry.

13. Navigation Brief

a. Purpose. To provide a plan for safe and prudent passage, including piloting in restricted waters.

b. Instructions for Maintenance. The Navigator is charged with supervising the preparation and presentation of each Navigation Brief per Appendix B. The Navigator, XO and CO will sign the file copy.

c. Retention. Keep the Navigation Brief on file as required, but not for less than twelve months.

14. Surface Weather Observation Form

a. Purpose. To provide inputs to the weather observation (SYNOPTIC) message.

b. Instructions for Maintenance. If a weather team is not embarked, the Navigator is charged with supervising the preparation of each weather observation form and message IAW NAVMETOCCOMINST 3144.1(Series).

c. Responsibility for Review and Approval. The OOD/METOC Officer/Duty AG will review weather observation messages prior to release.

d. Retention. Keep each weather observation form on file as required, but not for less than six months.

15. Data Recording provided by ECDIS-N.

a. Purpose. ECDIS-N is capable of recording, storing and downloading to removable media certain data elements to allow reconstruction of ship's track and verification of the official database(s) in use. This data does not yet replace existing log requirements but must be maintained to ensure a record of critical information utilized by ECDIS-N is available.

b. Instructions for Maintenance. The Navigator is charged with ensuring all hourly files generated by an ECDIS-N system while underway shall be backed up to a suitable storage medium, such as a CD-R, Zip drive, server-based drive, or a local hard-drive, twice a month at a minimum. Once the last files generated during an underway have been saved, no further downloads are required while inport.

c. Responsibility for Review and Approval. The Navigator is charged with ensuring the electronic backs up requirements are met.

d. Retention. Maintain the electronic back up for not less than twelve months.

APPENDIX A

SQUADRON/GROUP STAFF NAVIGATION ASSESSMENT

1. For a ship to be authorized for unrestricted navigation operations, the ship and crew must successfully complete an Squadron/Group Staff Navigation Assessment based on the checklists included in this appendix. The purpose of a Navigation Assessment (AKA 'Nav Check Ride') is to determine if, in the Squadron/Group Staff's judgment, the ship can safely navigate in Restricted Waters under all conditions. All ships will be assessed against the SQUADRON/GROUP STAFF NAVIGATION ASSESMENT CHECKLIST. Only those ships that are being assessed for unrestricted navigation operations using ECDIS-N will also be assessed against the SQUADRON/GROUP STAFF ECDIS-N NAVIGATION ASSESSMENT CHECKLIST. For ships certified to use ECDIS-N, items in the SQUADRON/GROUP STAFF NAVIGATION ASSESSMENT CHECKLIST that are not applicable will be identified as such.

2. The MINIMUM evolutions included in an Squadron/Group Staff Navigation Assessment are: Harbor Piloting by Gyrocompass; and Low Visibility Piloting. The first evolution allows an evaluation of the Visual plot, normally developed by the Bridge Navigation team. The second evolution allows an evaluation of the RADAR plot developed by the Radar Navigation team or, on an ECDIS-N ship, the RADAR operator reporting to the VMS Plotter. Each Squadron/Group Staff may require additional evolutions if, in the Squadron/Group Staff's judgment, such evolutions are necessary to complete a proper assessment.

3. For SURFOR ships, IAW CNSF Message DTG: 092319ZSEP2010, the following periodicity table will be followed to ensure that all ships are maintaining full navigational capability at all times.

Pierside Time	**STOPLIGHT**	**Requirement**
0 to 29 days	GREEN	Authorized "Unrestricted navigation operations"; standard SQUADRON/GROUP STAFF oversight.
30 to 59 days	YELLOW	SQUADRON/GROUP STAFF will conduct an in-depth review of the ship's navigation to include status of ship's MOB-N CCRs and TFOM proficiency and, if deemed necessary due to proficiency less than 80, conduct SQUADRON/GROUP STAFF Nav Assessment IAW ref l MOB-N CCR MGMT 5 (ECDIS MGMT 11).

90 days or greater	RED	Ship will be placed in restricted operations and the SQUADRON/GROUP STAFF shall embark sufficient personnel to ensure safe navigation. SQUADRON/GROUP STAFF personnel will be required to get underway with the ship until such time that the SQUADRON/GROUP STAFF re-validates that the ship has achieved a level of navigation readiness commensurate with independent operations. At a minimum to be removed from restricted operations, if the ship is in port greater than 90 days, the SQUADRON/GROUP STAFF must validate successful demonstration of the following ref l MOB-N TAB CCRs: PROF 2 (ECDIS PROF 14): PLAN TO NAVIGATE THE SHIP; PROF 4 (ECDIS PROF 16): PILOTING BY GYRO; PROF 5: PILOTING DURING LOW VISIBILITY; PROF 6 (ECDIS PROF 17): PILOTING DURING LOSS OF GYRO; PROF 9 (ECDIS PROF 23): LOSS OF STEERING; PROF 11 (ECDIS PROF 25): RULES OF THE ROAD EXAM; PROF 12 (ECDIS PROF 26): NAVIGATION LEVEL OF KNOWLEDGE EXAMS; PERS 7 (ECDIS PERS 14): BRIDGE RESOURCE MANAGEMENT AND ADVANCED SHIPHANDLING; MGMT 5 (ECDIS MGMT 11): SQUADRON/GROUP STAFF NAV ASSESSMENT.

4. For AIRFOR ships, a failure of an Strike Group Staff Navigation Assessment, a lapsed periodicity (greater than 32 months since last assessment), a grounding or serious navigational error, or an Strike Group Staff determination that the ship is not meeting reasonable ‘safety of ship’ navigation standards, will put the ship into restricted navigation operations. The Strike Group Staff must conduct another Strike Group Staff Navigation Assessment, which the ship must pass, to re-validate that the ship has achieved a level of navigation readiness commensurate for unrestricted navigation operations. Until that time, the Strike Group Staff shall embark sufficient personnel during each underway to ensure safe navigation.

5. Squadron/Group Staff's shall provide a message via the chain of command to the appropriate TYCOM, authorizing the ship for unrestricted navigation operations including the use of ECDIS-N as the primary navigation plot, as appropriate, in accordance with the requirements of this instruction. Sample message is provided on page A-18.

NOTE: For a ship's initial ECDIS-N certification, the Squadron/Group Staff will recommend approval, and the TYCOM will provide a message authorizing unrestricted navigation operations including the use of ECDIS-N, as applicable, in accordance with the requirements of this instruction. Sample message is provided on page A-19.

SQUADRON/GROUP STAFF NAVIGATION ASSESSMENT CHECKLIST

Item	Yes	No	NA
1. Is there a tailored navigation bill signed by the current CO that prescribes responsibilities and procedures for safe navigation of the ship, including navigation in restricted waters during low visibility (Ref OPNAVINST 3120.32C, Art. 630.13)?			
2. Is the Watch, Quarter, and Station bill current, complete, and readily available to navigation personnel (Ref OPNAVINST 3120.32C, Art. 610)?			
3. Does the organization provide for and designate personnel to pilot the ship?			
a. During special sea and anchor detail?			
b. During general quarters?			
c. During low visibility?			
d. During special evolutions?			
4. Are the watch personnel PQS qualified for their assigned positions with appropriate service record entries completed?			
5. Are qualified senior and experienced personnel on the watch bill as watch supervisors and/or assigned to training teams to ensure the thorough and professional performance of the watch teams?			
6. Verify the following logs and records are on board, up to date, and properly maintained:			
a. Deck Log (Ref OPNAVINST 3100.7 Series).			
b. Magnetic Compass Record Book (OPNAVINST 3120.32 Series). **(Not required for DFGMC).**			
c. Bridge-Bridge R/T log. (ref ACP 125(E))			
d. Navigation Workbook (Ref OPNAVINST 3530.3B).			
e. Standard Bearing Book (Ref OPNAVINST 3530.3B).			
f. Ship's Position Log (OPNAV 3100/3).			
g. Weather Observation Log (Ref NAVMETOCCOMINST 3144.1 Series).			
h. Surface Radar Contact Log.			
i. CIC Watch Log.			
j. Radar Navigation Fix Log.			
k. Radar and Visual Navigation Points Listing (Gazetteer).			

Item	Yes	No	NA
7. Is the CO's Night Order Book properly maintained and does it contain a copy of the CO's Standing Orders?			
8. Have ship control personnel (OOD, JOOD, TAO, CICWO, CDCWO, TOPWO, QMOW, EOOW, and BMOW) reviewed and initialed CO's Night Order Book?			
9. Have ship control personnel reviewed and initialed CO's Standing Orders monthly?			
10. Verify the following instructions, documents and references are on board and up to date:			
a. OPNAVINST 3530.3 (Series) (Bearing and Navigation Workbook).			
b. OPNAVINST 3100.7 (Series) (Deck Log).			
c. CINCPACFLTINST 3140.3 (Series) or CINCLANTFLT 3140.9 (Series) Chart and Pub Requirements and DLA R05 Listings.			
d. NAVMETOCCOMINST 3140.1 (Series) Meteorological Support.			
e. NAVMETOCCOMINST 3144.1 (Series) Weather Observation Manual.			
f. Atlas of Pilot charts.			
g. Typhoon/Hurricane Havens Handbook.			
h. Tide and Current tables.			
i. Weekly Notice to Mariners (Hard/electronic copy).			
j. Local Notice to Mariners (Hard/electronic copy).			
k. Summary of Chart/Pub Corrections.			
l. Navigation Safety Messages (Daily Memorandum).			
m. Nautical Almanac.			
n. NGA SRPUB 229 Vol. 1-5, NGA SRPUB 249 Vol. 1-3 (Sight Reduction Tables).			
o. Catalog of Maps, Charts, and Related Products.			
p. COMNAVSURFPACINST 3180.2 (Series) or COMNAVSURFLANTINST 9010.1 (Series) Replenishment Guide.			
q. NGA NAVPUB Pub 9 (Bowditch).			
r. Chart #1 (Chart Symbols).			
s. COMDTINST M16672.2 (Series) Rules of the Road.			
t. Light List, List of Lights.			

Item	Yes	No	NA
u. Coastal Pilots.			
v. Fleet Guide.			
x. Sailing Directions.			
y. Port Directory.			
z. NGA NAVPUB 1310 (Radar NAV Manual).			
aa. NGA NAVPUB 217 (Maneuvering Board Manual).			
ab. NGA RAPUB 117 (Radio NAVAIDS).			
ac. NGA NAVPUB 150 (World Port Index).			
ad. NGA NAVPUB 151 (Distances Between Ports).			
ae. Updated associated publications (technical and operator) for all installed navigational equipment.			
af. Navigation Light Certificate.			
ag. Profile Light Plan.			
ah. Tonnage Certificate/Certificate of Admeasurement.			
ai. Panama Canal Certificate (Auxiliary ships only).			
aj. Total Tides.			
ak. Quarterly CD.			
al. Complete set of current DNCs, plus previous editions. **(ECDIS-N only)**			
am. Current monthly VDU, plus previous month's edition. **(ECDIS-N only)**			
an. NSTM 420, Navigation Systems Equipment and Aids.			
ao. NSTM 422, Navigation and Signal Lights.			
11. Has the Commanding Officer specified, in writing, which ready charts and publications are to be kept and corrected up to date (Ref OPNAVINST 3120.32C, Art. 323 and Art. 630.13.4)?			
12. Verify the following are maintained on board:			
a. Full allowance of chart portfolios Ref CINCPACFLTINST 3140.3 (Series) or CINCLANTFLTINST 3140.9 (Series).			
b. Chart and pub correction tree for the full chart and pub allowance and checked through the latest Notice to Mariners and Local Notice to Mariners.			
13. Are appropriate steering casualty procedures available at all steering stations with individual responsibilities covered?			

Item	Yes	No	NA
14. Are Speed and RPM tables posted at all conning stations?			
15. Was the gyrocompass error and repeater error determined daily, reported to all navigation users, dated, posted on all gyrocompass repeaters, and logged in the Magnetic Compass Record Book and Deck Log?			
16. Was the radar range and bearing error determined prior to getting underway, dated, posted on all radar repeaters, and logged in the Standard Bearing Book and CIC/CDC/TOP Watch/Navigation Log?			
17. Are excerpts from the Act to Prevent Pollution from Ships, 1983 and the Clean Water Act of 1977 available to the OOD (OPNAVINST 5090.1 Series)?			
18. Are ship's tactical data tables available to the OOD and NAV/CIC/CDC plots?			
19. Are (non-laminated) checklists available for the following navigation evolutions:			
a. Leaving/Entering Port?			
b. Low Visibility?			
c. Swept Channel piloting?			
d. Special Evolutions (i.e., Replenishment at Sea, Fueling at Sea, Flight Quarters, etc.)?			
20. Are foreign articles/gear adrift stowed away from all electric and electronic equipment?			
21. Are operating instructions available for all electronic equipment?			
22. Is sufficient emergency lighting in operating condition?			
23. Is the degaussing folder properly maintained and utilized?			
24. Is the following navigation equipment maintained and properly adjusted in accordance with the Preventive Maintenance System (PMS) requirements and applicable technical manuals? If required, are calibration curves or correction tables maintained and checked at prescribed intervals? Is the equipment in satisfactory operating condition? Is the equipment operated in accordance with the applicable technical manuals/operating instructions? Are the watchstanders proficient in the use of the equipment and familiar with its limitations?			
a. Gyrocompass.			

Item	Yes	No	NA
b. Inertial Navigation System.			
c. Gyrocompass alarm.			
d. Gyro repeater benchmark alignment.			
e. Gyro repeaters (error posted and determined daily).			
f. Alidades and bearing/azimuth circles.			
g. Navy Standard Magnetic Compass (NSMC) and/or Digital Flux Gate Magnetic Compass (DFGMC).			
h. GPS Receivers.			
i. NAVSSI.			
j. EM speed log.			
k. Fathometer.			
l. Primary and secondary navigation radar (as applicable).			
m. Bridge/CIC/CDC/TOP radar repeaters (error posted and determined daily).			
n. Fire Control Radar.			
o. Electronic Charting Equipment/ECDIS-N.			
p. DRT/DDRT/CADRT.			
q. 3-arm protractor.			
r. Steering casualty alarm.			
s. Dead Reckoning Analyzer Indicator (DRAI).			
t. Navigation lights/Telltale Panel.			
u. Ship's whistle.			
v. Bell and gong (with lanyards attached).			
w. Degaussing system.			
x. Sextants.			
y. STELLA Program.			
z. Stadimeters.			
aa. At least one ECDIS-N/VMS node operational **(ECDIS-N Only)**.			
ab. At least one ECDIS-N/VMS workstation operational on the bridge. **(ECDIS-N Only)**.			
ac. Barometer (valid calibration sticker/ calibrated semi-annually).			
25. Are the optimum scale charts (paper and DNC®s) available, used at NAV/CIC/CDC/TOP plots, and corrected through the latest Notice to Mariners and local Notice to Mariners?			
26. Verify Bridge and CIC/CDC/TOP navigation charts are properly prepared with:			
a. Tracks labeled with true and magnetic courses, speeds, and distances of each leg.			

Item	Yes	No	NA
b. Turn bearing and ranges based on ship's tactical data and labeled with true and relative bearings and distance to the turn.			
c. Advance and transfer data, based on speed and rudder angle labeled for each turn.			
d. Danger bearings and/or ranges where dangers and shoal water are not marked by NAVAIDS.			
e. Chart shift points (Bridge and CIC/CDC shift points will not occur simultaneously).			
f. Shoal water and isolated dangers highlighted IAW ship’s navigation standards.			
g. Signature box for "prepared by," “reviewed by,” "submitted by," and "approved by."			
h. Visual and radar navigation points identical for Bridge and CIC/CDC/TOP and indexed in the Standard Bearing Book and CIC/CDC Navigation Log.			
i. Slide bar annotated on all turns.			
j. Local speed restrictions annotated.			
k. Range Scales (as appropriate).			
l. Tide and Current stations being used annotated on the chart?			
m. Datum in the GPS receiver adjusted to match datum on chart?			
n. Speed triangle annotated?			
o. Correction tree labeled on chart?			
27. Was the ship's draft determined and logged in the Deck Log before leaving/entering port?			
28. Are communications on the navigation circuits checked before leaving/entering port?			
29. Was a time check conducted over the 1MC circuit before transiting restricted waters and logged in the Deck Log?			
30. Are tides and currents graphed and posted at all navigation stations for each reference station passed and computations entered in the Navigation Workbook or loose leaf binder for computer program generated tide calculation?			
31. Are navigation briefs held within 24 hours of transiting restricted waters?			
32. Are the Bridge-To-Bridge R/T operational and tested before leaving/entering port and results documented in the R/T log? (ACP 125 (E))			

Item	Yes	No	NA
33. During piloting, are fixes taken as the situation dictates IAW table 3-A of this instruction?			
34. Are visual/radar/composite fixes properly labeled and contain at least three LOPs?			
35. Are DRs laid out from each fix at least two fix intervals, including beyond a turn, and labeled with times (Regardless of whether on track or not)? **(Non ECDIS-N only)**			
36. Is set and drift determined once on track legs less than 1500 yards and every third fix on longer legs and logged in the Deck Log? **(Non ECDIS-N only)**			
37. Are CIC/CDC fixes taken concurrently with the Bridge? **(Non ECDIS-N only)**			
38. Is CIC/CDC fix information reported to the Bridge in the format of the Navigation Evaluator's report? **(Non ECDIS-N only)**			
39. Is radar repeater error, gyro error, and gyro repeater error applied when plotting fixes? **(Non ECDIS-N only)**			
40. Do the Navigation Evaluator's fix reports to the Conn include the following information:			
a. Fix time?			
b. Fix/EP?			
c. Fix method if other than primary means (i.e., Bridge visual, CIC/CDC radar, etc.)?			
d. Fix position in relation to proposed track?			
e. Nearest hazard to navigation?			
f. Nearest aid to navigation?			
g. Corrected Fathometer sounding?			
h. Distance and time to next turn?			
i. Course on next turn (reported each leg and updated as Changes occur)?			
j. Any recommendation to regain/maintain proposed track?			
k. Computed set and drift (once on each leg when less than 1500 yards and every third fix for legs greater than 1500 yards)?			
l. The phrase " CIC/CDC concur(s)", "CIC/CDC do/does not concur", or "CIC/CDC have/has no fix?" **(Non ECDIS-N only)**			

Item	Yes	No	NA
m. The phrase "GPS/visual/RADAR (does not) concurs with GPS/visual/RADAR fix", to include the Figure Of Merit?			
41. Is there effective information flow between the Conn, CIC, and the Navigator regarding the piloting situation, ship's course and speed, and deviations from the proposed track?			
42. Are set and drift, and advance and transfer applied when making course recommendations?			
43. Are new courses searched for shipping before turning and a report made to the Conn?			
44. If two successive fix intervals, from primary plot, result in no fix, is appropriate action taken, such as slowing to bare steerageway or stopping, until a fix is obtained?			
45. Does the Navigator/Navigation Evaluator inform the Conn when to use International/Inland Navigation Rules?			
46. Is the low visibility watch bill published before getting underway to facilitate immediate implementation?			
47. Under conditions of low visibility, did the OOD/JOOD order:			
a. Qualified Lookouts?			
b. Anchor(s) to be manned and ready for letting go when in restricted waters?			
c. Material condition Zebra to be set on the DC deck and below (CO's discretion)?			
d. Navigation lights energized?			
e. Silence on the bridge, all hands on bridge to listen for and report sound signals?			
f. Appropriate fog signal sounded per the Navigation Rules?			
g. A safe speed per the Navigation Rules of the Road?			
h. All uncorrelated fog signals identified and a determination made that a risk of collision did not exist before the ship proceeded on?			

SQUADRON/GROUP STAFF ECDIS-N NAVIGATION ASSESSMENT CHECKLIST

Knowledge or Skill Standard (Only 3 operators for PC/MCM)	Nav	Sr QM/OS	VMS Op	VMS Op	VMS Op
A1. Completed VMS Operator Course CIN A-061-0042	YES NO	YES NO	YES NO	YES NO	YES NO
A2. Explain the requirements of the back-up plot	YES NO	YES NO	YES NO	YES NO	YES NO
B. SYSTEM SET UP- Can the Operator:					
Set up Sensor Inputs: B1. Heading (HDG)	YES NO	YES NO	YES NO	YES NO	YES NO
B2. Ground Speed (SOG)	YES NO	YES NO	YES NO	YES NO	YES NO
B3. Speed through the Water (STW)	YES NO	YES NO	YES NO	YES NO	YES NO
B4. Position (POS)	YES NO	YES NO	YES NO	YES NO	YES NO
B5. Fathometer	YES NO	YES NO	YES NO	YES NO	YES NO
Validate Input/Setting of: B6. Set and Drift	YES NO	YES NO	YES NO	YES NO	YES NO
B7. Time and Time Zone	YES NO	YES NO	YES NO	YES NO	YES NO
B8. Datum	YES NO	YES NO	YES NO	YES NO	YES NO
B9. Magnetic Variation	YES NO	YES NO	YES NO	YES NO	YES NO
B10. History Display	YES NO	YES NO	YES NO	YES NO	YES NO
B11. Set up the Features IAW NAVDORM/ ship's NAV Bill/ CO's Standing Orders	YES NO	YES NO	YES NO	YES NO	YES NO
B12. Set up the Safety Configuration IAW NAVDORM/ ship's NAV Bill/ CO's Standing Orders	YES NO	YES NO	YES NO	YES NO	YES NO
B13. Determine when an input has been lost/degraded	YES NO	YES NO	YES NO	YES NO	YES NO
B14. Recall ship's history data (time, position, heading, and speed at 1-min intervals)	YES NO	YES NO	YES NO	YES NO	YES NO

Knowledge or Skill Standard	Nav	Sr QM/OS	VMS Op	VMS Op	VMS Op
C. CHARTS- Can the Operator:					
C1. Identify a Planning Sheet	YES NO	YES NO	YES NO	YES NO	YES NO
C2. Use the Chart Catalog to identify / load a chart	YES NO	YES NO	YES NO	YES NO	YES NO
C3. Identify the latest edition of DNC for the local area	YES NO	YES NO	YES NO	YES NO	YES NO
C4. Identify the latest edition of TOD0 for the local area	YES NO	YES NO	YES NO	YES NO	YES NO
C5. Load a DNC (only one library required)	YES NO	YES NO	YES NO	YES NO	YES NO
C6. Load TOD0	YES NO	YES NO	YES NO	YES NO	YES NO
C7. Validate that the current local area SDNC is corrected up-to-date	YES NO	YES NO	YES NO	YES NO	YES NO
C8. Discuss what indications are received if the SDNC is out of date	YES NO	YES NO	YES NO	YES NO	YES NO
C9. Apply a VDU Correction to an uncorrected DNC (only one library required)	YES NO	YES NO	YES NO	YES NO	YES NO
C10. Display updates for review and determine if they have been included in the SDNC	YES NO	YES NO	YES NO	YES NO	YES NO
C11. Verify update was applied correctly	YES NO	YES NO	YES NO	YES NO	YES NO
C12. Add a manual correction from a Local Notice to Mariners	YES NO	YES NO	YES NO	YES NO	YES NO
C13. Remove a manual correction	YES NO	YES NO	YES NO	YES NO	YES NO
C14. Display the record of updates	YES NO	YES NO	YES NO	YES NO	YES NO
C15. Display the log file of accepted/rejected corrections	YES NO	YES NO	YES NO	YES NO	YES NO
C16. Add a chart overlay	YES NO	YES NO	YES NO	YES NO	YES NO
C17. Add an area overlay	YES NO	YES NO	YES NO	YES NO	YES NO

Knowledge or Skill Standard	Nav	Sr QM/OS	VMS Op	VMS Op	VMS Op
C18. Create a Danger Area and an Informational Mariner Object for the scenario area, and attach to a Layer	YES NO	YES NO	YES NO	YES NO	YES NO
C19. Attach the Layer to the Harbor chart of the scenario area	YES NO	YES NO	YES NO	YES NO	YES NO
C20. Create a chart portfolio for the scenario area suitable for going from pier to sea	YES NO	YES NO	YES NO	YES NO	YES NO
D. DISPLAY- Can the Operator:					
D1. Present a standard display at any time with a single operator action	YES NO	YES NO	YES NO	YES NO	YES NO
D2. Present a base display	YES NO	YES NO	YES NO	YES NO	YES NO
D3. Present all other display settings	YES NO	YES NO	YES NO	YES NO	YES NO
D4. Set display defaults, and retrieve defaults	YES NO	YES NO	YES NO	YES NO	YES NO
D5. Change the ship symbol to Outline	YES NO	YES NO	YES NO	YES NO	YES NO
D6. Verify an 'Overscale' chart	YES NO	YES NO	YES NO	YES NO	YES NO
D7. Verify an 'Underscale' chart	YES NO	YES NO	YES NO	YES NO	YES NO
D8. Verify the Figure of Merit	YES NO	YES NO	YES NO	YES NO	YES NO
D9. Input a geographic coordinate and display that position	YES NO	YES NO	YES NO	YES NO	YES NO
D10. Change the True Motion Center	YES NO	YES NO	YES NO	YES NO	YES NO
D11. Change Center Area	YES NO	YES NO	YES NO	YES NO	YES NO
D12. Reset Center Area	YES NO	YES NO	YES NO	YES NO	YES NO
D13. Manually change the chart area and position of the ship relative to the edge of the display?	YES NO	YES NO	YES NO	YES NO	YES NO

Knowledge or Skill Standard	Nav	Sr QM/OS	VMS Op	VMS Op	VMS Op
E. SPECIAL EVENTS- Can the Operator:					
E1. Enter an Event mark	YES NO	YES NO	YES NO	YES NO	YES NO
E2. Enter a Man Overboard	YES NO	YES NO	YES NO	YES NO	YES NO
E3. Clear a Man Overboard	YES NO	YES NO	YES NO	YES NO	YES NO
F. NAVIGATION INFO- Can the Operator:					
F1. Query a point (i.e. sounding, wreck) an area (i.e. TSS, no-fishing) a layer object (i.e. manual correction, chart overlay) and determine the critical info for each	YES NO	YES NO	YES NO	YES NO	YES NO
F2. Add radar to the VMS display	YES NO	YES NO	YES NO	YES NO	YES NO
F3. Verify the radar/chart alignment	YES NO	YES NO	YES NO	YES NO	YES NO
F4. Display the radar contact vectors in True and Relative	YES NO	YES NO	YES NO	YES NO	YES NO
F5. Remove the radar with a single operator action	YES NO	YES NO	YES NO	YES NO	YES NO
F6. Obtain range and bearing from three non-NAVAID conspicuous objects	YES NO	YES NO	YES NO	YES NO	YES NO
F7. Enable Visual/Radar NAVAIDs	YES NO	YES NO	YES NO	YES NO	YES NO
F8. Create a three-LOP visual fix with true bearings	YES NO	YES NO	YES NO	YES NO	YES NO
F9. Create a three-LOP visual fix with relative bearings	YES NO	YES NO	YES NO	YES NO	YES NO
F10. Create a three-LOP radar fix	YES NO	YES NO	YES NO	YES NO	YES NO
F11. Create a three-LOP composite Fix	YES NO	YES NO	YES NO	YES NO	YES NO
F12. Display the ships' assumed position and LOP's	YES NO	YES NO	YES NO	YES NO	YES NO
F13. Compare a fix from GPS and an EP generated from a visual/radar/composite fix	YES NO	YES NO	YES NO	YES NO	YES NO

Knowledge or Skill Standard	Nav	Sr QM/OS	VMS Op	VMS Op	VMS Op
F14. Build a Precision Anchorage	YES NO	YES NO	YES NO	YES NO	YES NO
F15. Determine and enter appropriate values for the Anchor Swing and Drag Circles	YES NO	YES NO	YES NO	YES NO	YES NO
G. VOYAGE PLANNING/MONITORING (Out of Home Port scenario) - Can the Operator:					
G1. Create a (minimum) of five-waypoints, two-turn Navigation Plan which uses the scenario chart portfolio and crosses at least one chart boundary	YES NO	YES NO	YES NO	YES NO	YES NO
G2. Enter a Critical Point at the chart boundary, with suitable text	YES NO	YES NO	YES NO	YES NO	YES NO
G3. Enter a Critical Point for a CPA with the safety contour, with suitable text	YES NO	YES NO	YES NO	YES NO	YES NO
G4. Create a Voyage Plan with the scenario objects	YES NO	YES NO	YES NO	YES NO	YES NO
G5. Successfully validate the Voyage Plan	YES NO	YES NO	YES NO	YES NO	YES NO
G6. Explain/demonstrate the approval of a Voyage and Navigation Plan	DEMO YES NO	DEMO YES NO	EXPL YES NO	EXPL YES NO	EXPL YES NO
G7. Explain/Identify the Cross Track Error alarm	YES NO	YES NO	YES NO	YES NO	YES NO
G8. Identify when the chart isn't using the WGS-84 datum	YES NO	YES NO	YES NO	YES NO	YES NO
G9. Explain why a Slide Line may not show up on the display	YES NO	YES NO	YES NO	YES NO	YES NO
H. UNDERWAY DEMO (Home Port) Can the Operator:					
H1. Conduct a proper Navigation Brief	YES NO	NA	NA	NA	NA
H2. Ensure the Primary plot is properly maintained	YES NO	YES NO	YES NO	YES NO	YES NO
H3. Ensure the Back-up plot is properly maintained	YES NO	YES NO	YES NO	YES NO	YES NO
H4. Load, start, stop and clear a Voyage Plan	YES NO	YES NO	YES NO	YES NO	YES NO

Knowledge or Skill Standard	Nav	Sr QM/OS	VMS Op	VMS Op	VMS Op
H5. Load and clear a Navigation Plan	YES NO	YES NO	YES NO	YES NO	YES NO
H6. Load and clear a PIM/MHN Plan	YES NO	YES NO	YES NO	YES NO	YES NO
H7. Change displayed Vector Length	YES NO	YES NO	YES NO	YES NO	YES NO
H8. Add a Temporary Track to a loaded Navigation Plan?	YES NO	YES NO	YES NO	YES NO	YES NO
H9. Explain/demonstrate the Return To Plan function	DEMO YES NO	DEMO YES NO	EXPL YES NO	EXPL YES NO	EXPL YES NO
H10. Detect/explain Critical and Non-Critical Alarms	YES NO	YES NO	YES NO	YES NO	YES NO
H11. Demonstrate use of ECDIS-N with a simulated failure of GPS IAW ship's NAV Bill /CO's Standing Orders	YES NO	YES NO	YES NO	YES NO	YES NO
H12. Transfer to the back-up plot within three minutes IAW ship's NAV Bill /CO's Standing Orders	YES NO	YES NO	YES NO	YES NO	YES NO
H13. Identify Valid and Invalid Sensors	YES NO	YES NO	YES NO	YES NO	YES NO
H14. Plot 10 non-GPS fixes? (5 fixes must be visual only, 5 fixes must include at least 2 radar LOPs.)	YES NO	YES NO	YES NO	YES NO	YES NO

Example Squadron/Group Staff Navigation Assessment Qualification Report (non-ECDIS-N)

ADMINISTRATIVE MESSAGE
ROUTINE

R XXXXXXZ FEB 07
FM SQUADRON/GROUP STAFF
TO APPROPRIATE TYCOM//N7//
USS SHIP

INFO CNO WASHINGTON DC//N63/N633/N84//
COMLANTFLT NORFOLK VA or
COMPACFLT PEARL HARBOR HI//N3/N37/N435/N66/N72//
APPROPRIATE NUMBERED FLEET COMMANDER
APPROPRIATE AFLOAT TRAINING GROUP
APPROPRIATE CLASSRON (SURFOR SHIPS ONLY)

BT

UNCLAS //N03530//
MSGID/GENADMIN/SQUADRON/GROUP STAFF /-/MONTH//
SUBJ/USS SHIP (HULL NUMBER) NAVIGATION ASSESSMENT QUALIFICATION REPORT//

REF/A/DOC/CNAF-CNSF/DDMMMYY//

NARR/REF A IS CNAF-CNSFINST 3530.4C NAVDORM.//

RMKS/1. IAW REF A USS SHIP CREW PROFICIENCY NAVIGATION ASSESSMENT WAS COMPLETED ON DD MMM YY. DETAILS OF THE ASSESSMENT WERE DISCUSSED WITH THE COMMANDING OFFICER.
2. USS SHIP IS RECOMMENDED FOR UNRESTRICTED NAVIGATION OPERATIONS.//
BT
NNNN

Example Squadron/Group Staff Navigation Assessment Qualification Report (ECDIS-N)

ADMINISTRATIVE MESSAGE
ROUTINE

R XXXXXXZ FEB 07
FM SQUADRON/GROUP STAFF
TO APPROPRIATE TYCOM//N7//
USS SHIP

INFO CNO WASHINGTON DC//N63/N633/N84//
COMLANTFLT NORFOLK VA or
COMPACFLT PEARL HARBOR HI//N3/N37/N435/N66/N72//
APPROPRIATE NUMBERED FLEET COMMANDER
APPROPRIATE AFLOAT TRAINING GROUP
APPROPRIATE CLASSRON (SURFOR SHIPS ONLY)
COMNAVSURFPAC SAN DIEGO CA//N7//
COMNAVAIRLANT NORFOLK VA//N7//

BT

UNCLAS //N03530//
MSGID/GENADMIN/SQUADRON/GROUP STAFF /-/MONTH//
SUBJ/USS SHIP (HULL NUMBER) ECDIS-N NAVIGATION ASSESSMENT QUALIFICATION REPORT//

REF/A/DOC/OPNAV/15FEB01//
REF/B/GENADMIN/SPAWAR/XXXXXXZMMMYY//
REF/C/DOC/CNAF-CNSF/DDMMMYY//

NARR/REF A IS OPNAVINST 9420.2 IMPLEMENTATION OF ECDIS-N CERTIFICATION PROCESS. REF B IS NAVCERT MSG. REF C IS CNAF-CNSFINST 3530.4C NAVDORM.//

RMKS/1. IAW REF A, USS SHIP NAVIGATION EQUIPMENT CERTIFICATION WAS COMPLETED BY SPAWAR SYSTEMS CENTER ATLANTIC ON DD MMM YY AND IS DOCUMENTED AS REF B.
2. IAW REF C, A CREW PROFICIENCY SQUADRON/GROUP STAFF NAVIGATION ASSESSMENT WAS COMPLETED ON DD MMM YY. DETAILS OF THE ASSESSMENT WERE DISCUSSED WITH THE COMMANDING OFFICER.
3. IAW REF C, USS SHIP IS RECOMMENDED FOR UNRESTRICTED NAVIGATION OPERATIONS USING ECDIS-N.//
BT
NNNN

APPENDIX B

NAVIGATION BRIEF

1. Required Attendance (signed muster required):

   a. Commanding Officer
   b. Executive Officer
   c. Operations Officer
   d. Navigator
   e. Engineer Officer
   f. Reactor Officer (when assigned)
   g. First Lieutenant
   h. CIC/CDC Officer
   i. Assistant Navigator (when assigned)
   j. CIC/CDC Surface Watch Officer
   k. Piloting and Shipping Officers
   l. METOC Officer/AG (when assigned)
   m. Helm Safety Officer
   n. Aft Steering Safety Officer
   o. Bridge Sea and Anchor Detail Team
   p. Helm/Lee Helm
   q. Senior QM and OS
   r. Staff Surface Operations Officer (when assigned)
   s. Other personnel as directed

2. Contents of brief: (All items must be briefed, not necessarily in this order)

   a. Arrival/departure time – Navigator

      (1) Consideration of options
          (a) Tides
          (b) Currents
          (c) Speed Restrictions

      (2) Operational Requirements
          (a) Conditions of readiness
          (b) Tactical situation

   b. Weather - Geophysics Officer/AG/Navigator

   c. Tides/currents – Navigator

      (1) Tides graphed using the Quarter/Tenth method, or printed from an approved electronic program, for the complete day.

(2) Currents graphed using straight-line method, or printed from an approved electronic program, for the complete day.

(3) Ebb/Flood velocity and directions at maximum velocity noted on graph. Tides/Currents readily available at all ship control stations with copies to CO, XO, NAV, OOD, Conning Officer, etc. Tables do not have to be physically 'posted'.

d. Astronomical data – Navigator: Sunrise, sunset, moonrise, and moonset, lunar illumination

e. Charts – Navigator

(1) Latest editions with corrections verified (paper and/or DNC®)
(2) Corrections/changes since last brief
(3) Type of buoyage system
(4) GPS Datum to be used with each chart
(5) Chart numbers to be used

f. Track - Conning Officer

(1) Courses/distance/speeds
(2) Danger bearings and ranges
(3) Designated shoal water and danger soundings
(4) Depth/width of channel, turning basin, etc
(5) Shallow water effects (if applicable)
(6) Significant NAVAIDS, terrestrial ranges
(7) Vessel traffic separation scheme/check in/out points
(8) Line of Demarcation
(9) Degaussing area
(10) Anticipated traffic
(11) Pier heading
(12) Description of anchorage or mooring
(13) Type of bottom (anchorage)
(14) Head/drop bearings (anchorage)
(15) Amount of anchor chain required (anchorage)
(16) Entering/exiting precautionary areas
(17) Rudder angles and speeds
(18) Pilot pick-up/drop off plan
(19) Shiphandling Plan (i.e., tug usage, environmentals, maneuvering)

g. Ground tackle - First Lieutenant

(1) Ready anchor - port/stbd/centerline

(2) Scope of chain
(3) Status of windlass/winches
(4) Special mooring buoy procedures
(5) Mooring plan
(6) Method of letting go/weighing the anchor
(7) Ready life boat status
(8) Boats in the water
(9) Accommodation ladder up/down

h. Operational considerations - Operations Officer

(1) Entering/Departing movements (military/civilian)
(2) Harbor special events
(3) Media coverage
(4) Flight ops (FOD/VERTREP/PAX Transfer)
(5) Hot areas

i. Tugs and pilots – Navigator

(1) Tug/Pilot (Harbor/Bar) pick up/drop off arrangements
(2) Communications

j. Status of nav equipment – Navigator

(1) Compass/Repeater errors
(2) Degraded/OOC equipment, impact, and ETR
(3) Backup systems
(4) ECDIS-N/Situational Awareness system
(5) Navigation/Surface radars

k. Status of engineering plant - Engineer Officer (or Reactor Officer)

(1) Plant status/configuration
(2) Limiting casualties
(3) Degaussing monitors
(4) Steering Gear status

l. Special considerations/events – Navigator

(1) Honors
(2) Flag Officer movements
(3) Visitors
(4) Harbor exercises
(5) Debrief/Hot wash-up schedule
(6) Uniform
(7) Watchbill

m. Emergencies – OOD

(1) Steering/Engineering casualties
(2) Man overboard
(3) Loss of gyros/RADAR/communications
(4) Reduced visibility
(5) Emergency anchorage locations

n. Force protection plan – WEPS/Force Protection Officer

(1) Small Craft Action Team (SCAT) status
(2) Small boat escorts
(3) Pre-Planned responses (PPR's)
(4) Communication plan

o. Risk assessment/ORM - Navigator/Safety Officer

(1) Collision
(2) Grounding
(3) Navigation equipment malfunction
(4) Communications failure
(5) Man overboard
(6) Breakdown in Bridge Resource Management
(7) Steering/Propulsion casualty
(8) Lessons Learned

3. Review/retention

a. At the completion of the Navigation Brief the Navigator will sign and forward the original brief cover letter for approval.

b. Forward to the XO for signature, and forward to CO for approval.

c. CO will approve and sign.

d. Navigator will maintain file copy of brief, signed muster sheet, tides and currents, and watchbill as required, but not less than twelve months.

APPENDIX C

SAMPLE CHECKLISTS

1. Checklists. Consideration shall be given to the following samples, at a minimum, when developing checklists. The chronological sequence and timeline of events shall be determined by the individual command.

GETTING UNDERWAY CHECKLIST

Event	COG	Initials
When Conditions are met Prior to Getting Underway		
1. Energize master gyrocompass/Inertial Navigation System in accordance with CSOSS and/or technical manual requirements.	ENG/CSO duty IC/ET	
2. DEFRAG VMS Hard drives (Ships equipped with VMS)	CSO duty IC/ET	
24 Hours Prior to Getting Underway		
3. Conduct navigation brief.	NAV	
4. Assume radio guard.	OPS	
5. Arrange for tugs/line handlers.	OPS	
6. Verify schedule for lighting off the plant	ENG/REAC	
7. Notify ships in nest.	OPS	
8. Check OPORD for required reports.	OPS	
9. Verify lifeboat assignment list is current and posted	OPS	
10. Complete all pre-underway steering gear PMS checks.	AUXO	
2 Hours Prior to Getting Underway		
11. Ascertain from the XO:	OOD	
a. If any variation in the standard time for stationing the Special Sea and Anchor detail.	OOD	
b. Disposition of boats.	OOD	
c. Instructions concerning U.S. and guard mail.	OOD	
d. Number of passengers and time of arrival.	OOD	
e. Uniform for getting underway.	OOD	
12. Start hoisting boats when OOD no longer requires their use, after obtaining permission of the XO/CO.	OOD	

Event	COG	Initials
13. Rig in booms and accommodation ladders and secure them for sea, after obtaining permission of the XO.	OOD	
14. Have the word passed giving time for getting underway	OOD	
15. Energize and check all CIC/CDC/TOP equipment.	CICO/ CDCO	
16. Conduct radio checks.	COMMO	
17. Shift from shore power to ship's power.	ENG/REAC	
18. Check all gyro repeaters against master gyro and report error.	NAV	
19. Adjust bridge radar repeaters.	OOD/CICO	
1 Hour Prior to Getting Underway		
20. Set appropriate material condition.	DCA/ DCPOs	
21. Clear ship of visitors and inspect for stowaways.	CMAA	
22. Postal Clerk makes last mail run.	LS	
23. Ascertain time for heaving around on anchor chain or taking in lines.	CDO/OPS	
24. Check power source, switch operation, oil level, and manual/electric brakes on Anchor Windlass.	ELECO	
25. Pass word, "All hands shift into the uniform for getting underway."	OOD	
26. Muster the crew on station.	DIVO	
30 to 60 Minutes Prior to Getting Underway		
27. Pass word, "Go to your stations all special sea and anchor detail" (twice). When relieved by the OOD underway pass the word, "The Officer of the Deck has shifted his watch from the Quarterdeck to the Pilot House."	OOD inport	
28. Man after steering and the pilot house. Safety test steering gear, communications, and emergency alarms.	OOD/ENG/ Helm	
29. Test engine order telegraph and revolution indicator.	OOD/ENG/ HSO	
30. Test navigation lights.	OOD	
31. Manned and ready reports from the following stations:	OOD	
	Forecastle	
	Fantail	
	Amidships	
	Signal Bridge	

Event	COG	Initials
	Pilot House	
	Main Control/CCS	
	CIC/CDC/TOP/MCC	
	After Steering	
	Fire Control	
32. Test Fathometer.	NAV/ASWO	
33. Test sound powered phone circuits.	OOD	
34. Receive departmental reports of readiness for sea:	OOD	
	OPS	
	WEPS/CBS	
	SUPPLY	
	ENG/REAC	
	NAV/ADMIN	
35. Record ship's draft both fore and aft.	DCA	
36. Direct main control to report when main engines are ready to be tested. Upon receipt of this report, obtain permission from the Commanding Officer to test the main engines and direct main control, accordingly. A qualified OOD underway must be on the bridge when testing the main engines. In particular, he shall ensure the stern area is clear, all mooring lines are double and properly secured, and the brow is in such a position that if the ship moves the brow will not be damaged.	OOD	
37. Disconnect utility lines from the pier with the exception of phone line.	ENG	
38. Complete all SSDG pre-underway PMS checks.	AUXO	
15 to 30 Minutes Prior to Getting Underway		
39. Rig in booms and davits as boats are hoisted or cleared away.	1st LT	
40. Request permission to get underway from SOPA.	OOD	
41. Test ship's whistle.	OOD	
42. Alarms set to "at sea" position.	ELECO	
43. Test gyro (failure) alarm.	ELECO	
44. Test hand-held radios (bridge/fantail/forecastle)	COMMO	
Within 15 Minutes Prior to Getting Underway		
45. Disconnect phone lines.	Duty IC	
46. Rig in brow.	OOD	
47. If moored to a buoy, take in chain or wire and ride to manila lines when directed.	OOD	

Event	COG	Initials
48. Report, "Ready to answer all bells."	ENG	
49. Pass word, "All hands topside fall into port/starboard for getting underway."	OOD	
50. Report ready to get underway to the XO, who will report to the CO.	OOD	
Immediately prior to getting underway		
51. Set Restricted Maneuvering in Main Control.	OOD	
52. Inform Main Control to, "Stand by to answer all bells."	OOD	
53. Make SECURITE call.	JOOD	
54. Log completion of checklist in the ship's Deck Log and deliver to the navigator	OOD	

ENTERING PORT/RESTRICTED WATERS CHECKLIST

INBOUND:_____

DATE:_____

Event	COG	Initials
When Conditions are met Prior to Entering Port/Restricted Waters		
1. Pump bilges prior to 50 NM limit (CO permission required).	EOOW/ OOD	
2. Cease dumping of shreddable metal & glass prior to 12 NM from land.	SUPPO/ OOD	
24 – 12 Hours Prior to Entering Port/Restricted Waters		
3. Conduct Navigation Brief.	NAV	
4. Conduct Intentional Auto-Compensation of DFGMC.	OOD	
5. Review radar radiation restrictions for the local area; brief at Nav Brief.	FCO	
When Conditions are met Prior to Entering Port/Restricted Waters		
6. Display speed flags.	OOD	
7. 45 minutes prior to approaching land to within 12 NM, inform EOOW to secure distilling water.	OOD/ NAV	
8. Prior to approaching land to within 10 NM, pass the word: "Station the Modified Navigation Detail". Ensure the detail is manned and ready at 10 NM point.	OOD/ NAV	
9. Prior to approaching land within 10 NM, pass the word: "Station the Sea and Anchor Detail. Station the Restricted Maneuvering Detail."	OOD	
2 Hours Prior to Entering Port/Restricted Waters		
10. Lay out mooring lines and raise jackstaff and flagstaff.	1st LT	
11. Confirm pilot/tug services.	OPS	
12. Clean bridge windows.	NAV/ BMOW	
13. Centerline and safe weapons systems as appropriate.	TAO/ WEPS	
14. Ensure VHF bridge to bridge radio is operational.	OOD	
15. Rig accomodation/boat/pilot ladder as necessary.	1st LT	
1.5 Hours Prior to Entering Port/Restricted Waters		

Event	COG	Initials
16. Test ship's whistle (CO permission required). Ensure no personnel aloft.	OOD	
17. Verify bull horn, wood chips and chemical lights are available on bridge wing.	JOOD	
18. Set up bridge wing communications: BTB radio remote, bridge wing sound-powered phone to SCU.	QMOW	
19. Conduct time check on 1MC.	QMOW	
20. Deliver Draft Report to OOD.	DCA	
21. Compute: a. True wind _____ b. Set/drift _____ c. Water depth at anchorage _____ d. Type bottom at anchorage _____	NAV	
22. Update gyro error on all gyro repeaters.	NAV	
23. Provide tide and current information.	NAV	
1 Hour Prior to Entering Port/Restricted Waters		
24. Order CCS to full power.	OOD	
25. Conform to local Radar radiation restrictions.	CSC	
26. Review EOCC for loss of steering procedures.	OOD/ Helm/ Aft St	
27. Shine bell.	SUPPO/ Inport OOD	
28. Shift pit sword to dummy log.	CSOOW	
29. Pass the word: "Check the setting of material condition Yoke; make reports to CCS".	DCA/ OOD	
When Conditions are met Prior to Entering Port/Restricted Waters		
30. 15 minutes prior to approaching land to within 3 NM, inform CCS to place VCHT in transit mode.	OOD/ NAV	
31. Pass the word: "All departments make readiness for entering port reports to the Executive Officer on the bridge. "Ship Name" will (anchor/moor) (port/stbd) side to at (anchorage/ pier/berth)".	OOD	

Event	COG	Initials
32. Pass the word: "All hands shift into the uniform for entering port. The uniform for entering port is _____ for officers and chief petty officers and _____ for E-6 and below".	OOD	
33. Make anchor ready for use.	1st LT	
34. Establish comms and request permission to enter port from proper authority (as required).	OOD	
35. When IVO harbor/port, issue securite call: "Securite, Securite, Securite. This is U.S. Navy Warship ?? inbound IVO _____, bound for _____ (harbor/port, berth/pier), standing by Channels _____ for any concerned traffic, out."	TACCOM	
30 Minutes Prior to Entering Port/Restricted Waters		
36. Receive manned and ready reports:	XO	
	Operations	
	WEPS/CBS	
	Engineering	
	Navigation/Admin	
	Supply	
37. Start off-line HPUs.	OOD	
15 Minutes Prior to Entering Port/Restricted Waters		
38. Receive manned and ready reports:	OOD	
	Nav Team	
	Signal Bridge	
	After Steering	
	CIC/CDC/TOP/MCC	
	Forecastle	
	Fantail	
	Midships	
	Anchor Windlass	
	CCS	
	CSMC	
39. Report "Ship manned and ready for entering restricted waters" to the Commanding Officer (Deck log entry required).	XO	
40. Place Restricted Maneuvering Doctrine in effect (CO permission required). If permission granted, pass the word: "Restricted Maneuvering Doctrine is in effect."	OOD	

Event	COG	Initials
In Restricted Waters		
41. Secure TACAN and IFF.	CSC	
42. Display international call sign.	OOD	
30 Minutes prior to mooring or anchoring		
43. Station the quarterdeck watch.	SUPPO	
44. Station line handlers.	OOD	
15 Minutes prior to mooring or anchoring		
45. Embark pilot and display Code Hotel.	OOD	
46. Prepare to receive tugs.	OOD/ 1st LT	
47. If mooring to a buoy, lower boat when directed.	OOD/ 1st LT	
48. Pass the word: "Fall in to quarters for entering port".	OOD	
2 Minutes prior to mooring or anchoring		
49. Pass to foc'sle and fantail: "Line handlers, stand by your lines".	OOD	
Moored or Anchored		
50. Pass the word: "Moored/anchored".	BMOW	
51. "Secure the Restricted Maneuvering Doctrine."	OOD	
52. Pass the word: "Secure the Navigation Detail."	OOD	
53. Shift to inport disk packs (Ships with SPY-1D).	CSOOW	
54. Rig accommodation ladder/brow/boats, as required.	OOD	
55. Transmit arrival MOVREP.	OPS	
56. Turn over Bridge CMS to CICWS/CDCWS for transfer to CMS Custodian.	NAV	
57. Conduct final inventory, lock safe and sign SF702.	NAV	
58. CICWS turn in Bridge/CIC/CDC/TOP/MCC CMS to CMS Custodian.	CICWS	
59. Secure steering units.	OOD/ EOOW	
60. Secure main engines (CO permission required).	OOD/ EOOW	

Event	COG	Initials
61. Pass the word: "Secure the Sea and Anchor Detail. Secure the Restricted Maneuvering Detail."	OOD	
62. Pass the word: "The Officer of the Deck is shifting the watch from the Bridge to the Quarterdeck." (Send deck log, ship's bell, transfer control of 1MC to quarterdeck).	OOD	
63. Shift DL alarms, emergency IVCS number and FZ alarm to Quarterdeck.	CSOOW	
64. Deliver completed checklist to Navigator for review and log completion in Ship's Deck Log.	QMOW	

_____ _____

Navigator Signature Date

LOW VISIBILITY CHECKLIST

Event	COG	Initials
1. Log commencement of Low Visibility Checklist		
2. Station the low visibility detail.		
3. Order, "SET MATERIAL CONDITION ZEBRA MAIN DECK AND BELOW" (CO's discretion).		
4. Energize navigation lights in BRIGHT.		
5. Order, "SILENCE ON THE BRIDGE."		
6. Sound fog signals according to inland/international rules of the road.		
7. Shift radio circuits to CIC/CDC/TOP.		
8. Check settings on bridge-to-bridge radio.		
9. The Commanding Officer will determine which plot is to be designated as primary, but the bridge will plot by GPS; CIC/CDC will retain a radar plot with GPS back up (if available).		
10. Slow to a safe speed and ensure primary plot has established the ship's position.		
11. Open bridge wing doors (if applicable).		
12. If at trail shaft, order split plant (if applicable).		
13. Log completion of checklist in the ship's Deck Log.		

MINE COUNTERMEASURES/SWEPT CHANNEL CHECKLIST

Event	COG	Initials
24 Hours Prior to Entering Mine Danger Area		
1. Log commencement of Swept Channel Checklist	OOD	
2. Consolidate mine threat intelligence (floating/bottom/influence/magnetic/acoustic).	ISC/OPS	
3. Determine transit route and time (consider tides, currents, and depths).	NAV/CICO	
4. Conduct brief (concurrent with NAV brief).	NAV	
5. Review/verify Quiet Ship Bill.	ENG/ASWO	
6. Verify degaussing is operational.	ELECO	
7. Secure cathodic protection.	ELECO/EMO	
1 Hour Prior to Entering Mine Danger Area		
8. Conduct noise survey IAW EOSS MLOC.	ENG	
9. Ensure all personnel possess inflatable life preservers	1ST LT	
10. Set Quiet Ship Condition Q1 or Q2 (at CO's discretion).	OOD	
11. Every 15 minutes, pass word: The ship will enter a mine danger area in ___ minutes."	OOD	
12. Pass word: "Secure all missile hazards throughout the ship."	OOD	
13. Brief mine watch personnel and then station the detail.	CICWO	
14. Set modified material condition ZEBRA main deck and below.	CICWO	
30 Minutes Prior to Entering Mine Danger Area		
15. Prepare mine reports.	CICWO	
16. Ensure prairie/masker air is energized (If ship's speed is greater than 5 knots).	EOOW	
17. Display lights/day shapes for ship restricted in ability to maneuver.	OOD	
18. Man repair lockers	DCA	
19. All topside personnel don life preservers and helmets.	OOD	
20. Station anchor detail (if applicable).	OOD	
21. Station leadsman (if applicable).	OOD	
10 Minutes Prior to Entering Mine Danger Area		
22. Secure fathometer.	OOD/ASWO	

Event	COG	Initials
23. Pass word: "The ship will enter a mine danger area in ten minutes. All personnel not on watch remain inside the skin of the ship. All non-essential personnel lay to the second deck or above."	OOD	
24. Make the anchor ready for letting go (if applicable).	1ST LT	
25. Shift DRT trace to 1000 yard scale.	CICWO	
In Mine Danger Area		
26. Transit at slowest possible speed (7 kts or less if not swept).	OOD	
27. Pass word: "The ship has entered a mine danger area. All personnel not on watch remain inside the skin of the ship. All non-essential personnel lay to the second deck or above."	OOD	
28. Log completion of checklist in the ship's Deck Log.	OOD	

QMOW TURNOVER CHECKLIST

Inventory	
	Night Orders
	Navigation Bill
	QMOW Pass Down Log
	Bearing Book
	Position Log
	Nautical Almanac
	Magnetic Compass Book
	Navigation Workbook
	Navigation Rules
	Chart 1
	Voyage Planning Worksheet
	Deck Log/Extra sheets
	Position Report/Extra sheets
	Weather Observation Log/Extra sheets
	8/12/20 O'clock Reports
Celestial Computations	
	Sunrise
	Sunset
	Moonrise
	Moonset
	Azimuth
	Amplitude
Weather	
	Air Temperature
	Sea Temperature
	Heavy Weather Messages Plotted
	Last Fax/Next Fax

Intentions	
	DR Course/Speed
	Fix Interval
	PIM Track Course
	PIM Track Speed
	Track Left/Right
	Track Ahead/Behind
	Next Turn Point/Time
	Set/Drift
	CIC/CDC Fix Comparison
	Expected Aids/Landfall
Ships in Company:	
Steaming Formation/Formation Guide	
Senior QM Remarks	
Navigator Remarks	

PILOTING PREPARATION CHECKLIST

PILOTING PREPARATIONS CHECKLIST (SHEET 1 OF 5)
NOTE: PREPARE SEPARATE CHECKLISTS FOR BRIDGE AND CIC/CDC CHARTS

Port/Position_____ ETD/ETA_____

1. Planning Publications
(Sailing directions, Fleet Guide, Coast Pilot, etc)

Pub Title	Corrected to NTM	Developer	Independent review

2. Piloting Charts
Select charts for piloting. Consider NAVAID availability, plotting surface and PMP mobility.

Chart Number	Copies Required	Quantity Onboard	Edition # / Latest NTM	Current Edition verified and corrected to latest NTM	
				Developer	Ind. Review

PILOTING PREPARATIONS CHECKLIST (SHEET 2 OF 5)

3. Chart Preparation:

ACTION	INITIALS							
	Chart#		Chart#		Chart#		Chart#	
	Dev.	Ind. Rev	Dev.	Ind. Rev	Dev.	Ind. Rev	Dev.	Ind. Rev
3.a. Compare all charts on allowance list covering the area for inconsistencies. Transfer hazards as required.								
3.b. Apply all applicable changes. (Broadcast warnings, NAVAREA, Local NTM, etc) **(ECDIS-N ships update available VDU)**								
Determine and Label the following:								
3.c. Annotate limit of navigable water parallel to the channel. (Normally 36-40 foot curve or equivalent)								
3.d. Highlight hazards (Shoals, wrecks, etc.)								
3.e. Select, highlight and label visual NAVAIDS								
3.f. Select, highlight and label RADAR NAVAIDS								
3.g. Select, highlight and label composite NAVAIDS								
3.h. Construct Speed Triangle for charts with scales larger than 1:100,000 **(N/A for ECDIS-N)**								
3.i. Select ranges (Man-Made and/or naturally-occurring) for use as heading reference and for determination of gyro error.								
3.j. Select and label danger bearings and ranges as appropriate. Bearings shall be labeled to the nearest tenth-degree.								

PILOTING PREPARATIONS CHECKLIST (SHEET 3 OF 5)

4. Track Preparation:

ACTION	INITIALS							
	Chart#		Chart#		Chart#		Chart#	
	Dev.	Ind. Rev	Dev.	Ind. Rev	Dev.	Ind. Rev	Dev.	Ind. Rev
4.a. Lay track IAW Fleet Guide, Sailing Directions, Coast Pilot, etc. as appropriate.								
4.b. Turn points determined from ship's tactical data.								
4.c. Plot and label Turn Bearings (True and Relative) to the nearest tenth-degree.								
4.d. Draw a Slidebar through each turn point. **(N/A for ECDIS-N)**								
4.e. Plot and Label a Turn Range arc for each turn. **(N/A for ECDIS-N)**								
4.f. Plot "Distance Ticks" from the turn point along the track as appropriate.								
4.g. Determine and label courses to the nearest half-degree and leg-distance to the nearest 20 yards, chart scale permitting.								
4.h. If not already labeled on the chart, construct an expanded range scale to assist with radar piloting. **(N/A for ECDIS-N)**								
4.i. Annotate points where specific actions may be required. Examples include, but are not limited to: -Tug/Pilot Rdvu -Blind Bend Signal -Lower/Raise Pit Sword -Speed Limit Changes								
4.j. Determine and label sounding tripwires and points at which their values change.								
4.k. Plot and label GPS Waypoints.								
4.l. Label Chart Shift Points. **Note: Shift Points shall be different for Bridge and CIC/CDC Charts. (N/A for ECDIS-N)**								

PILOTING PREPARATIONS CHECKLIST (SHEET 4 OF 5)

5. VMS Preparations (if equipped).
Note: These preparations shall be accomplished REGARDLESS of certification status.

ACTION	INITIALS							
	Chart#		Chart#		Chart#		Chart#	
	Dev.	Ind. Rev	Dev.	Ind. Rev	Dev.	Ind. Rev	Dev.	Ind. Rev
5.a. Verify current edition DNC installed and converted to SDNC format								
5.b. Apply latest VDU Patch to all applicable charts.								
5.c. Create Voyage Plan annotating the following: -Waypoints (Must match paper charts) -Turn Bearings and Ranges -ETD or ETA -Critical Points (Match action points from 4.i. above) -Planned speed -Cross-Track error limits -Standard Rudder used for all turns.								
5.d Validate Voyage Plan and check dangers.								

PILOTING PREPARATIONS CHECKLIST (SHEET 5 OF 5)			
6. GPS			
ACTION		**Developer**	**Independent Review**
6.a. Generate and verify waypoint list from planned track.			
6.b. Waypoints and chart datum entered and verified as follows:			
-Military GPS			
-Commercial GPS			
Navigator Approval	**Signature:**		**Date:**
7. Approval		**Navigator**	**Executive Officer**
7.a. Piloting charts and Voyage Plan (VMS for Piloting) reviewed and recommended for approval by Commanding Officer.			
7.b. Bridge and CIC/CDC charts compared for accuracy.			
		Commanding Officer	
7.c. Piloting Charts and Voyage Plan approved			

VOYAGE PLANNING CHECKLIST

VOYAGE PLANNING CHECKLIST (SHEET 1 OF 6)

_____

(Brief description of passage or operation)

CAUTION

1. This checklist is preparatory to navigating in open ocean or in restricted waters. Operational planning aspects that are unique to accomplishing assigned missions are not specifically addressed and should be managed in the operational planning and risk management process. Use applicable portions of this checklist when approving changes to approved navigation plans.
2. This checklist addresses the minimum preparations required for safe navigation and does not address mission-specific requirements. Consult operational directives for additional guidance.

PORT/POSITION	**ETD:**
PORT/POSITION	**ETA:**

Prerequisites:

1. Piloting Preparations Checklist commenced.

1. Chart Selection

ACTION	Developer	Independent Review
1.a. Identify and list all charts in the allowance list covering the area of operation. Chart #'s: _____ _____ _____		
1.b. Select charts for planning and track (List in part 2)		
1.c. Compare all on allowance list covering the area. Transfer hazards as required.		

VOYAGE PLANNING CHECKLIST (SHEET 2 OF 6)

2. Chart Correction

Chart Number	Copies Required	Quantity Onboard	Edition # / Latest NTM	Current Edition verified and corrected to latest NTM	
				Developer	Ind. Review

3. Prepare Operations Binder

3.a. Verify applicable navigation information up-to-date. (NAVAREA, HYDROLANT/HYDROPAC, NTM, Local NTM, Broadcast NTM, latest VDU updates, etc)		
3.b. Include current MOVEREP, OPORD, PRE-EX's, etc)		
3.c. Include Hazardous Operations notifications (FACSFAC weekly OPSKEDS, etc)		

VOYAGE PLANNING CHECKLIST (SHEET 3 OF 6)

4. Chart Preparation:

ACTION	INITIALS							
	Chart#		Chart#		Chart#		Chart#	
	Dev.	Ind. Rev	Dev.	Ind. Rev	Dev.	Ind. Rev	Dev.	Ind. Rev
4.a. Screen NAVHAZARD information (NAVAREA, HYDROLANT / HYDROPAC, NTM, Local NTM, Broadcast NTM, etc) for area of operation. Annotate hazards on charts.								
Determine and Label the following:								
4.b. 100-Fathom and 10-Fathom (183 Meter and 20 Meter) Curves.								
4.c. 10nm from 10 Fathom (20 Meter curve)								
4.d. 12nm from Land								
4.e.. Select, highlight and label VISUAL NAVAIDS								
4.f. Select, highlight and label RADAR NAVAIDS								
4.g. Select, highlight and label composite NAVAIDS								

VOYAGE PLANNING CHECKLIST (SHEET 4 OF 6)

5. Track Preparation:

ACTION	INITIALS							
	Chart#		Chart#		Chart#		Chart#	
	Dev.	Ind. Rev	Dev.	Ind. Rev	Dev.	Ind. Rev	Dev.	Ind. Rev
5.a. Lay track , remaining clear of hazards and, where appropriate, outside 12nm from land or claimed territorial waters.								
5.b. Annotate each track leg with Course, Speed Distance and sounding tripwires.								
5.c. PIM at a minimum of four-hour intervals.								
5.d. Chart shift points and next chart in use indicated. **(N/A for ECDIS-N)**								
5.e. Annotate points where specific actions may be required. Examples include, but are not limited to: -Stationing Nav Detail / MOD Nav Detail -RDVU Points -Time Zone shifts								

VOYAGE PLANNING CHECKLIST (SHEET 5 OF 6)

6. VMS Preparations (if equipped).
Note: These preparations shall be accomplished REGARDLESS of certification status.

ACTION	INITIALS	
	Developer	Independent Review
6.a. Verify current edition DNC installed and converted to SDNC format		
6.b. Create Chart Portfolio		
6.b. Apply latest VDU Patch to all applicable charts.		
6.c. Create Voyage Plan annotating the following: -Waypoints (Must match paper charts) -ETD or ETA -Critical Points (Match action points from 4.i. above) -Planned speed -Cross-Track error limits -Standard Rudder used for all turns.		
6.d Validate Voyage Plan and check dangers.		

VOYAGE PLANNING CHECKLIST (SHEET 6 OF 6)

7. GPS

ACTION	Developer	Independent Review
7.a. Generate and verify waypoint list from planned track.		
7.b. Waypoints and chart datum entered and verified as follows:		
-Military GPS		
-Commercial GPS		

Navigator Approval	**Signature:**	**Date:**

7. Approval	**Navigator**	**Executive Officer**
7.a. Charts and Voyage Plan (VMS) reviewed and recommended for approval by Commanding Officer.		
7.b. Bridge and CIC/CDC charts compared for accuracy.		
	Commanding Officer	
Chart # _____	Approved: _____	
Chart # _____	Approved: _____	
Chart # _____	Approved: _____	
Chart # _____	Approved: _____	

APPENDIX D

SHIP'S POSITION REPORT (NAVSHIP 9240/1)

1. Purpose. To provide a means of reporting the ship's position

2. Format. Required information:

a. At (time of day) - 0800, 1200, or 2000
b. Date - current date
c. Latitude/Longitude - DR LAT/LONG at 0800, 1200, or 2000
d. Determined at - the time of the fix from which the position was obtained
e. By (indicate by check box)
f. Set/Drift
g. Distance made good since (Time/Miles) - the distance traveled since the last report, always computed from position report to position report
h. Distance to - always to the ultimate destination
i. ETA - the estimated time of arrival at the ultimate destination, expressed as a date/time group
j. True heading - the heading of the ship corrected from gyro error
k. Error - the gyro error previously computed
l. Variation - the angular difference between the true North Pole and the magnetic north pole, as determined from the chart compass rose
m. Magnetic Compass Heading - (Check one) the magnetic compass check
n. Deviation
o. Table deviation - the deviation from Form 1104 that was predetermined for the magnetic compass
p. Degaussing (DG) (Indicate by check in box) - status of degaussing, on or off
q. Remarks – GPS Figure Of Merit (FOM) values and additional information from the Navigator to the CO
r. Respectfully submitted by (Navigator) - the Navigator's signature. CC - Carbon Copy to embarked staff, CIC/CDC, and (1) to file

3. Responsibility for submission. The QMOW/PLOT watch will fill out and submit the position report to the Assistant Navigator/ Senior Quartermaster.

4. Responsibility for review and approval. The Navigator is responsible for position reports. The Navigator will approve them by signature before submission to the CO, embarked staff, and CIC/CDC.

5. Disposition. The duplicate ship's position report will be kept as may be convenient.

6. Responsibility for maintenance. The Assistant Navigator is responsible for maintaining the file of duplicate position reports.

APPENDIX E

CHARTS AND PUBLICATIONS

Paper Chart Product	Electronic Product	Class/ Caveat
Nautical Charts	DNC®	LIMDIS
Notice to Mariners	VDU	LIMDIS
OpArea, Range, and Exercise charts	TOD™ 0	LIMDIS/ Secret
Bottom Contour (BC)	TOD™ 1	Conf
Bathymetric Nav Planning Charts (BNPC)	TOD™ 2	Secret
Strategic Straits	TOD™ 5	Secret
Combat Charts	None	Secret
Other Charts	Various	Conf/ Secret/TS

The distribution of DNC® is authorized to U.S. Department of Defense and their contractors. DNC® updated by the Vector Product Format (VPF) Database Update (VDU) is authorized for navigation on certified systems such as the Electronic Chart Display and Information System-Navy (ECDIS-N) or comparable systems (33 CFR 164.01).

The DNC® is an unclassified vector-based digital geospatial intelligence database depicting significant features essential for safe marine navigation. DNC® libraries are automatically distributed on CD-ROM for all 29 Regions and is also available over the NGA Gateway: POC – mailto:mcddnc@nga.mil
NIPRNET: http://www.nga.mil/portal/site/dnc/
SIPRNET: http://sps.stl.nga.smil.mil/products/dnc1/index.htm
JWICS: http://jws.stl.nga.ic.gov/products/dnc1/index.htm
NGA PK-Enabled NIPRNet account: https://www.extranet.nga.mil

VDU for DNC® is automatically distributed monthly on CD-ROM for all 29 Regions and is also available over the NGA public website: NIPRNET: http://www.nga.mil/portal/site/dnc/. VDUs are updated on a monthly cycle, with one-quarter of the DNCs updated each week. Weekly downloads of the new VDUs applicable to the a ship's operations will keep the DNC libraries up-to-date.

Authorized users of DNC® are requested to immediately report any safety of navigation related discrepancy that may be detected on DNC® to NGA's 24-hour World-Wide Navigational Warning Service Broadcast Desk via: DMS message to NGA NAVSAFETY AUTODIN and to NGA NAVSAFETY BETHESDA MD//; NIPRnet e-mail

at Navsafety@nga.mil; SIPRNET e-mail at Navsafety@nscn.nga.smil.mil Phone: Comm 301-227-3147, 1-800-362-NAVY, or DSN 287-3147. In the report, the user must identify which electronic charting system/ECDIS-N, including the software version, is being used; the DNC® library number; DNC® CD edition number and a description of the discrepancy. Upon receipt of the report, NGA will take immediate action to determine if corrective action is necessary and, if so, will advise all users accordingly via the HYDROLANT and HYDROPAC broadcast service.

Additional NGA e-mail addresses include:
Advanced Geospatial Intelligence (AGI) - MCDAGI@nga.mil
Bathymetric Navigation Planning Charts (BNPC) - MCDBNPC@nga.mil
Chartlets - MCDChartlets@nga.mil
Charts - MCDCharts@nga.mil
Digital Nautical Charts (DNC) - MCDDNC@nga.mil
Electronic Chart Display and Information System (ECDIS) - MCDECDIS@nga.mil
Electronic Print-On-Demand - Maritime (EPODS-M) - MCDEPOD@nga.mil
HarborView(TM)/Global Port Infrastructure Data (HV/GPID) - MCDHV@nga.mil
Bathymetric Data (HYSAS program) - MCDHYSAS@nga.mil
OPAREA data - MCDOPAREA@nga.mil
Tactical Ocean Data (TOD) - MCDTOD@nga.mil

Paper Publication	Electronic Format	Class/ Caveat
Notice to Mariners	.pdf	1 Unclass/ 1 Secret
Summary of Corrections	.pdf/db	5 Unclass/ 1 Secret
Chart 1: Nautical Chart Symbols and Abbreviations, United States of America	.pdf	Unclass
Chart 4: Symbols, Abbreviations, Terms used on Nautical Charts of Russia (BEING DELETED)	.pdf	Unclass/ LIMDIS
Pub # 9: The American Practical Navigator (Bowditch)	.pdf	Unclass
Pub # 102: International Code of Signals	.pdf	Unclass
Pub #105 - 109: Atlas of Pilot Charts	.pdf	Unclass
Pub # 110 – 116: NGA List of Lights (6 Vols)	.pdf/db	Unclass

Paper Publication	Electronic Format	Class/ Caveat
Pub # 117: Radio Navigation Aids	.pdf/db	Unclass
Pub # 120....200: Sailing Directions	.pdf	Unclass
Pub # 150: World Port Index	.pdf/db	Unclass
Pub # 151: Distance Between Ports	.pdf	Unclass
Pub # 229: Sight Reduction Tables for Marine Navigation (6 Vols)	.pdf	Unclass
Pub # 940: Fleet Guide (Atlantic)	.pdf	Unclass/ LIMDIS
Pub # 941: Fleet Guide (Pacific)	.pdf	Unclass/ LIMDIS
Pub # 1310: Radar Navigation and Maneuvering Board Manual	.pdf	Unclass

FOREIGN CHART REQUESTS: See Chapter 3, para 3.3.e.

PACOM POC: Daniel G. Morris
COMPACFLT GI&S Officer
DSN: 315-474-6901 (STE)
TEL: 808-474-6901 (STE)
NIPRNET: daniel.g.morris@navy.mil
SIPRNET: daniel.morris@navy.smil.mil
PLA: COMPACFLT PEARL HARBOR HI//N3WX//

USFFC POC: Dan Soper
U.S. Fleet Forces (N372)
Navigation/Geospatial/Fleet Survey Programs
DSN: 836-6837
TEL: 757-836-6837
NIPRNET: daniel.j.soper@navy.mil
SIPRNET: daniel.j.soper@navy.smil.mil
PLA: COMUSFLTFORCOM NORFOLK VA//N37//

Mapping Customer Operations

Service	DODAAC Service Point
Navy	DSN: 580-5908; Commercial: (216) 204-5908
Army	DSN: 645-8292; Commercial: (256) 955-8292 DSN: 645-9653; Commercial: (256) 955-9653 DSN: 645-0825; Commercial: (256) 955-0825 DSN: 645-9750; Commercial: (256) 955-9750
Air Force	DSN: 787-9812; Commercial: (937) 257-9812
Marines	DSN: 567-8027; Commercial: (877) 564-8762 DSN: 567-6845
Coast Guard	Commercial: (410) 762-6590

Table 1: Department of Defense Activity Address Code: DODAAC Service Points for the Military

The AMPS link: https://amps.dla.mil .

To access your map account, use this link: https://mebs.dla.mil.

If you have questions, you may contact MCO at DSN 695-6500, Option 2 or commercial 804-279-6500, or 1-800-826-0342, Option 2.

You may also contact MCO via email at acctmgr@dla.mil.

APPENDIX F

NAVIGATION SYSTEMS/EQUIPMENT

1. Global Positioning System. Figure of Merit (FOM) is an integer representation of position error (3 dimensions, 1 sigma) as shown in the table below and reflects the following 'predictable' errors:

   a. Receiver state and navigation mode

   b. Availability/accuracy of ionospheric corrections

   c. Satellite geometry (Dilution Of Precision - DOP)

   d. Degradation due to SA exclusion

   e. User range accuracy effects

	Estimated Position Error		
Figure Of Merit	Meters	Feet	Yards
1	Less than or equal to 25	Less than or equal to 82	Less than or equal to 27.3
2	Greater than 25 Less than 50	Greater than 82 Less than 164	Greater than 27.3 Less than 54.7
3	Greater than 50 Less than 75	Greater than 164 Less than 246	Greater than 54.7 Less than 82
4	Greater than 75 Less than 100	Greater than 246 Less than 328	Greater than 82 Less than 127.3
5	Greater than 100 Less than 200	Greater than 328 Less than 656	Greater than 127.3 Less than 218.6
6	Greater than 200 Less than 500	Greater than 656 Less than 1640	Greater than 218.6 Less than 546.6
7	Greater than 500 Less than 1000	Greater than 1640 Less than 3280	Greater than 546.6 Less than 1093.3
8	Greater than 1000 Less than 5000	Greater than 3280 Less than 16400	Greater than 1093.3 Less than 5466.6
9	Greater than 5000	Greater than 16400	Greater than 5466.6

Additional errors may be introduced by anomalies in the satellite/control station and/or hostile actions that result in range error above the operational tolerance. These errors are different from the predictable degraded accuracy described above. GPS integrity refers to the ability of the system to provide a timely warning to users when it should not be used for

navigation. Integrity anomalies should be rare, occurring only a few times per year, but are critical for navigation. Integrity can be achieved by use of an algorithm internal to the GPS receiver or integration with other on-board navigation sensors. The AN/WRN-6 does not have this capability and the capability is not enabled in NAVSSI Block 3 or Block 4 with inputs provided by the installed GVRCs. However, continued use of visual and RADAR plotting provides the necessary integrity of the navigation system.

f. All GPS(PPS) receivers must have crypto loaded anytime the receiver is being used to lessen the risk of jamming or spoofing.

2. Fathometers. A correction factor must be applied to the fathometer reading to ensure the water depth below the deepest projection is reported. The method of calculating the correction factor is determined by the type of fathometer installed and the ship class. A label must be affixed to the fathometer and each remote repeater showing the correction factor to be applied to the fathometer reading to obtain the water depth below the deepest projection. The reading is reported as the "Corrected Fathometer Sounding".

a. In ships where the vertical relationship between the transducer face and deepest projection varies widely because of loading characteristics or vessels trim, a single correction factor is not practical. Therefore, a correction factor must be calculated for the load that exists at the time the Fathometer is in operation. A nomogram incorporating draft forward and aft will be developed to decide the vertical correction. The location of the transducer will be on the nomogram. A label with a provision for filling in the correction and the time/date the factor was calculated, using a grease pencil. The nomogram will be used to learn the depth of the transducer face given the fore and aft draft. Adding this depth to the uncorrected Fathometer sounding results in the depth of water and can be compared with indicated chart depth.

3. Digital Flux Gate Magnetic Compass (DFGMC). The DFGMC is an authorized replacement for the conventional magnetic compass. As long as the operational and adjustment procedures are practiced and compass limitations are well understood, the DFGMC offers excellent accuracy with reduced maintenance. At the CO's discretion, ships with both a conventional compass and DFGMC may place the conventional compass in lay-up in order to reduce maintenance requirements. In accordance with the ship's gauge

calibration instruction, an "Out Of Commission" sticker will be placed on the compass in plain view of the helmsman. This may be on the compass face itself in order to obstruct compass reading.

a. Limitations. Once the operation and adjustment procedures are completed, there are certain limitations that must be understood. Due to the nature of DFGMC auto compensation, it is not always possible to complete the procedure when the magnetic environment changes. For example, after degaussing is energized the ship may not be able to immediately complete two 360° turns. A case to consider occurs when the ship leaves port. Degaussing may have been cycled through several states prior to a degaussing range run. Also, the DFGMC may not have compensation coils used with the Navy Standard Magnetic Compass (wet compass) and therefore, may not automatically compensate for changes in the ship's degaussing system. The following guidelines apply:

(1) Gyro Casualty. With a DFGMC, it is even more imperative to use magnetic checking courses to determine course to steer in the case of a gyro casualty. A loss of gyro can cause unpredictable fluctuations in ship's degaussing which in turn can affect the DFGMC. Intentional auto-compensation must be completed as soon as possible after degaussing is set in manual and stabilized. It is not always possible to complete auto-compensation procedures, and unlike a conventional magnetic compass, compass deviation cannot be measured for later use in course calculations. The DFGMC heading must be considered suspect until verified, or until auto-compensation is completed.

(2) Auto-compensation should normally be completed within 24 hours prior to operating in a restricted maneuvering environment. Degaussing should be set in its intended mode of operation and not energized or de-energized following the check. As a rule, the procedure should be completed whenever steering checks are required (i.e., as a part of the "Entering Port" or "Underway Replenishment" checklist). This will ensure the compass has been set with minimal deviation.

(3) If auto-compensation cannot be completed, the ship will always attempt to keep degaussing set in the same position as during the last auto-compensation prior to entering restricted maneuvering. This will help minimize magnetic field changes that may affect the compass.

(4) If possible, the Navigator should study the effects of energizing and de-energizing degaussing on the DFGMC. This may help the Navigation Team predict the effects of degaussing.

APPENDIX G

NAVIGATION TRAINING RESOURCES

1. Safe and efficient navigation in practice is highly dependent upon an effective program of training for all navigation and ship control personnel. Analysis of navigation incidents has repeatedly cited lack of professional knowledge as a significant contributor and in some cases has been among the primary causes of these incidents. Ships are encouraged to develop and implement an aggressive training plan for navigation and to make optimum use of every opportunity to conduct navigation training, including incorporation of training into the Navigation Brief, during allotted Navigation, Seamanship, and Shiphandling (NSST) sessions, and while debriefing navigation evolutions.

2. Immediate Superiors in Command (SQUADRON/GROUP STAFF s) are encouraged not only to assess Navigation Team performance on their ships but also to test requisite knowledge of all Navigation Team and shiphandling personnel during every phase of the ship's life cycle. Topics include but are not limited to Rules of the Road, Piloting Procedures, GPS/INS Capabilities and Limitations, Basic Hydrography and Charting, Operational Risk Management, and Case Study Analysis.

3. The following resources are available to assist Navigators and Training Officers in developing their training curriculum:

NAVY-WIDE RESOURCES

Navigator of the Navy http://www.oceanographer.navy.mil/

Naval Safety Center http://safetycenter.navy.mil/index.asp

Resources available: Interactive Case Study Analysis, Operational Risk Management Training, Sanitized Afloat Mishap Reports, and Best Business Practices (Lessons Learned)

SURFOR RESOURCES https://www.surfor.navy.mil

SUBFOR TRAINING https://www.cnet.navy.mil/sobt/web/index.html

Afloat Training Group Atlantic https://www.atgl.spear.navy.mil

Afloat Training Group Pacific https://www.atgpac.navy.mil

Navy Lessons Learned- Navy Warfare Development Command (NWDC).

The Navy Lessons Learned Program is the process by which the Navy collects and disseminates all Observations and Recommendations and Port Visit Reports (PVRs) from Joint and Maritime Operations. This feedback includes observations that may identify problems, issues, or requirements, and, if known, suggested corrections to these deficiencies. Observations may also contain pertinent information concerning doctrine, tactics, techniques, procedures, systems, or may simply address a general document or process.

- Navy Lessons Learned Database (SIPR): http://www.jllis.smil.mil/navy
- Navy Lessons Learned Database (Unclassified) https://www.jllis.mil/navy (CAC required and users must register and establish an account in order to view NLL records)
- NWDC Lessons Learned Portal https://portal.nwdc.navy.mil/Ops/default.aspx (CAC required)

Contact Information

Navy Lessons Learned (Unclassified: NIPRnet) nwdcnavylessons@nwdc.navy.mil
Navy Lessons Learned (Classified: SIPRnet): navylessons@nwdc.navy.smil.mil

OUTSIDE AGENCY RESOURCES

National Geospatial-Intelligence Agency (NGA) http://www.nga.mil/portal/site/maritime/
http://www.nga.mil/portal/site/dnc/
https://www.extranet.nga.mil/servlet/ShowHomepage

USCG Navigation Training http://www.navcen.uscg.gov/

DOD GPS Operations Center http://www.schriever.af.mil/gpsoc/index.asp

Defense Automated Visual Information System/Defense Instructional Technology Information System Audiovisual Products
http://jvisda.afis.osd.mil/index.html

Pin:	Title:
34406	MELBOURNE/EVANS INCIDENT, THE
803247	SHIP HANDLING CASE STUDIES: SURFACE SHIP COLLISIONS
806319	READING CHARTS
806318	PILOTING NAVY SHIPS

613471 GLOBAL POSITIONING SYSTEM
602800 PRINCIPLES OF DOPPLER RADAR
602719 CONCEPTS OF CELESTIAL NAVIGATION
602714 INERTIAL NAVIGATION SYSTEM
602799 BASIC RADAR PRINCIPLES
25486 (ALTITUDE) INTERCEPT METHOD
25487 (CELESTIAL) SOLUTION AND PRACTICAL APPLICATION

Interactive Multimedia Instruction Products:
GLOBAL POSITIONING SYSTEM (GPS) TUTORIAL
NAVSTAR ICW (AN/WRN-6(V))
CELESTIAL NAVIGATION
NAVIGATION SIMULATOR
RULES OF THE NAUTICAL ROAD
NAVIGATION SIMULATOR (NAVSIM)
DEFENSE ADVANCED GPS RECEIVER (CD 11-64)
PILOTING BRIEF NORFOLK, VA
PILOTING BRIEF PEARL HARBOR, HI
PILOTING BRIEF SAN DIEGO, CA
PILOTING BRIEF BANGOR, WA
PILOTING BRIEF KINGS BAY, GA
PILOTING BRIEF GROTON, CT
NOTE: Piloting Briefs are Submarine-oriented

APPENDIX H

DEFINITIONS

1. Definitions.

a. Fix. A position determined without reference to any former position. The common intersection of three or more lines of position, and/or three or more RADAR ranges obtained from simultaneous observations. A GPS fix is the latitude and longitude provided by the installed equipment or the common intersection of three or more lines of position from three different waypoints input into the installed equipment. A composite fix uses multiple sources (i.e. visual and radar LOPs) rather than a homogenous source (only visual LOPs) to develop a fix position.

b. Estimated Position. An Estimated Position (EP) is defined as two simultaneous lines of position, either visual or electronic. Using GPS for an "EP" depends on the FOM in relation to the required fix accuracy (i.e., distance from land or shoal water).

c. Running Fix. The intersection of three or more lines of position, not obtained simultaneously, advanced down DR track to a common time.

d. No Fix. No Fix is when you do not have information that meets the criteria for a Fix, an Estimated Position, or a Running Fix.

e. Safety Depth. Value is the ship's draft plus safety factor. Can be in feet, fathoms, or meters.

f. SDNC. System Digital Nautical Chart is the database resulting from the direct read of VPF products by the ECDIS-N for appropriate use, updates to DNC and TOD via VDU, and other data added by the operator. It is the database that is actually accessed by ECDIS-N for the display generation and other navigational functions, and is the equivalent to an up-to-date paper chart. The SDNC may also contain information from other sources.

g. Datum. Any numerical or geometrical quantity or set of such quantities which may serve as reference or base for other quantities. In navigation two types of datums are used: horizontal and vertical.

h. Estimated Position Error (EPE). The metric or Imperial values that correspond to a specific GPS FOM, i.e. FOM 1 has EPE values of 25m, 82ft, and 27.3yds.

i. UTC(USNO). Coordinated Universal Time as established by the U.S. Naval Observatory, the time scale that is available from WWV/WWVH broadcast time signals and GPS receivers.

j. IBS/IBNS. Integrated Bridge System/Integrated Bridge Navigation System. The full-control (rudders and engines) ECDIS-N suite installed on various ship classes.

k. S-IBS. Scalable Integrated Bridge System. The rudder-control only ECDIS-N suite installed on various ship classes.

l. DHSL. Digital High Speed Log. A self contained, two-axis velocity measurement system.

m. DDRT/CADRT. Digital Dead Reckoning Tracer/ Computer Assisted Dead Reckoning Tracer.

n. AIS. Automatic Identification System.

o. AIAS. Aircraft Inertial Alignment System.

p. Moriah. A combined wind, meteorological, and oceanographic measuring and indicating system.

q. Mariner Object. Operator-entered information often concerning known dangers, operating areas, navigational aids, or other data related to specific chart locations, displayed along with the basic chart data. This added information can be organized into visual layers, which are turned on and off as needed through the use of a layer portfolio. Each Mariner Object is categorized by object type and by sub-type.

r. Chart Data Layer. A Mariner Object can be saved to the chart data for a specific electronic chart library. Objects saved to the chart data layer are known as Chart Additions. Mariner Objects saved as Chart Additions are displayed ONLY with the chart to which they were saved; they are not displayed with any other chart, even when the coverage area of that chart includes the position of the object.

s. Display Layer. A VMS Data Layer. When a Mariner Object is saved to an operator-defined display layer, the object is

linked to its designated location, and not to a specific chart. The object can be displayed with any electronic chart whose coverage area includes the object's location; however, display of the object depends upon activation of the layer portfolio which contains the display layer to which the object was saved.

t. Tactical Layer. A special display layer which is always active for display and safety-checking, without regard to the selected electronic chart or layer portfolio. Mariner Objects saved to the Tactical layer are always available for display, independent of the displayed chart or of any selected layer or layer portfolio. When Mariner Objects are added to the Tactical layer, the objects are available for immediate use, without requiring modification of a stored display layer or a layer portfolio. Display of the Tactical layer can be turned on and off.

u. Event Mark. The Event Mark function allows the operator to mark and describe events that occur during a voyage. When an Event Mark is set, the time of the event is immediately recorded to a log file on the hard drive of the VMS workstation. If Ownship History option is turned on in the Main Features window, a time-stamped event mark is placed on the chart display at the present Ownship position.

APPENDIX I

VMS MANAGEMENT TOOLS

NAVIGATION PLAN MANAGEMENT

Navigation Plan Name	
Class	
Notes	
DNCs used	
Last VDUs	

INCLUDED PORTFOLIOS AND PLANS

Voyage Plan Name	
Voyage Plan Name	
Voyage Plan Name	
PIM Plan Name	
PIM Plan Name	
PIM Plan Name	
Chart Portfolio Name	
Chart Portfolio Name	
Chart Portfolio Name	
Layer Portfolio Name	
Layer Portfolio Name	
Layer Portfolio Name	

Date Created	Signature
Date Reviewed	Signature (SR QM)
Date Reviewed	Signature (ANAV)
Date Approved	Signature (NAV)
Date Approved	Signature (XO) (SURFOR ships)
Date Approved	Signature (CO)

MARINER OBJECT MANAGEMENT

Name	
Class	
Label	
NTM ID	
Notes	
Description	

BORDER AND FILL (ONE MUST BE USED)

Line Color		SOLID	DOTTED	DASHED	LINE
Weight		Fill Color			
Symbology		Transparency			
Fill Pattern		Notification Text			
Restrictions	NONE	STAY OUTSIDE		STAY INSIDE	

ACTIVITY TIME PERIODS

Period	Start	End

SOUNDINGS

Minimum:	Yellow:	Red:
Created Date	By	
Primary Layer to Which Applied		
Reviewed Date	By	

LAYER PORTFOLIO MANAGEMENT

Layer Portfolio Name	
Notes	
Description	

INCLUDED LAYERS (MARINER OBJECTS)

Layer Portfolio Name	
Layer Portfolio Name	
Layer Portfolio Name	
Layer Portfolio Name	
Layer Portfolio Name	
Layer Portfolio Name	
Layer Portfolio Name	
Layer Portfolio Name	
Layer Portfolio Name	
Layer Portfolio Name	
Created Date	By
Primary Chart Portfolio To Which Applied	
Secondary Chart Portfolio To Which Applied	
Tertiary Chart Portfolio To Which Applied	
Reviewed Date	By
Approval Date	Senior QM
Approval Date	ANAV
Approval Date	NAV
Approval Date	XO (SURFOR ships only)
Approval Date	CO

CHART PORTFOLIO MANAGEMENT

Chart Portfolio Name	
Notes	
Description	

INCLUDED LAYERS AND CHARTS

Chart Number	
Chart Number	
Chart Number	
Chart Number	
Chart Number	
Chart Number	
Chart Number	
Chart Number	
Chart Number	
Chart Number	
Layer Portfolio Name	
Layer Portfolio Name	
Layer Portfolio Name	

Created Date	By
Reviewed Date	By
Approval Date	Senior QM
Approval Date	ANAV
Approval Date	NAV
Approval Date	XO (SURFOR ships only)
Approval Date	CO

APPENDIX J

ECDIS-N DISPLAY FEATURES

Display Features		Ocean	Coastal	Piloting	Restricted
Anchor Drag					
	Drag Circle	ON/OFF	ON/OFF	ON	ON
	Swing Circle	ON/OFF	ON/OFF	ON	ON
Anchoring					
	Anchorage	ON/OFF	ON/OFF	ON	ON
	Head Bearing Line	ON/OFF	ON/OFF	ON	ON
Guard Ring		ON/OFF	ON/OFF	ON	ON
LOP Draw					
	Fix	ON	ON	ON	ON
	Fix History	ON	ON	ON	ON
	Dead Reckoning	ON	ON	ON	ON
	Temp Nav Points	ON	ON	ON	ON
LAT/LONG Grid		ON/OFF	ON/OFF	ON/OFF	ON/OFF
Mariner Objects					
	Object Name	ON	ON	ON	ON
	Object Label	ON	ON	ON	ON
	Show Hidden Objects	OFF	OFF	OFF	OFF
	Orientation Arrow	ON/OFF	ON/OFF	ON/OFF	ON/OFF
Own Ship					
	Ship Outline	ON	ON	ON	ON
	Ship Symbol	OFF	OFF	OFF	OFF
	Heading Vector	ON	ON	ON	ON
	Course Vector	ON	ON	ON	ON
	Predicted Vector	ON/OFF	ON/OFF	ON/OFF	ON/OFF
	Predicted Ship	ON/OFF	ON/OFF	ON/OFF	ON/OFF
	History Ship	ON	ON	ON	ON
	Ship History	ON	ON	ON	ON
SDNC Charts					
	Symbolization	Traditional	Traditional	Traditional	Traditional

Display Features		Ocean	Coastal	Piloting	Restricted
	Depth Shades	Four	Four	Four	Four
	Shallow Contour (m)	ON	ON	ON	ON
	Deep Contour (m)	ON	ON	ON	ON
	Water – DNC Depth, Depth, DNC Water	ON	ON	ON	ON
	TOD 0	ON	ON	ON	ON
	TOD 2	ON/OFF	ON/OFF	ON/OFF	ON/OFF
Chart Text					
	Navigational Aid Names	ON/OFF	ON/OFF	ON/OFF	ON/OFF
	Light Characteristics	ON/OFF	ON/OFF	ON/OFF	ON/OFF
	Sound and Color Labels	ON/OFF	ON/OFF	ON/OFF	ON/OFF
	Seabed Characteristics	ON/OFF	ON/OFF	ON/OFF	ON/OFF
	Named Locations	ON/OFF	ON/OFF	ON/OFF	ON/OFF
	Berth Names	ON/OFF	ON/OFF	ON/OFF	ON/OFF
	Other Text	ON/OFF	ON/OFF	ON/OFF	ON/OFF
Chart Features					
	Display Failed Symbolization	ON	ON	ON	ON
	Major Coastal Features	ON	ON	ON	ON
	Conspicuous Landmarks	ON/OFF	ON/OFF	ON	ON
	Shallow Water Pattern	ON/OFF	ON/OFF	ON/OFF	ON/OFF
	Swept Areas	ON/OFF	ON/OFF	ON/OFF	ON/OFF
	Seabed Dangers	ON	ON	ON	ON
	Traffic Routes	ON	ON	ON	ON
	Restricted and Cautionary Areas	ON	ON	ON	ON
	Information and Protected Areas	ON	ON	ON	ON
	Daymarks	ON/OFF	ON/OFF	ON/OFF	ON/OFF
	Buoyage Information	ON/OFF	ON/OFF	ON/OFF	ON/OFF
	Topmarks	ON/OFF	ON/OFF	ON/OFF	ON/OFF
	Lights	ON/OFF	ON/OFF	ON/OFF	ON/OFF

Display Features		Ocean	Coastal	Piloting	Restricted
	Fog Signals	ON/OFF	ON/OFF	ON/OFF	ON/OFF
	Radar Navigational Aids	ON/OFF	ON/OFF	ON/OFF	ON/OFF
	Pilot and Signal Stations	ON/OFF	ON/OFF	ON/OFF	ON/OFF
	Additional Information	ON/OFF	ON/OFF	ON/OFF	ON/OFF
	Natural Features	ON/OFF	ON	ON	ON
	Shore Structures	ON/OFF	ON	ON	ON
	Port Features	ON/OFF	ON/OFF	ON/OFF	ON
	Soundings	ON/OFF	ON/OFF	ON/OFF	ON/OFF
	Depth Contours	ON	ON	ON	ON
	Currents	ON/OFF	ON/OFF	ON/OFF	ON/OFF
	Seabed Information	ON	ON	ON	ON
	Administrative Areas	ON/OFF	ON/OFF	ON/OFF	ON/OFF
	Radar and Radio Stations	ON/OFF	ON/OFF	ON/OFF	ON/OFF
	Coast Guard and Rescue Stations	ON/OFF	ON/OFF	ON/OFF	ON/OFF
	Small Craft Facilities	ON/OFF	ON/OFF	ON/OFF	ON/OFF
Targets					
	Symbol	ON/OFF	ON/OFF	ON/OFF	ON/OFF
	ID	ON/OFF	ON/OFF	ON/OFF	ON/OFF
	Name	ON/OFF	ON/OFF	ON/OFF	ON/OFF
	Platform	ON/OFF	ON/OFF	ON/OFF	ON/OFF
	Background	ON/OFF	ON/OFF	ON/OFF	ON/OFF
	Alert Radius	ON/OFF	ON/OFF	ON/OFF	ON/OFF
	Vector Type	TRUE/REL	TRUE/REL	TRUE/REL	TRUE/REL
	Vector	ON/OFF	ON/OFF	ON/OFF	ON/OFF
	Arrow	ON/OFF	ON/OFF	ON/OFF	ON/OFF
	History	ON/OFF	ON/OFF	ON/OFF	ON/OFF
	PPC	ON/OFF	ON/OFF	ON/OFF	ON/OFF
	PADs	ON/OFF	ON/OFF	ON/OFF	ON/OFF

Display Features		**Ocean**	**Coastal**	**Piloting**	**Restricted**
Track Display					
	GPS FWD	ON/OFF	ON/OFF	ON/OFF	
	GPS AFT	ON/OFF	ON/OFF	ON/OFF	
	Range LOP	ON/OFF	ON/OFF	ON/OFF	
	Comp LOP	ON/OFF	ON/OFF	ON/OFF	
	MANUAL	ON/OFF	ON/OFF	ON/OFF	
	Visual LOP	ON/OFF	ON	ON	ON
Voyage Plans					
	Track Line	ON	ON	ON	ON
	Waypoint Numbers	ON/OFF	ON/OFF	ON/OFF	ON/OFF
	Waypoint Names	ON/OFF	ON/OFF	ON/OFF	ON/OFF
	Leg Course	ON	ON	ON	ON
	Leg Spd/Dist/Time	ON	ON	ON	ON
	Planned Position	ON/OFF	ON/OFF	ON/OFF	ON/OFF
	Turn Range Navaid	ON/OFF	ON	ON	ON
	Turn Bearing Navaid	ON/OFF	ON	ON	ON
	Slide Bar	ON/OFF	ON	ON	ON
	Time to Wheel Over	ON/OFF	ON	ON	ON
	PIM Plan	ON/OFF	ON/OFF	ON/OFF	ON/OFF
	PIM Spd/Dist/Time	ON/OFF	ON/OFF	ON/OFF	ON/OFF