



DEPARTMENT OF THE NAVY  
OFFICE OF THE CHIEF OF NAVAL OPERATIONS  
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IN REPLY REFER TO  
OPNAVINST 9070.2  
N86  
05 December 1996

OPNAV INSTRUCTION 9070.2

From: Chief of Naval Operations

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

- Ref: (a) OPNAVINST 9070.1, Survivability Policy for Surface Ships  
of the U.S. Navy (NOTAL)  
(b) OPNAVINST 5420.2Q, Resources and Requirements Review  
Board (NOTAL)  
(c) OPNAVINST 4700.7J, Maintenance Policy for Naval Ships  
(NOTAL)  
(d) OPNAVINST C8950.2F, Magnetic Silencing (NOTAL)  
(e) COMNAVSURFLANTINST/COMNAVSURFPACINST C9073.5, Ship  
Silencing (NOTAL)

Encl: (1) Terminology

1. Purpose. To establish policy and assign responsibility for incorporating signature control features in ships and craft, and their systems.

2. Background. 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)



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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. 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 onboard 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 effect of these activities will 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.

4. Objective. To implement definitive policy leading to operationally relevant signature requirements at the total ship

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system level for ships, craft, and their respective machinery, combat, and topside systems. Specifically, this policy will:

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 early concept exploration phase prior to Milestone (MS) 0, and continue through MS I and MS II so that signature thresholds appear as Measures of Effectiveness (MOEs) in the acquisition program's Test and Evaluation Master Plan (TEMP) and Operational Requirements Document (ORD).

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/system new construction and upgrades.

d. Emphasize achievable signature levels and approve those that are affordable and will ultimately relate to mission/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 System Commands 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.

5. Applicability and Scope. This instruction applies to in-service and new ships and selected craft, and encompasses all onboard 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

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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.

## 6. 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 in accordance with 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 (c) 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 (c) 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 (d) and (e).

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.

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## 7. Responsibilities and Actions

### a. Deputy Chief of Naval Operations (Resources, Warfare Requirements & Assessments) (N8) 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. Director, Surface Warfare Division (N86) 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/craft and systems under their control, and shall direct appropriate programming and budgeting actions to ensure signature controls are incorporated. As Chair of the Ship Characteristics Improvement Panel (SCIP), N86 is the CNO's Executive Agent for implementing ship and craft signature reduction initiatives. In addition to the SCIP responsibilities set forth in reference (b), and in conjunction with the warfare sponsors, the SCIP Chair shall:

(1) Provide continuous coordination, direction, management focus, and control to ensure effective implementation of ship and craft signature reduction and control requirements.

(2) Ensure that operational requirements for all future ships and craft formally address all signatures, and establish signature control requirements that are balanced to the degree dictated by the ship/craft mission and employment concept.

c. Director, Air Warfare Division (N88) shall coordinate with N86 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

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initiatives receive support to the maximum extent technically feasible and affordable.

d. Director, Expeditionary Warfare Division (N85) shall coordinate with N86 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. Director, Space and Electronic Warfare (N6) shall coordinate with N8 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, Navy Test & Evaluation & Technology Requirements (N091) shall coordinate with Office of Naval Research (ONR), N85, N86, N88, N6, and Commander, Naval Sea Systems Command (COMNAVSEASYSKOM) to ensure that new developing technologies are available for consideration in determining the most cost-effective approaches to signature reduction. N091D shall provide support as the Office of Primary Responsibility (OPR) for low-observables security requirements in support of the National Disclosure Policy set by the Office of the Secretary of Defense.

g. Fleet Commanders in Chief (FLTCINCs)

(1) FLTCINCs, being responsible for the material condition of their ships, shall coordinate with the appropriate program manager to ensure that all life cycle support, maintenance, and upgrade activities preserve ships' signature characteristics.

(2) Fleet Commanders shall 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.

h. Commanding Officers of Ships. A ship's commanding officer shall appoint an officer to oversee ship signature control and all maintenance afloat and ashore that impacts the ship's signature.

i. 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 will 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. COMNAVSEASYS COM, Commander, Naval Air Systems Command (COMNAVAIRSYS COM), and Commander, Space and Naval Warfare Systems Command (COMSPAWARSYS COM), 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.

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(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 onboard systems.

k. COMNAVSEASYSCOM, 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 be responsible for maintaining central technical authority for signature control, for determining feasible signature levels, coordinating with ONR regarding suitable emerging technologies, and supporting the C<sup>4</sup>I, Combat, and Weapon System PEOs regarding development and integration of capable and suitable low-signature combat system equipment.



D. L. PILLING

Deputy Chief of Naval Operations  
(Resources, Warfare Requirements  
and Assessments)

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C<sup>4</sup>I. Acronym for Command, Control, Communications, Computers, and Intelligence.

Combat Systems. Devices and systems used for detection and tracking, recognition and identification, communication, navigation, weapons firing and control, electronic countermeasures, and test equipment.

Low observables (LO). 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 low observables (VLO) or "stealth."

Observable. See Signature.

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.

Sensor. 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.

Signature. Any attribute of an object by which a sensor can detect, locate, and/or classify that object. Signatures for surface ships and craft include:

(1) the radar cross section (RCS) of the ship and its wake by which a radar can detect the ship;

(2) the acoustic signature which can be broken down into the following components:

Enclosure (1)

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(a) 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 own-ship sonars or nearby friendly sonars (mutual interference);

(b) sonar self-noise which limits the ability of own-ship's sonar to detect and classify other ships;

(c) far-field airborne noise which determines the ability of the ship to be detected by an observer (particularly relevant for small craft);

(d) reflected (target strength) acoustic signatures by which threat sensors can detect the ship;

(3) the infrared (IR) radiation by which passive sensors can detect either ship-generated or externally-reflected IR emissions from the ship;

(4) the magnetic signature by which sensors can detect the disturbance to the earth's magnetic field caused by the passage of the ship through the water;

(5) the electromagnetic signature by which passive sensors can detect the many forms of RF emissions radiated from the ship's required sensors and systems;

(6) the electric signature by which passive sensors can detect the current field generated by dissimilar metals in the ship's hull, or by impressed current cathodic protection (ICCP) systems used to control erosion;

(7) the visual signature by which electro-optical devices or the human eye can detect the ship;

(8) the pressure signature by which sensors can detect a change in the local water pressure caused by the passage of the ship through the water; and

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(9) 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.

Stealth. See low observables.