U.S. Department of Transportation
United States Coast Guard

Commandant (G-OCU)
United States Coast Guard

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COMDTINST 3530.2

8 FEB 1990

COMMANDANT INSTRUCTION 3530.2

Subj: Cutter Navigation Standards and Procedures

Ref: (a) COMDTINST M5000.3 (Series), Regulations 1985 (CG)
(b) COMDTINST M3502.4 (Series), Cutter Training and Qualification Manual

1. **PURPOSE.** To emphasize the importance of prudent cutter navigation procedures.

2. **DISCUSSION.**

a. Results of various cutter evaluations and vessel mishaps have highlighted the need for guidance on Coast Guard navigation procedures and policy.

b. This instruction provides general guidance on procedures for safe cutter navigation and was developed to assist the commanding officer, officer-in-charge, and navigator in carrying out their responsibilities outlined in reference (a). The information in this instruction is not new, but is a compilation of generally accepted navigation procedures.

c. No single instruction could be all inclusive on cutter navigation due to many variables such as differing cutter types, personnel qualification and experience, operating areas, etc. Therefore, the majority of this instruction is advisory, leaving cutter navigational execution to the discretion of individual commanding officers or officers-in-charge.

d. The information in this instruction will be included as the Navigation Bill in a future standard Cutter Organization and Regulations Manual.

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3. **RESPONSIBILITIES.**

a. Commanding officers of all cutters 180 feet and longer shall:

(1) Assign, train, and qualify navigation personnel in accordance with enclosure (1) and reference (b).

(2) Use enclosures (2) and (3) as general guidance in preparing for safe cutter navigation.

(3) Develop checklists for getting underway and entering port/approaching restricted waters modeled on enclosures (4) and (5) respectively.

(4) Comply with enclosure (6) in the execution of cutter navigation.

(5) Publish command navigation standards. These standards should amplify the navigation requirements in reference (a) and this instruction. Command navigation standards shall also include:

(a) Standard helm and engine order commands.

(b) Standard line handling commands.

(c) Standard navigational plotting symbols.

(d) Command definition of restricted waters, policy on when navigation details shall be set, and standard navigational fix intervals.

(e) Designation of cutter's navigational draft and depth of shoal water to be highlighted on piloting charts.

(f) Other navigational information desired by the commanding officer.

b. Commanding officers and officers-in-charge of all cutters less than 180 feet shall:

(1) Assign, train, and qualify navigation personnel in accordance with enclosure (1) and reference (b).

(2) Use enclosures (2), (3), and (6) as general guidance in preparation for and execution of safe cutter navigation.

(3) Develop checklists for getting underway and entering port/approaching restricted waters modeled on enclosures (4) and (5) respectively.

3. b. (4) Publish command navigation standards which include the requirements in paragraph 3-a-5 above.

4. **ACTION.** Area and district commanders, commanders of maintenance and logistics commands, and unit commanding officers shall ensure the requirements of this instruction are included as appropriate in area/district training team curricula, refresher training, and other cutter training and inspection programs.

5. **CHANGES.** Recommended changes to this instruction shall be routed via the chain of command, including via the respective area commander, to Commandant (G-OCU).

W. T. Leland
Chief, Office of Law Enforcement and
Defense Operations

Encl: (1) Navigation Personnel Training and Qualification
(2) Standard Navigation Planning Checklist
(3) Standard Navigation Brief Outline
(4) Standard Checklist For Getting Underway
(5) Standard Checklist For Entering Port/Approaching Restricted Waters
(6) Navigation Plan Execution

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U.S. NAVY DISTRIBUTION: COMNAVSURFLANT (4), COMNAVSURFPAC (4), CONTRALANT (4), COMTRAPAC (4), FTC NORFOLK (4), NWTC CHARLESTON (4), FTC MAYPORT (4), FTU LITTLE CREEK (4), FTC PEARL HARBOR (4).

NAVIGATION PERSONNEL TRAINING AND QUALIFICATION

1. **Navigator.** Cutter navigators shall be assigned as follows:

   a. Reference (a) states that, "the operations officer will normally also be the navigator. However, when circumstances require, an officer may be assigned as navigator under the operations officer." Due to the size, billet structure and the nature of duties of some cutters, it is not possible to comply with the above criteria. In those cases, great care should be exercised in assigning a navigator, with emphasis on proficiency, navigation training, maturity and judgement.

   b. Navigators shall meet the following training qualifications:

      (1) Be a qualified underway Officer of the Deck in the cutter presently assigned.

      (2) Have completed one of the following:

         (a) Applicable sections of the U.S. Navy Ship Control and Navigation Personnel Qualification Standard, or;

         (b) Navigator-Piloting Refresher Course (J-2G-0602) and Navigation-Celestial Refresher Course (J-2G-0603), or;

         (c) Navigation Officer Course (J-2G-0618 or K-2E-2207/ J-2G-0603).

      (3) Have completed adequate sea service both as a trainee and as a qualified watchstander requiring navigation duties (i.e., OOD, JOOD, QMOW) which will prepare the individual to meet the demands of the duties of navigator. The time necessary to complete required training and to qualify as OOD (normally totalling 6 to 9 months) is the minimum time requirement. It is prudent to provide for a post-qualification period of experience before assigning duties as the navigator. As a guide, individuals with less than approximately twelve months of training and experience should not normally be assigned as navigator.

2. **Assistants to the Navigator.** Officers or enlisted personnel may be designated as assistants to the navigator or the navigation division officer/petty officer. These individuals shall normally, under supervision of the navigator, oversee the implementation of safe cutter navigation. The assistants to the navigator may evaluate the navigation plot, providing navigation information and recommendations to the conning officer. The assigned navigator shall retain the responsibilities in reference (a) and monitor the performance of both the bridge and Combat Information Center (CIC)/Combat Support Center (CSC) navigation teams. The assistants to the navigator should have completed, or be in the process of completing, the training designated for the navigator in paragraph 1.b.(2) of this enclosure.

3. **Bridge Navigation Team.** Shall complete applicable sections of U.S. Navy Ship Control and Navigation PQS (NAVEDTRA 43492-2 series) before being considered qualified in their assigned billets.

4. **Combat Information Center (CIC)/Combat Support Center (CSC) Team.** Shall complete applicable sections of U.S. Navy Non-NTDS CIC Operations PQS (NAVEDTRA 43358-3 series) before being considered qualified in their assigned billets. On cutters without a CIC/CSC, some sections of this PQS are required for the bridge navigation team. See reference (b) for specifics.

5. **Training Exercises.** Cutters shall conduct navigation training exercises in accordance with reference (b).

STANDARD NAVIGATION PLANNING CHECKLIST

1. **Preliminary Planning.**

   a. Ensure publications and charts are on board in accordance with cutter's allowances, corrected, and reviewed (as applicable):

      (1) Coast Pilot.

      (2) Fleet Guide.

      (3) Sailing Directions.

      (4) Light List/List of Lights.

      (5) The Port Directory (CLF 45 series, etc.).

      (6) Appropriate Operation Orders.

      (7) Operating Area Instructions.

      (8) Radio Aids to Navigation.

      (9) Notice to Mariners, Local Notice to Mariners, NAVAREAs, HYDROLANTS/PACS.

      (10) Tidal Current Tables.

      (11) Tide Tables.

      (12) HO 229/249.

      (13) Bowditch (Vol I and II).

      (14) Nautical Almanac.

      (15) COMDTINST 16672.2 (Navigation Rules).

      (16) Charts/plotting sheets are selected based on a review of the Catalog of Nautical Charts, HO PUB 1N. Review requirement for classified charts. Ensure all chart corrections are entered.

NOTE: It is extremely important that preliminary navigation planning include attempts to gain all available information on areas to be transited. This should include a review of the above references, and as practical contact with vessel commanders who normally operate in the area, local base commanders, pilots, etc. If moored in an unfamiliar port and a large crew turnover occurs (i.e., during a long yard period) it is recommended that navigation personnel tour the port by boat or other vessel in preparation for own cutter's future transit.

2. **Open Ocean Transit Planning.**

a. Track Selection (Rhumbline/Great Circle/Combination).

(1) Environmental Considerations.

(2) Optimum Track Ship Routing (OTSR) recommendation.

(3) ETA/SOA considerations.

(4) Review of Pilot Charts.

b. Track plotting on charts/plotting sheets.

(1) Conforms to:

(a) Recommended routes of Coast Pilot/Sailing Directions or OTSR recommendations.

(b) Operational requirements.

(c) Desires of CO/OINC/OTC.

(2) Clear of hazard/restricted/prohibited areas.

c. Radar Landfall Predictions.

d. Departure/Enroute/Arrival Lighted Aids to Navigation.

(1) Name.

(2) Nomenclature.

(3) Characteristics.

(4) Physical description.

(5) Maximum range of visibility computed.

(6) Time and bearing of expected sighting/losing.

3. **Restricted Waters Transit Planning.**

a. Lighted Aids to Navigation.

(1) Name.

(2) Nomenclature.

(3) Characteristics.

(4) Physical description.

3. a. (5) Computed visibility determined.

(6) Time and bearing of expected sighting/losing.

b. Chart preparation.

(1) All charts covering the area compared (using largest scale practical). Piloting charts selected.

(2) Hazards (shoals, gunnery practice areas, etc.) are:

(a) Displayed on all charts.

(b) Prominently marked.

(c) Marked with danger bearing/range.

(3) Visibility arcs of all lights plotted. (Use value computed above.)

(4) Aids to navigation marked and labeled with identical bridge/CIC/CSC labels for radar points (labels annotated in radar and visual bearing books for permanent reference.)

(a) Visible and distinctive.

(b) Close to the track (radar targets beyond minimum radar range).

(c) Provide bearing spread.

c. Track.

(1) Laid down on all charts (bridge/CIC/conning officer) of the areas for comparison.

(2) In accordance with recommended track per Fleet Guide, Sailing Directions, Coast Pilots, etc. Follow traffic separation schemes as necessary.

(3) Track allows sufficient maneuvering room for possible errors in position of charted hazards.

(4) Track does not cross danger bearings/ranges.

(5) Properly labeled in accordance with command navigation standards and includes:

(a) True/magnetic Courses, SOA, and distance marked on each leg.

3. c. (5) (b) Time of sightings for lights marked along with bearing.

(c) Turn bearings and turn ranges for every turn:

1. Marked from a fixed aid to navigation or radar navigation point.

2. Sufficient bearing/range rate.

3. Allows for advance and transfer.

(d) Danger bearings and ranges:

1. Each hazard marked.

2. Taken from fixed aids to navigation.

3. Provides sufficient warning of danger.

(e) Danger soundings (shoal waters):

1. Highlighted on either side of track.

2. Provide sufficient reaction time before grounding.

(f) Preselected points for chart shifts indicated.

(g) Track reviewed and an independent check of the track on all charts made.

d. Advance computations.

(1) Sunrise/set, moonrise/set.

(2) Tides.

(3) Tidal currents.

(4) Tides and current plotted against time.

e. Where practical, the Conning Officer should conduct a small boat transit of unfamiliar, highly restricted channels.

4. **Equipment checks/verification.**

a. Navigation Equipment.

(1) Compasses.

4. a. (1) (a) Gyro Compass:

1. Determine error.

2. Check repeater benchmark alignment and agreement between repeaters. Note errors for future reference.

(b) Magnetic Compass:

1. Within acceptable limits.

2. Deviation tables posted for ready reference by conning officer and navigation plotter(s) (bridge and CIC/CSC).

(2) Position Display Equipment (as applicable).

(a) DRA/DRAI:

1. Verify operations.

2. Insert initial position.

(b) DRT - Verify operation.

(c) CRT plot Displays:

1. Verify operation.

2. Insert initial position.

(d) Fathometer:

1. Verify operation.

2. Set to trace mode for restricted water transit.

(e) Pit Log - Verify Operation.

(f) Degaussing - Verify operation and proper settings.

(3) Optical Equipment.

(a) Verify operation/alignment of:

1. Sextants.

2. Stadimeters.

3. Alidades.

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4. a. (3) (a) 4. Azimuth/Bearing circles.

5. Binoculars.

6. Night Vision Devices.

(4) Electronic Equipment.

(a) Verify operation/alignment of:

1. Navigation radar/repeaters.

a. Record errors for future use.

2. Omega/Loran/Satellite electronic navigation equipment.

a. Plot and compare position.

b. Determine offset corrections as required.

3. Bridge-to-bridge Radio.

4. All radio direction finders (MF/HF/VHF/UHF as available).

a. Calibrated and calibration tables posted for navigation plotter(s) use.

(5) Plotting Equipment.

(a) Verify operation/alignment of:

1. PMPs.

2. Three-arm protractors.

3. Parallel rulers.

4. Navigation computers/calculators.

(6) Timepieces.

(a) Verify operation and errors of:

1. Chronometers.

2. Stop watches.

3. Comparing watches.

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STANDARD NAVIGATION BRIEF OUTLINE

The navigation brief shall normally be given at least 24 hours prior to getting underway or entering port. For cutters transiting homeport or normal operating areas, especially on a frequent basis such as aids to navigation cutters or on short notice basis such as a search and rescue standby cutter, this briefing may be limited to those items subject to change (i.e., weather, tides, currents, etc.).

1. CO/OINC/XO/XPO/OOD/Conning Officer Briefing

   a. Review of charts and track.

   b. Hazards to navigation.

      (1) Danger Bearings/Ranges.

      (2) Danger Soundings.

      (3) Navigation Warnings.

      (4) Bridge vertical clearances.

      (5) Bridge signals; radio capability (if manned).

   c. Maximum allowable deviation from track.

   d. Maximum safe speed.

   e. Areas where cutter can divert to or anchor in emergencies.

   f. Anticipated maritime traffic.

   g. Traffic separation schemes.

   h. Port or Vessel Traffic System (VTS) reporting /coordination requirements.

   i. Environmental considerations.

      (1) Tides.

      (2) Currents.

      (3) Weather predictions.

   j. Demarcation lines.

      (1) Inland/International Rules of Road.

      (2) Bridge-to-bridge Radiotelephone.

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1. k. Bouyage system in effect.

   l. Port requirements/regulations.

   m. Navigation equipment status.

2. **Navigation Team Briefing (Both bridge & CIC/CSC teams).**

   a. Review track charts.

      (1) Hazards to navigation - danger bearing/ranges.

      (2) Anticipated aids to navigation-nomenclature to be used.

   b. Assignment of navigation team stations including review of duties.

   c. For each leg:

      (1) Maximum allowable deviation from track.

      (2) Maximum safe speed.

      (3) Planned fix interval.

      (4) Danger soundings.

      (5) Anticipated traffic.

      (6) Areas along track where cutter can divert to in an emergency and possible anchorages.

      (7) Expected availability of suitable radar aids to navigation.

      (8) Expected sightings of navigation lights.

   d. Traffic separation schemes.

   e. Port or Vessel Traffic Systems (VTS) reporting/coordination requirements.

   f. Expected tidal currents and the state of the tide.

   g. Planned sequence of aids to navigation and points at which coordinated chart shifts will occur.

   h. Inland/International waters demarcation lines and boundary lines governing the use of bridge-to-bridge radiotelephone.

   i. Buoyage system in use for that port.

STANDARD CHECKLIST FOR GETTING UNDERWAY

Times and events should be adjusted as appropriate for each cutter.

Time prior to Getting Underway	Event
48 Hours	Establish getting underway schedule covering: propulsion plant light off, shift from shore to cutter power, last boat run, boat hoisting schedule, rigging in of accommodation ladder, disposal of cutter vehicles, light off and testing of electronic suite, late stores loading, U.S. and Guard Mail.
	Release MOVREP.
24 Hours	Standard Navigation Plan brief for CO/OINC, XO/XPO, OOD, JOOD, Navigation Teams.
	Ensure CIC/CSC/bridge/conning officer chart tracks are identical.
	Conduct steering system PMS.
	Verify arrangements for tugs/pilots/line handlers.
	Verify schedule for lighting-off power plant.
	Check navigation lights for proper operation.
	Ensure provisions are made to run degaussing range (when available).
	Ascertain schedule of other vessel movements in harbor on underway day.
8 Hours	Energize gyrocompasses.
	Energize and calibrate all radar repeaters. (Post errors at each repeater and for navigation plotters.) Energize and initialize all electronic navigation equipment. (Coordinate with shift from shore to cutter power.)
4 Hours	Determine gyro, steering, and navigation repeater errors. (Post for ease of reference by OOD, navigation plotters, and bearing takers.)
	Reconfirm tugs/pilots/line handlers
3 Hours	Verify arrangements for discontinuance of shore services.

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Time prior to Getting Underway	Event
2 Hours	Ascertain from the executive officer/executive petty officer: 1. If any variation in standard sequence of stationing Special Sea Detail and Anchor Detail exists. 2. Time of heaving in to short stay or singling up lines. 3. Disposition of boats and vehicles. 4. Instructions concerning U.S. and Guard Mail. 5. Number of passengers and expected time of arrival. Ensure berthing, messing, muster, and abandon ship assignments are complete for each passenger. After obtaining permission from the executive officer/executive petty officer start hoisting boats and returning vehicles as soon as no longer required. After obtaining permission from the executive officer/executive petty officer rig in booms and accommodation ladders not in use and secure for sea. Promulgate underway time to all hands. Energize all radars except those prohibited by local electromagnetic emissions restrictions. Check/energize all other electronic equipment (e.g. fathometer, etc.). Conduct radio checks on all required circuits. (Include bridge-to-bridge radio telephone.)
1 1/2 Hours	Muster the crew. Shift into the Uniform of the Day (if required).
1 Hour	Set condition Yoke. Chief Master at Arms (CMAA) inspection for stowaways. Clear cutter of visitors. Tune and peak radars. Ensure cleanliness of pier.

Time prior to Getting Underway	Event
1 Hour	Dump all trash and garbage.
	Ensure that the pit sword is in raised position (if applicable).
45 Minutes	Station the Special Sea Detail and Anchor Detail.
	In reduced visibility:
	1. Station the low visibility detail.
	2. Set material condition Zebra on main deck and below.
	Embark pilot. Display CODE HOTEL.
	Test anchor windlass.
	Prepare anchor(s) for letting go.
	OOD shift watch to the bridge.
	Conduct loss of steering drill. (Check steering in all available modes.)
	Test sound-powered phone circuits in use.
	Post tide/current/aids to navigation information on the bridge and CIC/CSC.
	Receive department reports for readiness to get underway.
	CMAA make report of inspection for stowaways.
	Record draft of ship fore and aft in cutter's deck log.
15 Minutes	Obtain commanding officer's/officer's-in-charge permission to shift to pilot house control (when equipped) and test main engine(s). Direct engineering control accordingly after ensuring that the screw(s) are clear. (Ensure brow, mooring lines, and shore connections do not foul engine tests.)
	Test cutter's whistle/general alarms.
	If alongside a pier, ensure that all shore connections are broken and that the brow(s) are ready to be removed.

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Time prior to Getting Underway	Event
15 Minutes (cont)	Single up lines when so ordered.
	When required, sound quarters for leaving port.
	Conduct time check throughout the cutter.
	Report when "ready for getting underway" to the executive officer/executive petty officer.
10 Minutes	Warn engineering control to standby to answer all bells or of impending pilothouse control maneuvers.
	If a Flag Officer or Unit Commander is embarked, request permission to get underway as scheduled.
Zero Time	Underway.
	Shift colors/close up international call sign (if appropriate).
	Report underway to VTS, check for vessel traffic which may be encountered in transit.
	When clear of restricted waters, lower pit sword.
After U/W	Advise CO/OINC when entering international waters/haul down international call sign (if appropriate).
	When clear of restricted waters conduct loss of steering drill.
	Check out of VTS when appropriate.
	When directed secure the Special Sea Detail.
	Return check list to navigator for filing.

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STANDARD CHECKLIST FOR ENTERING PORT/ APPROACHING RESTRICTED WATERS

Times and events should be adjusted as appropriate for each cutter.

Time prior to Entering Port or Restricted Waters	Event
24 Hours	Standard Navigation Plan brief with CO/OINC, XO/XPO, OOD, JOOD, Navigation Teams.
	Ensure CIC/CSC, bridge and conning officer, chart tracks are the same.
When Directed	Dump all trash and garbage overboard as regulations permit.
	Pump bilges as regulations permit.
	Deballast as far in advance as prudent and for as long as regulations permit.
	Blow tubes if required.
	Subject to the concurrence of the navigator, raise the pit sword (if applicable).
	Ensure the smart appearance of the cutter (fouled ensigns, gear adrift, etc.).
3 Hours	Ascertain the expected time of anchoring/mooring from the navigator, and notify the engineer officer/engineer petty officer, weapons officer, first lieutenant, and engineering control.
1 Hour	Pass the word, "Make all preparations for entering port. Cutter will anchor (berth _____ side to) at about_____. All hands shift into the Uniform of the Day."
	Station the Navigation Detail.
	Weather permitting remove such canvas covers as are normally off when in port.
	Obtain information concerning boating from the executive officer/executive petty officer and inform the first lieutenant.
	Lay out mooring lines if required.
	Set up and check all harbor and tug radio frequencies.
	Check into VTS when appropriate.

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Time prior to Entering Port or Restricted Waters	Event
45 Minutes	Test Cutter's whistle/general alarms.
	Pass the word "Set the Anchor Detail" or "Set the Special Sea Detail" (as appropriate). Have anchor(s) ready for use when appropriate.
	Prior to approaching restricted waters, conduct a loss of steering drill. (Check steering in all available modes.) Shift to pilothouse control (when available) and test backing bells.
	Hoist international call sign when entering inland waters (if applicable).
30 Minutes	Obtain information from navigator on depth of water at anchorage, type of bottom, ready anchor, and scope of chain to be used; and inform anchor detail.
	Receive readiness reports for entering port.
	Request permission to enter port from the proper authority.
	When mooring to a pier inform first lieutenant as to range of tide and time of high water.
	Station linehandlers.
20 Minutes	When required, designated personnel fall in at quarters for entering port.
	Direct CMAA to inspect upper decks to see that crew is in proper uniform.
15 Minutes	Station inport deck watches.
	If mooring to a buoy, lower boat with buoy detail as directed.
	Standby to receive tugs and pilots.

Time prior to Entering Port or Restricted Waters	Event
Upon Mooring	Secure main engines on _____hour standby. Secure gyros and navigational radars as directed.
	Check out of VTS as appropriate.
	If anchored, obtain navigation bearings and ranges, and determine swing and drag circles.
	Record draft of cutter fore and aft.
	Shift watch to quarterdeck.
	Return checklist to navigator for filing.

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NAVIGATION PLAN EXECUTION

1. **Restricted Waters Navigation.** (As defined by command navigation standards.)

   a. Navigation Team Composition (adjust as appropriate for cutter capability and personnel available).

      (1) Bridge:

         (a) Navigator.

         (b) Assistant to the navigator (navigation evaluator).

         (c) Navigation plotter (should not be same individual as navigation evaluator unless cutter personnel strength prohibits).

         (d) Bridge bearing takers.

         (e) Bearing book recorder.

         (f) Bridge phonetalker(s).

         (g) Fathometer operator.

         (h) Leadsman and phonetalker (forecastle).

         (i) Lookouts.

         (j) Bridge radar observer (to assist conning officer).

         (k) Shipping personnel (see 1-a-2).

      (2) CIC/CSC (when equipped, cutters shall always use CIC/CSC in restricted waters to provide navigation/shipping information, even in unrestricted visibility).

         (a) Piloting officer

         (b) Navigation plotter.

         (c) Navigation log keeper.

         (d) Navigation radar operator.

         (e) Shipping officer.*

         (f) Shipping radar operator.*

1. a. (2) (g) DRT plotter.

(h) Maneuvering board operator.*

(i) Vertical plot.

(j) Surface status board keeper.

(k) Phonetalker(s).

(l) Radar control officer.

* Shall be included in bridge navigation team on cutters without CIC/CSC.

b. **Steering Checks.** Prior to getting underway, entering port, or otherwise approaching restricted waters, a successful shift of steering control to after steering (loss of steering drill when underway prior to entering restricted waters) shall be conducted by members of the Special Sea and Anchor Detail. This loss of steering drill shall be annotated on the appropriate checklist in enclosures (4) and (5).

c. **Plotting Procedures.** Danger bearings and shoal water/danger soundings, course and distance of each leg, and turn bearing/ranges based on advance and transfer shall be plotted. The day and/or night characteristics of all navigational aids intended for use shall be determined, and computed visibilities of lights shall be plotted.

d. **Radar Range and Gyro Error.** Radar range error shall be determined and applied during every radar navigation evolution. Radar range error shall be posted on radar repeaters and at navigation plots. The gyro error shall be checked at appropriate visual range opportunities.

e. **Set and Drift.** Set and drift shall be determined at every fix if the fix interval is three minutes or more. If the fix interval is less than three minutes, set and drift shall be determined at every second fix. Set and drift shall be applied to subsequent dead reckoning (DR) positions to determine an estimated position (EP) in the event that planned fixes are not obtained.

f. **Fix Times and Plotting Fixes.** Fix intervals shall be determined by the navigator based on the command navigation standards. The bridge and CIC shall use identical fix intervals and fix times. Each shall compare the other station's fixes on a periodic basis. A DR plot shall be maintained through a minimum of the next two planned fixes.

1. g. **Lines of Position (LOP) Use.** When navigating in either restricted waters or open ocean, all available means of navigation should be used. At a minimum, general requirement shall include:

(1) When true bearing LOPs are available, they shall be used for bridge piloting fixes. A minimum of three visual LOPs shall be used, with a desired 60 degrees of bearing spread between each. One radar range LOP shall always be used in conjunction with visual LOPs.

(2) When relative bearing visual LOPs are used, a minimum of two visual LOPs and one radar range LOP shall be used for bridge piloting fixes.

(3) CIC/CSC shall use radar ranges for fixes unless more precise navigation is required using visual bearings (i.e., naval gunfire support, etc.).

(4) When only radar range LOPs are available, at least three LOPs shall be used for a radar fix.

(5) Sextant angles may be used in lieu of visual LOPs. Sextant angles must be checked to ensure a "swinger" is not encountered.

(6) At times it may be necessary to combine visual, radar, and other electronic navigation LOPs to obtain fixes in coastal areas.

(7) When only two LOPs from any means are available, the resultant position shall be classified an estimated position. (This does not include LORAN navigation when only two LOPs are required for a fix.)

(8) When shifting from one type of LOP to another (i.e., visual to radar or LORAN), ensure electronic systems are checked against visual fixes while visual fixes are still available.

h. **Coordination of Chart Shift.** Bridge and CIC/CSC shall coordinate chart shifts so that both are not shifted at the same time and so that they do not require shifting during an impending turn.

i. **Navigation Team and OOD/Conning Officer Coordination.**

(1) The navigation evaluator shall make recommendations in a clear and positive manner to the OOD/conning officer. In those instances in which the navigator or navigation evaluator does not concur with action of the conning officer, that fact must be made known to and acknowledged by the commanding officer or officer-in-charge.

(2) On CIC/CSC equipped cutters, in order for the OOD/conning officer to not be overburdened with duplicate or conflicting reports the following procedures shall be followed:

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1. i. (2) (a) When visibility is unrestricted the CIC/CSC piloting information shall be provided to the bridge navigation evaluator vice the OOD/conning officer. The navigation evaluator shall compare the CIC/CSC information to the visual plots and use both plots information in providing information and recommendations to the OOD/conning officer.

(b) When CIC/CSC radar navigation is the primary information available, the CIC/CSC piloting information shall be passed direct to the OOD/conning officer. The bridge navigation evaluator shall concur/not concur with CIC/CSC's information and recommendations based on the bridge's own radar and/or partial visual plot.

(c) Shipping information coordination shall include:

1. On CIC/CSC equipped cutters the CIC/CSC shipping information shall be provided direct to the OOD/conning officer. The bridge radar observer shall keep track of these reports and correlate them with their own display and other information from lookouts, bridge-to-bridge radiotelephone, etc. The bridge radar observer shall notify the OOD/conning officer of all hazards and provide a "course clear" determination before all major course changes.

2. On cutter with Automatic Radar plotting Aids (ARPAs) or without CIC/CSC, the primary shipping plot shall be maintained on the bridge. Lookouts shall then report direct to the bridge ARPA operator/shipping plot. When primary shipping plot is on the bridge, CIC/CSC must still maintain a shipping plot in order to correlate piloting/shipping information. A "scope plot" may be sufficient for this purpose.

3. Some cutters may be required to combine the duties of bridge radar observer, shipping officer, navigation/shipping radar operator and maneuvering board operator. Rapid radar plotting techniques or "scope plots" may be required on cutters with limited personnel strengths.

(d) The OOD/conning officer shall keep the bridge and CIC/CSC navigation teams informed of their intentions and objectives well in advance of execution. If the OOD/conning officer does not agree with the navigation information being provided, an immediate report of that fact shall be made and acknowledged by the commanding officer or officer-in-charge.

j. **Fathometer/Leadline Use.**

(1) All available fathometers shall be used at each fix to determine water depth. This information shall be provided to both the bridge and CIC/CSC navigation plots for comparison with other navigation information.

1. j. (2) A leadsman and lead shall be made ready whenever the Special Sea Detail is set. The leadline should be used when necessary to verify the cutter's fathometer readings and the depth marked on available charts.

2. **Open Ocean Navigation.**

a. Position Determination. Even with several electronic navigational systems available, use of celestial navigation is still important. In some area of the world, or when casualties occur to electronic systems, celestial observations may be the only navigation method available. Celestial navigation is also an important check of electronic systems and must be practiced to maintain personnel proficiency. Operating area and weather conditions permitting, minimum daily celestial activity shall always include:

(1) Morning and evening star observations.

(2) Morning, LAN, and afternoon sun line observations.

(3) Celestial determination of gyro error.

b. Set and Drift. Set and drift shall be determined with each fix.

c. Plotting. In all cases involving point-to-point navigation, the cutter's track shall be plotted and Position and Intended Movement (PIM) indicated at minimum intervals of four hours. A DR plot shall be maintained through a minimum of the next two planned fix times. In electronic navigation system coverage areas, at a minimum, an hourly electronic fix shall be plotted for each electronic system available and compared to the DR from the most recent high confidence fix.