DEPARTMENT OF THE NAVY
NAVAL SEA SYSTEMS COMMAND
2531 JEFFERSON DAVIS HWY
ARLINGTON VA 22242-5160

IN REPLY REFER TO

NAVSEAINST 9700.2
Ser 05K2/
11 Sep 98

NAVSEA INSTRUCTION 9700.2

From: Commander, Naval Sea Systems Command

Subj: INTEGRATED TOPSIDE SAFETY AND CERTIFICATION PROGRAM FOR SURFACE SHIPS

Ref:
(a) OPNAVINST 5100.8G, Navy Safety and Occupational Safety and Health Program of 02 Jul 86
(b) OPNAVINST 8023.2C, U.S. Navy Explosives Safety Policies, Requirements, and Procedures (Department of the Navy Explosives Safety Policy Manual) of 29 Jan 89
(c) DoD INST 6055.11, Protection of DoD Personnel From Exposure to Radio Frequency Radiation and Military Exempt Lasers of 21 Feb 95
(d) NAVSEAINST 5100.12A, Requirements for Naval Sea Systems Command System Safety Program for Ships, Shipborne Systems and Equipment of 11 Dec 95
(e) NAVSEA S9040-AA-GTP-010/SSCR Rev 3 of 22 Aug 90
(f) NAVSEAINST 3960.4A, Implementation Of Total Ship Test Program for Ship Production (TSTP/SP) of 01 Oct 85
(g) NAVSEA OP 3565/NAVAIR 16-1-529/NAVELEX 0967-LP-624-6010 of 22 May 96

Encl:
(1) Policies and Responsibilities of the Integrated Topside Safety and Certification Program for Surface Ships
(2) Procedures for Structural Test Firing of Mortars Torpedo Tubes, Rocket Launchers, and Guns Smaller than Three Inches
(3) Procedures for Structural Test Firing of Guns Three Inches and Larger (including 76mm)
(4) Procedures for Structural Test Firing of Guided Missile and ASROC Launchers
(5) Ammunition Authorization for Structural Test Firing

1. Purpose. To consolidate in one program, the policies and responsibilities for Surface Ship Topside Safety and Certification Programs.

2. Cancellation. This instruction cancels and supersedes NAVSEAINST 9110.1A and 9700.1A.

3. Definition. Topside Design is the ship design discipline that deals with the location, effects and safety of weapon systems, sensors, antennas, and other topside equipment over the entire topside of a ship. It deals with the physical interaction

of the installed topside equipment with each other, ship structure, ordnance, fuel, and personnel. The primary areas of concern for the Integrated Topside Safety and Certification Program are pointing and firing cutout zones, missile and gun blast effects, structural test firing, electromagnetic interference (EMI) and compatibility (EMC), hazard of electromagnetic radiation to ordnance (HERO), hazard of electromagnetic radiation to fuel (HERF), hazard of electromagnetic radiation to personnel (HERP), and radiation hazard (RADHAZ) cutout zones.

4. Background. The topside arrangement of weapons, sensors and antennas and their safety issues are directly related to the weapon's pointing, firing, and RADHAZ cutout zones, HERO, HERF, HERP, EMI, missile and gun blast effects and structural integrity. As these technical areas expanded with time, it became apparent that a consolidation of the instructions governing their execution would result in a more efficient, cost effective and manageable program. The establishment of this program is based on the requirements of references (a) through (g) and NAVSEAINSTs 9110.1A and 9700.1A to ensure the delivery and maintenance of a ship topside safe from the effects of the ship's weapon systems, sensors and antennas.

5. Scope. This instruction applies to all U.S. Navy, Coast Guard, Foreign Military Sales (FMS) and Military Sealift Command (MSC) ships.

6. Policy. The integration of weapons, sensors and antennas with the ship's topside shall be optimized for maximum warfighting capability commensurate with the highest level of safety as described in enclosure (1).

7. Responsibilities

a. The Integrated Topside Safety and Certification Program for Surface Ships, described in enclosures (1) through (5), shall be managed by the Warfare Systems Group, SEA 05K2.

b. Program Managers for Ships (PMS) and Participating Managers (PARM) shall provide the funding required for all of the certifications. PMSs and PARMs shall provide the information for their share of the program as described in enclosure (1).

c. The Naval Surface Warfare Center, Dahlgren Division, shall be the designated Technical Direction Agent for the accomplishment of the program tasks described in enclosure (1).

d. The following activities shall provide program support as described in enclosure (1):

Fleet Technical Support Centers

Naval Shipyards

Naval Ordnance Centers

Naval Surface Warfare Center, Crane Division

Naval Surface Warfare Center, Port Hueneme Division

Coast Guard Yard, Curtis Bay

Supervisors of Shipbuilding, Conversion and Repair

8. Action. Addressees shall take the action necessary to ensure the effective implementation of this instruction.

G. P. NANOS, JR.

Distribution:

SNDL	A3	CNO (N41, N411)
	21A	CINCs
	22A	Fleet Commanders
	24D	Type Commanders, Surface Force
	26F	Operational Test and Evaluation Force and Detachment
	26Z	Shore Intermediate Maintenance Activity
	28	Squadron, Division and Group Commanders-Ships (less 28K)
	29	Warships (less 29N, 29P, 29Q, and 29S)
	30	Mine Warfare Ships
	31	Amphibious Warfare Ships
	32	Auxiliary Ships
	36	Service Craft
	41A	Commander, MSC
	C84	Shore Based Detachments, SEASYSCOM (less C84D, C84J, C84K, C84M)
	C25C	Inspection and Survey Board
	FKM13	Navy Inventory Control Point, Mechanicsburg
	FKP4E	Surface Warfare Centers and Divisions
	FKP7	NAVSHIPYD
	FKP8	SUPSHIP

NAVSEA Special List Y1

Defense Printing Detachment
1401 South Fern Street
Arlington VA 22202-2889

Stocked: SEA 09A1 (5 copies)

POLICY AND RESPONSIBILITIES OF THE INTEGRATED TOPSIDE SAFETY AND CERTIFICATION PROGRAM FOR SURFACE SHIPS

1. Policy. The integration of weapons, sensors and antennas with the ships' topside shall be optimized for maximum warfighting capability commensurate with the highest level of safety to ensure the integrity of the ship and its personnel. For this purpose, the following shall be provided for all ships or ship classes:

a. Optimized weapons systems, sensors and antennas arrangement and installations in new construction, converted, modernized and altered ships.

b. Maximized and safe pointing and firing cutout zones for all applicable weapons systems.

c. Structural grid charts that show the maximum allowable height that any object can extend above the ship baseline without piercing the weapon system pointing and firing zone.

d. Depiction of the extent of missile and gun blast effects over the ship topside.

e. RADHAZ cutouts for emitters; the depiction of the extent of these zones over the ship topside.

f. A structural test firing (STF) for weapons on the lead ship of new ship classes and for new or modified weapons systems installations to verify the safety and integrity of the weapons systems installation and surrounding ship structure, ship services, equipment and outfitting. An STF shall also be performed if blast sensitive equipment is being installed in or in close proximity to the blast zone. The detailed procedures for STF are contained in the enclosures (2) through (5).

g. Certification for:

(1) The safe, correct and interference free installation of weapon systems pointing and firing cutout (P&FCO) zones whenever a SHIPALT has been accomplished which affects the P&FCO or if it has been more than three years since the last certification, see reference (e).

(2) The safe and correct installation of RADHAZ cutout zones whenever a SHIPALT has been accomplished which affects the RADHAZ zones or if it has been more than three years since the last certification; see reference (e).

(3) The safe and proper installation of weapon systems with regard to the blast effects on the ship.

(4) The safe separation of installed weapons and ordnance from electromagnetic radiation emitters' effects to prevent an unsafe HERO situation.

(5) The safe separation of installed fuel stowage equipment and fuel from electromagnetic radiation emitters' effects to prevent an unsafe HERF situation; see reference (e).

(6) The safe and healthy shipboard environment for personnel, free of hazards associated with non-ionizing radiation from electromagnetic emissions; see reference (e).

2. Responsibilities

a. The Integrated Topside Safety and Certification Program for Surface Ships shall be managed by the Warfare Systems Group, SEA 05K2.

(1) SEA 05K2 shall have the final approval of the location of all topside equipment such as weapons systems, sensors, and antennas onboard all surface ships.

(2) SEA 05K2 management of the Integrated Topside Safety and Certification Program for Surface Ships shall include:

(a) Developing, implementing and reviewing program policy and addressing policy issues relating to the effective implementation of pointing and firing, blast and RADHAZ cutout zone requirements; structural test firing (STF) requirements; and EMI/EMC requirements.

(b) Developing, implementing and reviewing program policy and addressing policy issues relating to HERO, HERP, and HERF.

(c) Promoting the necessary inter- and intra-command coordination required to assure compliance with this instruction such that pointing and firing, blast and RADHAZ cutout zone requirements; and HERO, HERP, and HERF requirements; STF requirements; and EMI/EMC requirements are addressed in NAVSEA and non-NAVSEA cognizant equipment and systems installed on the ship topside.

(d) Reviewing and analyzing shipboard topside arrangements and equipment placement with respect to applicable system parameters in consonance with references (b) through (g).

(e) Ensuring that all specifications for applicable development of new weapon systems and sensors include

requirements for the physical implementation of pointing and firing, blast and RADHAZ cutout zones.

(f) Ensuring that all Statements of Work (SOWs) for ship design and alteration include the requirement to address weapon system(s) blast, pointing and firing, and RADHAZ zone cutout mechanisms, HERO, HERP, HERF, STF, EMI/EMC, and associated cutout zones in the design process.

(g) Ensuring that ship contractual specifications, and ship alterations documentation includs, where applicable, the requirement for the engineering, manufacturing, installation, testing, and certification of weapon pointing and firing cutout mechanisms, blast and RADHAZ cutout mechanisms, computer program cutouts, STFs, and certifications for HERO, HERF and HERP.

(h) Assuring proper topside design planning documents and budget information are prepared for:

1. New ship construction, conversion and life-cycle maintenance programs.

2. New topside system/weapon developments.

3. Fleet Modernization Program(s).

4. FMS and MSC ships.

(i) Providing tasking to Naval Surface Warfare Center, Dahlgren Division (NAVSURFWARCENDIV Dahlgren), for program execution based on cost estimates for current and projected work (two years out).

(j) Upon notification by NAVSURFWARCENDIV Dahlgren, of any emerging unfunded pointing and firing, blast and RADHAZ cutout system certification requirements; STF certification requirements; and HERO, HERF and HERP certification requirements, SEA 05K2 shall notify the appropriate Combat System Engineer (CSE) and the Ship Program Manager to obtain funding to support the corrective action. Where funding is not available, SEA 05K2 shall notify the ship, Type Commander, and Fleet Commander, via naval message, of the ship's restrictions resulting from operating the weapon system(s) with unsafe cutout systems or zones; unsafe blast zone environment; or unsafe HERO, HERF or HERP environment(s).

(k) Ensuring that pointing and firing, blast and RADHAZ cutout system, STF, HERO, HERF, and HERP certification requirements are included in the ship acquisition Test and Evaluation program required by reference (f) and included in the Test and Evaluation Master Plan.

b. Program Managers for Ships (PMSs) and Participating Managers (PARMs) shall:

(1) Provide funding and material (STF blast test vehicles and ammunition) required for all of the certifications to SEA 05K2.

(2) Provide documentation of topside configuration changes resulting from ship design, ship alterations, ECPs, etc. to SEA 05K2 for determining the impact of these changes to the pointing and firing, blast and RADHAZ cutout zones, STF certification, EMI/EMC environment, and HERO, HERF and HERP bills.

(3) Ensure that any ship topside deficiencies that are identified by NAVSURFWARCENDIV Dahlgren or NOC, resulting from their findings in performance of this program, are corrected.

(4) Ensure all specifications for applicable development of new weapon systems and sensors be forwarded to SEA 05K2.

c. NAVSURFWARCENDIV Dahlgren shall be the designated Technical Direction Agent for the accomplishment of the program tasks described herein.

(1) Develop, maintain and distribute pointing and firing, blast and RADHAZ cutout zone data for surface ships during all phases of the ship's life cycle.

(2) By letter, issue NAVSEA drawings that detail safe ship topside systems pointing and firing, blast and RADHAZ cutout zones data.

(3) Provide the cutout cams, circuit boards and other components for the pointing and firing, blast and RADHAZ zones.

(4) By letter, provide a HERO emission control (EMCON) matrix/bill.

(5) By letter, provide technical report of HERP and HERF survey.

(6) Certify the pointing and firing cutout, blast and RADHAZ zones, HERO, HERF and HERP shipboard environment following surface ship industrial periods and shipboard inspections.

(7) Coordinate and execute the STF program.

(a) Identify the quantity of Blast Test and Launch Test Vehicles (BTV/LTV) and ammunition required for each STF.

(b) Identify ship deficiencies that require correction prior to the STF.

(c) Provide a test plan and schedule to all concerned with the STF.

(d) Submit final test report to the STF program manager, including all discovered ship deficiencies that must be corrected prior to further weapon firing.

(8) Develop and maintain database of program information concerning the installation of topside electronic transmitting equipment, and weapon systems aboard all ship classes.

(9) By letter, provide program planning and budgeting for continued maintenance of the program for the current year and projected work (two years out) to SEA 05K2. Provide quarterly funding updates reflecting impact of ship schedule changes, unplanned actions and emerging requirements to SEA 05K2.

(10) Provide pointing and firing, blast and RADHAZ cutout zones deficiencies; STF deficiencies; and HERO, HERF and HERP deficiencies to the SESI teams.

d. Naval Ordnance Center Indian Head shall:

(1) Act as the Navy technical authority for HERO safety issues of ordnance only.

(2) Conduct shipboard-explosive-safety inspections of all ships.

(3) Ensure pointing and firing, blast and RADHAZ cutout zones deficiencies; structural test firing deficiencies; and HERO, HERF and HERP deficiencies are reviewed during the SESIs.

e. The Fleet Technical Support Centers shall:

(1) Provide field service for the program. Investigate reported discrepancies at the request of ship's force and Type Commanders. Boresight, scribe and install new cutout mechanism components as directed by NAVSURFWARCENDIV Dahlgren or SEA 05K2. Submit documentation of actual firing cutout zones and report computer program cutout changes to NAVSURFWARCENDIV Dahlgren/ISEA.

(2) Provide technical assistance to NAVSURFWARCENDIV Dahlgren, the various Supervisors of Shipbuilding, Conversion and Repair, and the Naval Shipyards.

(3) Conduct tests on specific ships to determine compliance with specified pointing and firing zone data and computer program cutout requirements as directed by NAVSURFWARCENDIV Dahlgren, complete Cutout Mechanism Performance Data, obtain ship's Commanding Officer's concurrence; and forward the reports to NAVSURFWARCENDIV Dahlgren. Provide technical assistance, as requested, in the boresighting, scribing, and installation of cutout and associated mechanism.

(4) Provide necessary planning and budgetary information to perform the above tasks to SEA 05K24 for commissioned ships or to NAVSURFWARCENDIV Dahlgren for new ships.

f. Naval Shipyards shall:

(1) Assist in boresighting and scribing for applicable systems at the first opportunity after the topside configuration of the ship is firm and combat system alignment is accomplished and submit this technical data, present zones and other necessary ship configuration design documentation to NAVSURFWARCENDIV Dahlgren in support of the program.

(2) Install all cutout mechanisms in accordance with production schedules and prescribed procedures (reference (b)). Perform complete checkout testing of pointing, firing, blast and RADHAZ cutout zones and computer program cutouts, of each trainable weapon and director at ship overhaul/availability.

(3) Provide ship drawings required for zone determination to the Technical Direction Agent, NAVSURFWARCENDIV Dahlgren.

(4) When required by the appropriate shipbuilding, conversion, overhaul or repair contract, assure that the contractor installs all cutout mechanisms in accordance with production schedules and prescribed procedures. Schedule complete check-out testing of pointing and firing, blast and RADHAZ and computer program cutouts of each trainable weapon and director at ship overhaul/availability.

(5) Provide necessary planning and budgetary information to perform above tasks to SEA 05K24 in a timely manner.

(6) Report the status of NAVSURFWARCENDIV Dahlgren's certification of the pointing and firing, blast zone, and RADHAZ cutout zone requirements; STF certification requirements; and HERO, HERP, and HERF certification requirements for the surface ship industrial periods in accordance with reference (e).

(7) [Planning yards] act as secondary data repositories for pointing and firing, blast and RADHAZ cutout zones for appropriate ship classes.

g. NAVSURFWARCENDIV Crane, NAVSURFWARCENDIV Port Hueneme, and Coast Guard Yard, Curtis Bay shall:

(1) As In-Service Engineering Agents (ISEAs), perform technical assistance in the installation of cutout mechanism components, alteration of computer program cutouts, and repair and adjustment of mechanisms and verification of proper zone implementation as required in support of the Fleet Technical Support Centers, Naval Shipyards, Supervisors of Shipbuilding, Conversion and Repair, and NAVSURFWARCENDIV Dahlgren. Submit documentation of actual pointing and firing cutout mechanism performance/checkout to NAVSURFWARCENDIV Dahlgren.

(2) Provide new or refurbished weapon installation schedule to NAVSURFWARCENDIV Dahlgren.

(3) Provide system specific assistance, as requested, to any principal activity involved in the implementation of this instruction.

h. Supervisors of Shipbuilding, Conversion and Repair shall:

(1) For each ship availability, contact NAVSURFWARCENDIV Dahlgren to determine which systems require rezoning or mechanism repair, and for assistance in scheduling and defining the level of effort.

(2) Make provisions in scheduling and contractor support for accomplishment of the above.

(3) Ensure that arrangements are made with Fleet Technical Support Center and NAVSURFWARCENDIV Dahlgren to perform boresighting and scribing for applicable systems at the first opportunity after the topside configuration of the ship is firm and combat system alignment has been accomplished. Arrange for installation of components, repairs, adjustments and checkout of cutout mechanisms.

(4) Report the status of NAVSURFWARCENDIV Dahlgren's certification of the pointing and firing, blast zone, and RADHAZ cutout zones, and computer program cutouts, STF, HERO, HERP and HERF for surface ship industrial periods in accordance with reference (e).

3. Action. Addressees shall take the action necessary to ensure the effective implementation of NAVSEAINST 9700.2.

PROCEDURES FOR STRUCTURAL TEST FIRING OF MORTARS TORPEDO TUBES, ROCKET LAUNCHERS (less Missile Launchers), AND GUNS SMALLER THAN THREE INCHES

1. General Procedures

a. Structural Test Firing (STF) will normally be conducted by the ship's force unless otherwise directed. All testing is normally the responsibility of the ship's force, unless prior arrangements have been made with the Integrated Topside Safety and Certification Program Manager.

b. STFs should not be conducted under hazardous weather conditions.

c. Gun mount/turret train and elevation power drives, oscillating assemblies, and loading sub-systems shall be operated before and after firing of each salvo or burst to determine whether or not any increase in effort is required to train or elevate the mount as a result of the test.

d. After each salvo or burst, the mount, foundation, roller path, hold-down bolts and clips, and ship's structure and equipment in the vicinity of the mount shall be examined to the maximum extent practicable without disassembly or lifting of equipment. Hydraulic piping shall be inspected. The mounts and foundations of automatic weapons and rapid-fire guns shall be closely observed during firing to determine whether or not vibration occurs.

e. Angles of train shall be relative to ship centerline and angles of elevation shall be relative to gun/launcher foundation unless otherwise specified.

f. When conducting STF of ordnance specified in this enclosure, the ship will be in the normal battle condition, (necessary lifelines down, condition "Zebra" set, etc.) "Circle William" W shall be opened and operating. All equipment shall be rigged in accordance with the strikedown and stowage requirements of the Pointing and Firing Cutout Zone drawings.

g. It is recommended that the maximum practicable number of electronic, electrical, and emergency equipments be lighted-off during gun mount/turret tests. Equipments should be observed before, during, and after tests for indications of inadequate mounting, excessive vibration, tripped circuit breakers, degraded performance, or catastrophic failure.

h. The Commanding Officer shall select the angles of train for test firing and ensure the range is clear. The angle of train should be selected to impose maximum stress practicable on nearby structure, equipment, etc., in general accordance with paragraph 2.d. of enclosure (3).

2. Detailed Procedures

a. .50 Caliber and 25mm Mounts. Fire 20 rounds from each gun in bursts of five to ten rounds at angles of train and elevation selected by the Commanding Officer. Both barrels of twin mounts shall be fired simultaneously. Firing angles at extremities of the firing arc (both clockwise and counter clockwise) shall be included.

b. 40mm Machine Guns (Grenade). Fire ten rounds from each gun at angles of train and elevation selected by the Commanding Officer.

c. 60mm and 81mm Mortar. Fire ten rounds from each mortar at angles of train and elevation selected the Commanding Officer.

d. Torpedo Tubes. No STF of torpedo tubes is required.

e. SRBOC Launchers. Fire one round from each barrel/tube per launcher. For SEAGNAT capable ships the test ammunition shall include a minimum of two MK 216 (rocket propelled) and two MK 229 (mortar propelled rounds) per launcher.

f. NULKA Launchers. Fire one round per launcher.

g. PHALANX Close-In-Weapon System (CIWS). The CIWS shall be fired in the reaction calibration mode PAC. The firings for each mount shall consist of five 100 round bursts as follows:

Round	Train	Elevation
1-100	Near center of firing arc	15°
101-200	Maximum counter clockwise position of firing arc	0°
201-300	Maximum counter clockwise position of firing arc	45°
301-400	Maximum clockwise position firing arc	0°
401-500	Maximum clockwise position of firing arc	45°

h. Other Minor Caliber Weapons. Test procedure provided by the Integrated Topside Safety and Certification Program Manager upon request.

3. Results

a. When results require NAVSEA action, notify the Integrated Topside Safety and Certification Program Manager. Minor damage should be included. Major damage or other unsatisfactory conditions that might make the ship/ordnance unfit for combat or that might constitute an unacceptable safety hazard to men or equipment shall be reported by message. When a damage description is necessary, the activity conducting the test shall describe any damage, equipment degradation, or unsafe condition observed, and any recommendations that pertain. The description should include: the conditions under which each test was conducted (weather, mount elevation and train, barrel(s) fired, rounds expended, etc.), the test activity's conclusions concerning the structural integrity of the installation (the mount itself, foundation, vent work, ship's structure, etc.), and safety of equipment and personnel.

b. Distribution. When required, structural firing results shall be distributed to all commands having substantial interest in the particular test or damaged items. Distribution shall include, but not be necessarily limited to, the following addressees:

COMNAVSEASYSCOM
SEA 03P
05K2
Appropriate SHAPM and PARM
NAVSURFWARCENDIV Dahlgren Code G72 (2 copies)
COMSPAWARSYSCOM
BUMED
Type Commander (2 copies)

PROCEDURES FOR STRUCTURAL TEST FIRING OF GUNS THREE INCHES AND LARGER (Including 76mm)

1. General Procedures. The general procedures for these tests are the same as indicated in enclosure (2), with the exception that the STF Test Director will plan and conduct tests on first-of-a-class ships or alternate yard ships, or ships having new ordnance installed. Subsequent testing of follow-on ships will normally be carried out by the ship's force in accordance with the guidelines of this instruction. The Technical Manager will normally provide the test ship with a test plan similar to that provided in lead ship except that it will incorporate lessons learned in the initial tests.

2. Detailed Procedures. The test plan consists of four basic parts as follows:

a. Part 1. Each mount/turret shall be trained and elevated relative to its total arc of fires as shown in Figure 1. One round per barrel shall be fired at each firing position. All barrels in the firing mount/turret shall be fired as nearly simultaneously as practicable but only one mount/turret shall be fired at a time.

b. Part 2. After all mounts have completed Part 1, each mount/turret shall fire a burst of ten rounds or one minute of firing (whichever is less) for each barrel at the maximum rate of fire. All mounts/turrets shall commence fire simultaneously. All mounts/turrets shall be under automatic control by the fire control system where practicable while tracking a simulated target. The motion of the simulated target should be such as to cause the mount/turret to transverse the maximum practicable arcs of train and elevation during the firing of the guns.

c. Part 3. This part applies only to multibarrel mounts/turrets to determine the effect of whip on the training mechanism. One round shall be fired from either the right or left gun while the mount is being trained under power in the opposite direction, i.e., left gun fired while the mount/turret is training right or vice versa.

d. Part 4. In addition to the tests specified above, each mount will be fired to determine the effects of gun shock, muzzle blast, etc., on parts of the ship structure, other ordnance, exposed equipment, interior equipment, ventilation system, etc. The test shall consist of firing a minimum of five rounds rapid fire at each "worst case" gun firing orientation. Normally two or more "worst case" orientations will be selected depending on what is deemed necessary for the particular ship configuration.

The following procedures will be used when planning and conducting these special tests:

(1) The train and elevation of each mount/turret shall be selected to impose the maximum stress from gun shock, muzzle blast, flying objects, etc., on the selected antenna, equipment, structure, or other ordnance. The Test Director may also specify orientation of other equipment, such as launchers, directors, and antennas. The ship's force will operate the equipment to achieve the configurations specified in the Test Director's test plan.

(2) All barrels of multibarrel mounts shall be fired as nearly simultaneously as is practicable. All rounds will be fired at the maximum practicable rate.

(3) Normally, only one mount/turret will be fired at a time because of the inherent safety hazard of this type firing and in order to eliminate mutual interference between mounts.

CAUTION: During these tests, the mount will usually be trained clockwise or counterclockwise to its extreme firing limits. In all cases, the safety of the ship is paramount. These special tests must be carefully controlled and observed to assure that the projectile will not impinge on any part of the ship's structure, equipment, life rafts, etc. Because "long wire" and ship antennae are often necessarily present within gun firing zones, it is especially important that prudence be exercised to assure that these antennae are not unnecessarily damaged or destroyed when firing these special tests.

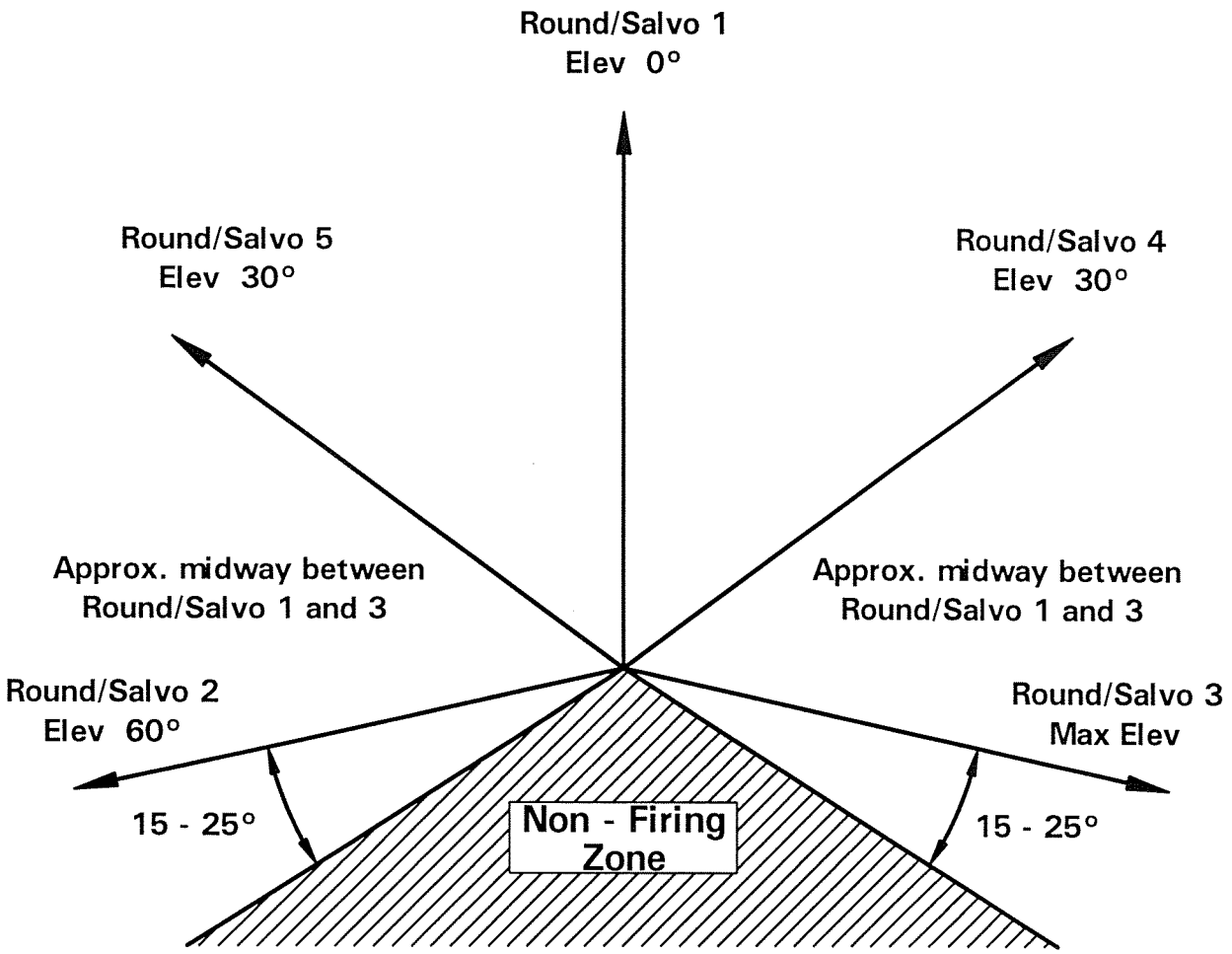
3. Results

a. The Test Director or ship's force as appropriate shall prepare a brief describing the tests, any damage, equipment degradation or unsafe conditions observed, and any recommendations that may pertain. The brief should include: the conditions under which each test was conducted (weather, mount elevation and train, barrel(s) fired, rounds expended, etc.), and safety of equipment and personnel. When ship's force conducts the test, inform NAVSEA only when action is required.

b. Distribution. The distribution list of enclosure (2) shall be followed.

Guns Three Inches and Larger (Including 76 mm)

Center of Mount
Arc of Fire in Train



Note: Round/Salvo 2 will be fired at maximum elevation if mount/turret cannot be elevated to 60°.

Figure 1

Enclosure (3)

PROCEDURES FOR STRUCTURAL TEST FIRING OF GUIDED MISSILE LAUNCHERS

1. Structural Test Firings (STF) for guided missile launchers are conducted to evaluate the effects of missile blast on ship structure and launcher and to determine whether hazards exist for personnel required to man internal and external areas aboard ship during missile firings. The Test Director will prepare the test plan, conduct the tests, and prepare the results on the first-of-a-class of ships, first ship of alternate yard, ships receiving new installation, or ships having new ordnance installed. The ship's force will be requested to assist as necessary. Subsequent testing of follow-on ships will be carried out at the discretion of the Program Manager/SHAPM/Ship Logistics Division. If a decision is made to test, the following paragraphs 2 through 5 will be implemented with the lead ship.

2. The Test Director will normally visit the ship to be tested prior to the test date to examine the installation and ship configuration. Based on this visit, review of ship's plans, and analysis of prior tests of similar installations, he will determine the number of rounds to be fired and the angles of train and elevation to be used. Factors to be considered will include, but not be limited to: the relationships of various portions of ship's structure to the launcher, the proximity of various equipments (either internal or external) both along the missile line of flight and in the area of exhaust impingement, location of manned stations in the vicinity of the launcher and along the missile line of flight, and the locations of ship ventilation intakes and exhausts.

3. The Test Director will prepare a test plan for conducting the STF. The plan will contain adequate information, including Blast Test Vehicle (BTV) requirements, to permit preparation for the test by the ship, COMNAVSEASYSCOM, and other cognizant agencies. In addition, the test plan shall indicate any installation discrepancies that should be corrected prior to conduct of the test. If, after careful review of the particular ship installation, the Test Director deems a structural test to be unnecessary (or not necessary for all installed launchers), he may so indicate to the STF Program Manager and applicable SHAPM/SLM.

4. The Test Director shall provide suitable test instrumentation to ensure that all important STF effects are measured and/or recorded. At the discretion of the Test Director, these effects and the required data will normally include the following:

a. Temperature

(1) Air temperature shall be monitored in nearby operational areas to record changes attributable to missile firing.

(2) Surface temperature and/or gas temperature shall be monitored and recorded at strategically located exposed deck and bulkhead fittings, wiring, and fire fighting equipment.

b. Gas Ingress. Doors, hatches, ports, and ventilation openings in the vicinity of the missile launcher shall be monitored for evidence of flame, hot gas, or smoke ingress to the interior of the ship.

c. Toxicity Sampling. Toxicity tests shall be conducted at all manned positions, both exterior and interior, in the vicinity of the launcher during each firing. Manned spaces served by "Circle William" ventilation supply systems with intakes in the vicinity of the launcher will be monitored for toxicity. The concentration, if any, of toxic gases shall be determined.

d. Pressure. Blast pressures shall be monitored to determine the possible effects of repeated blast impingement on adjacent superstructure, components, and equipments.

e. Sound Pressure Level. Sound pressure levels shall be measured in all manned positions, internal and external, in the vicinity of the missile launcher.

f. Missile Ejecta and Deposits. Any ejecta and exhaust residue deposits shall be examined after each firing. Adverse operations of any equipment caused by masking or clogging by ejecta or deposits, as well as damage caused by burning or corrective conditions attributed to launching, shall be observed and recorded.

g. Structural Damage. All structural or equipment damage caused by temperature, pressure, hot gases, smoke, or missile ejecta shall be photographed and described in writing.

5. Results

The Test Director shall describe the test, resulting conditions, and any recommendations for corrective action that may pertain. Minor damage shall be included. Major damage or other unsatisfactory conditions that might make the ship/ordnance unfit for combat or that might constitute an unacceptable safety hazard to men or equipment shall be reported by message.

Adequate detail shall be provided to fully describe the conditions under which each test was conducted (weather, launcher position, data points, etc.) The description should include: the test activity's conclusions concerning the structural integrity of the installation (strength, rigidity, tightness, etc.); safety of personnel under training and operational conditions; and adequate data and information to support the conclusions and to permit evaluation of any recommendations offered.

a. Preliminary Results. Preliminary results are due within one month of the test completion date, with final results due as soon thereafter as practicable but not later than 90 days after the test completion.

b. Distribution. Results shall be distributed to all commands having substantial interest in the particular test. Distribution shall include but not necessarily be limited to, the following addresses:

Ship tested (2 copies)
Type Commanders (2 copies)
COMNAVSEASYSCOM
SEA 03D
03P
03H
05K2 (2 copies)
Appropriate SHAPM
NAVSURFWARCENDIV Dahlgren (Code G72, 5 copies)
BUMED (Code 732, 2 copies)
Appropriate Naval Shipyard and Supervisor of Shipbuilding
NAVSURFWARCENDIV Port Hueneme (5 copies)

AMMUNITION AUTHORIZATION FOR STRUCTURAL TEST FIRING

NOMENCLATURE	NAVY AMMUNITION LOGISTIC CODE (NALC)	QUANTITY/BARREL OR TUBE
Ctg., .50 Cal, Ball and Tracer	A-557	100
Ctg., 20mm A/C, TP	A-661	100
Ctg., 20mm AA, BLP/BLT	A-741	100
Ctg., 20mm, linked, DS MK 149 MOD 1 (PHALANX), DU	A-675	500/MT
Ctg., 20mm, linked, DS MK 149 MOD 4 (PHALANX), Tungsten	A692	500/MT
Ctg., 25mm, TP-T, M242 MG	A976	100/MT
Ctg., 40mm, HE, for MK 19 MG (GRENADE)	B-572	50
Ctg., 40mm HE, for MK 20 MG	B-570	72
Ctg., 60mm, HE	B-632/B-634	10
Ctg., 81mm, TP	C-227	10
SEAGNAT, MK 214 (mortar)	9W22	1
SEAGNAT, MK 216 (rocket)	3W80	1
Ctg., 76mm/62, BLP	C062	15+5/ea. Worst case firing
Charge, Propelling, 5"/54 Full	D-324/D-326	15+5/ea. Worst case firing
Projectile, 5"/54, BLP, Inert, MK 92	D-349	15+5/ea. Worst case firing
Projectile 5"/54 BLP HIFRAG, MK 109 MOD 0	D-341	15+5/ea. Worst case firing