

DEPARTMENT OF THE NAVY

OFFICE OF THE CHIEF OF NAVAL OPERATIONS 2000 NAVY PENTAGON WASHINGTON, DC 20350-2000

OPNAVINST 9070.2A N9 12 Sep 2012

OPNAV INSTRUCTION 9070.2A

From: Chief of Naval Operations

Subj: SIGNATURE CONTROL POLICY FOR SHIPS AND CRAFT OF THE U.S.

NAVY

Ref: (a) OPNAVINST 9070.1

(b) OPNAVINST 4700.7L

(c) OPNAVINST C8950.2G (NOTAL)

(d) COMNAVSURFLANTINST/COMNAVSURFPACINST C9073.5 (NOTAL)

Encl: (1) Terminology

- 1. <u>Purpose</u>. To establish policy and assign responsibility for incorporating signature control features in ships and craft, and their systems.
- 2. <u>Background</u>. Congress enacted Public Law 95-485 on Navy shipbuilding policy out of concern for the ability of combatant forces to withstand battle damage. In response to that public law, the Navy addressed vital elements of ship survivability in separate directives. Reference (a) integrated the broad aspects of survivability, which had previously been addressed by individual instructions, into a comprehensive policy directive for ships. In the context of providing fundamental design guidance to enhance readiness and warfighting sustainability, reference (a) identified signature reduction as one of several required ship protection features. This instruction expands upon the requirements for incorporating signature reduction and control features in U.S. Navy ships and craft.
- 3. Cancellation. OPNAVINST 9070.2.

4. Discussion

a. For the purpose of this instruction, signatures are defined as any attribute by which a ship or craft can be detected by specific sensors. In most cases, these signatures

can be a source of classification as well as detection. Enclosure (1) contains definitions of several types of signatures relevant to ships and craft, and on board systems.

- b. Warships and selected craft are expected to perform offensive missions, operate in high threat areas, withstand enemy attacks, and survive. Ship signature control technologies improve both ship warfighting capability and combat systems effectiveness, and cost-effectively enhance passive survivability. Passive survivability is a vital attribute in littoral warfare with the advent of readily available, technologically sophisticated sensors and weapons.
- c. Effective ship signature control must be achieved in a balanced and affordable manner through design practices, equipment selection, and material application, as well as maintenance, doctrine, and tactics. The combined effects of these activities shall synergistically improve the ship's warfighting capability and combat systems effectiveness.
- d. Goals of signature control include: (1) reducing overall detection and targeting of the ship or craft to a range less than the maximum effective range of its main defensive battery for air, surface, and undersea warfare; (2) reducing the distinction between specific ship or ship class signatures, thereby preventing identification and targeting of specific ships or ship classes; (3) reducing the likelihood that a homing weapon could acquire and guide onto a reduced-signature ship equipped with active and passive countermeasures; and (4) blending passive signature reduction and active signature management measures (emissions control) to prevent exploitation and cause confusion in the enemy's ability to identify and target ships.
- 5. <u>Objective</u>. To implement definitive policy leading to operationally relevant signature requirements at the total ship system level for ships, craft, and their respective machinery, combat, and topside systems. Specifically, this policy shall:
- a. Ensure incorporation of signature control measures early in the ship and systems design process. For truly effective signature reduction and control to be accomplished on future ships, craft, and applicable ship systems, the integration effort must start in the materiel solution analysis phase prior

to milestone A, and continue through milestone B so that signature thresholds appear as measures of effectiveness and as performance attributes in the acquisition program's test and evaluation master plan, operational requirements document, and capability development document.

- b. Provide the basis for establishing multi spectral signature goals for all ships, craft, and systems under development.
- c. Provide the basis for developing an investment strategy to relate affordable signature reduction and mission effectiveness issues and to establish priorities to implement signature control features in ship and critical equipment and system new construction and upgrades.
- d. Emphasize achievable signature levels and approve those that are affordable and will ultimately relate to mission and employment concepts for use in development of operational requirements, milestone exit criteria, test and evaluation plans, design specifications, design reviews, evaluation of change proposals, and the procurement of shipboard equipment.
- e. Address implementation issues concerning long-term maintenance costs and maintainability requirements to ensure that in-service ships maintain specified signature levels.
- f. Foster coordination between systems commands (SYSCOM) and program executive offices (PEOs) in a team effort to design in signature control and retain control of signature throughout the service life of ships, while ensuring that primary performance capabilities of combat system elements are maximized.
- 6. Applicability and Scope. This instruction applies to inservice and new ships and selected craft, and encompasses all on-board equipment, whether mission critical or not, that contributes to the overall ship signature while the ship is in a heightened state of readiness for potential conflict. Comprehensive signature control for future ships and craft must consider the impact on signatures during evolutions involving not only tactical, navigation, and other mission critical systems, but also involving non-critical items such as boats,

replenishment stations, non tactical communication equipment, quarterdeck equipment, and temporary topside equipment, throughout the life of the ship.

7. Policy

- a. Signature control shall be considered a fundamental design requirement at the total ship systems level. Signature control features shall be incorporated in a cost-effective manner in all shipboard systems, machinery, communication and combat systems; shall be designed into all systems from inception; and shall be maintained through the ship's life cycle.
- b. Signature control features in existing ships shall be maintained per platform requirements. Major overhaul and modernization activities shall ensure that existing signature control features are not compromised and that additional signature reduction is incorporated where feasible, taking into consideration total ownership costs, system performance, and advancing threats.
- c. Reference (b) defines general maintenance policy for Navy ships. It requires that ships' configuration be controlled and material condition be maintained to support accomplishment of assigned missions. Reference (b) also requires that maintenance programs take into account technical information and data about system and equipment performance requirements. Because ship signatures influence mission effectiveness, these policies shall also apply to configuration and material condition associated with ship signature control. In some cases, separate instructions outline additional responsibilities for testing, controlling, and maintaining specific types of signatures, as exemplified by references (c) and (d).
- d. Procurements for mission and non-mission essential equipment shall invoke signature control where appropriate and necessary to meet projected ship and craft operational requirements.

8. Responsibilities and Actions

- a. Deputy Chief of Naval Operations for Warfare Systems (CNO (N9)) shall:
- (1) Exercise primary responsibility and authority for the coordination, direction, and development of naval warfare signature control guidance, and shall provide management focus to ensure balance among mission effectiveness versus projected threat, platform commonality, and affordability issues.
- (2) Ensure that planning, programming, budgeting, and staffing exist to support further development, incorporation, and testing of signature control features for all shipboard systems, machinery, and combat systems.
- b. <u>Director</u>, <u>Surface Warfare Division (OPNAV (N96))</u> shall implement the responsibilities of the Chief of Naval Operations (CNO) with regard to the determination of cost-effective signature control requirements and characteristics for ships and craft and systems under their control, and shall direct appropriate programming and budgeting actions to ensure signature controls are incorporated.
- c. <u>Director</u>, <u>Air Warfare Division (OPNAV (N98))</u> shall coordinate with OPNAV (N96) and implement the responsibilities of the CNO with regard to the determination of signature control requirements and characteristics of aircraft carriers, all ship embarked aircraft, and aviation systems installed in other ships, and shall direct programming and budgeting actions to ensure signature control initiatives receive support to the maximum extent technically feasible and affordable.
- d. <u>Director</u>, <u>Expeditionary Warfare Division (OPNAV (N95))</u> shall coordinate with OPNAV (N96) and implement the responsibilities of the CNO with regard to the determination of signature control requirements and characteristics of amphibious ships and craft and associated systems under their cognizance, and shall direct planning, programming and budgeting actions to ensure signature control initiatives are supported to the maximum extent technically feasible and affordable.

- e. Deputy Chief of Naval Operations for Information Dominance (CNO (N2/N6)) shall coordinate with CNO (N9) and implement the responsibilities of the CNO with regard to the implementation of signature control requirements and characteristics into shipboard systems under their cognizance, and shall direct programming and budgeting actions to ensure signature control initiatives are supported to the maximum extent technically feasible and affordable.
- f. Director, Low Observable (LO) and Counter Low Observable Policy, Technology, and Advanced Projects (OPNAV (N84D)) shall coordinate with OPNAV (N96), OPNAV (N98), CNO (N2/N6); the Office of Naval Research (ONR); Commander, Naval Sea Systems Command (COMNAVSEASYSCOM); and Commander, Naval Air Systems Command (COMNAVAIRSYSCOM) to ensure that newly developing technologies are available for consideration in determining the most cost-effective approaches to signature reduction. OPNAV (N84D) shall provide support as the office of primary responsibility for LO security requirements for the Navy and Marine Corps, in support of the National Disclosure Policy set by the Office of the Secretary of Defense.
- g. <u>COMNAVSEASYSCOM</u>, <u>COMNAVAIRSYSCOM</u>, <u>and Commander</u>, <u>Space</u> and <u>Naval Warfare Systems Command</u>, in support of and in coordination with the CNO, shall:
- (1) Provide the focus for comprehensive development, assessment, and implementation of signature control technology in ships and craft, and their systems.
- (2) Assume responsibility for state of the art technology awareness, transfer of technology, and implementation of cost-effective signature control technologies.
- (3) Develop appropriate system engineering capability to perform assessments of signature control efforts for use in new designs and operational requirements.
- (4) Determine the feasibility, benefits, and costs associated with developing and implementing signature control features.

- (5) Establish test standards, specifications, and procedures, and conduct developmental testing and evaluation to assess the technical performance of signature control techniques matched to actual and anticipated threat sensors.
- (6) Ensure that all applicable military and federal specifications, standards, manuals, and other directives are updated and or developed as necessary to reflect performance requirements for signature control features.
- (7) Ensure appropriate planning, programming, and budgeting exists to implement all ship, craft, and systems signature control requirements.
- (8) Develop security guidelines applicable to signature control of Navy ships and craft, and their associated on-board systems.
- (9) For existing systems, ensure that signature control is considered in planned upgrades of existing systems or hardware for which they exercise life cycle responsibilities. Signature control requirements must be considered in the context of the mission requirements of the ships or craft in which the upgraded system will be installed.
- h. <u>COMNAVSEASYSCOM</u>, specifically, shall ensure that signature control engineering is integrated during research, development, design, production, and life cycle support for ships and craft, and related systems. COMNAVSEASYSCOM shall:
- (1) Maintain central technical authority for signature control, determining feasible signature levels, coordinating with ONR regarding suitable emerging technologies, and supporting the appropriate PEOs and SYSCOMs regarding development and integration of capable and suitable low signature combat system equipment.
- (2) For ships with RCS signature requirements, COMNAVSEASYSCOM and PEO shall conduct ship RCS measurements predeployment and as required by other guidance, such as the system maintenance index page, in order to certify that the ship meets the class requirement, and to determine signature deficiencies during life cycle. Translate these assessments into survivability risk determinations and provide recommendations

for specific remedial actions to support ship deployment at sufficient readiness to support combat operations. These recommendations shall be provided to fleet commanders and type commanders for action.

- (3) Provide input to fleet and type commanders for repair packages for all CNO availabilities. These packages shall encompass the work required to address major RCS deficiencies and sustain the ship through its operational cycle.
- i. $\underline{\text{PEOs}}$, in support of and in coordination with the CNO, shall:
- (1) For new systems, incorporate balanced signature requirements in the design and construction of new ships and craft, and ship systems under their cognizance. PEOs shall reserve technical authority for concurrence to system designs or modifications.
- (2) For existing systems, ensure that signature control is considered in planned upgrades of existing systems or hardware for which they exercise life cycle responsibilities. Signature control requirements must be considered in the context of the mission requirements of the ships or craft in which the upgraded system will be installed.

j. Fleet Commanders shall:

- (1) As being responsible for the material condition of their ships, coordinate with the appropriate program manager to ensure that all life cycle support, maintenance, and upgrade activities preserve ships and signature characteristics.
- (2) Designate appropriate officers to coordinate and oversee all ship level matters pertaining to signature control, and all maintenance activities from organizational level through depot level, to ensure that in service ship systems are maintained at fully effective levels. Fleet commanders shall advise OPNAV (N96) when budget resources are inadequate to support the maintenance of signatures required to sustain the designed level of ship combat capability.

- k. Commanding Officers of Ships shall appoint an officer to oversee ship signature control and all maintenance afloat and ashore that impacts the ship's signature. Ships with radar cross section (RCS) reduction suites shall report degradations to their RCS signature via Defense Readiness Reporting System-Navy (DRRS-N).
- 9. <u>Records Management</u>. Records created as a result of this instruction, regardless of media and format, shall be managed per Secretary of the Navy Manual 5210.1 of January 2012.

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TERMINOLOGY

- 1. <u>Combat Systems</u>. Devices and systems used for detection and tracking, recognition and identification, communication, navigation, weapons firing and control, electronic countermeasures, and test equipment.
- 2. <u>Low Observables (LO)</u>. Efforts dedicated to making features (i.e., observables, signatures) of a vehicle more difficult for a number of different sensors to observe; i. e., the field of signature reduction technology. Also very LO or "stealth."
- 3. Passive Survivability. Generally, this term refers to the ability of a ship or craft to endure in a threatening environment without resorting to active countermeasures such as weapon firing or electronic jamming. A typical example of effective passive survivability would be a situation where an incoming missile is distracted or seduced away from a ship due to the ship's signature being lower than that of an offboard decoy.
- 4. <u>Sensor</u>. A device for detecting energy emissions, disturbances, or reflections. Examples include antennas for radiofrequency (RF) energy, hydrophones for acoustic energy, electro optic cameras, and also human visual and olfactory senses.
- 5. <u>Signature</u>. Any attribute of an object by which a sensor can detect, locate, and or classify that object. Signatures for surface ships and craft include:
- a. The RCS of the ship and its wake by which a radar can detect the ship.
- b. The acoustic signature which can be broken down into the following components:
- (1) Underwater radiated noise which provides the means for a passive underwater acoustic sensor to detect, classify, and localize a ship, and which can interfere with ownship sonars or nearby friendly sonars (mutual interference).

- (2) Sonar self noise which limits the ability of ownship's sonar to detect and classify other ships.
- (3) Far field airborne noise which determines the ability of the ship to be detected by an observer (particularly relevant for small craft).
- (4) Reflected (target strength) acoustic signatures by which threat sensors can detect the ship.
- (5) The infrared (IR) radiation by which passive sensors can detect either ship generated or externally reflected IR emissions from the ship.
- (6) The electromagnetic signature by which passive sensors can detect the many forms of RF emissions radiated from the ship's required sensors and systems.
- (7) The visual signature by which electro optical devices or the human eye can detect the ship.
- (8) Other signatures from sources such as bioluminescence, radioactivity, and miscellaneous effluents (e.g., garbage, human waste, petroleum products, air pollutants) by which specialized sensors can detect the ship.