UNITED STATES COAST GUARD

ORDNANCE INSTRUCTIONS

1938

UNITED STATES
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The following instructions are promulgated for the guidance of personnel of the United States Coast Guard in matters relating to ordnance, gunnery, and small-arms training. They shall become effective upon receipt.

R. R. WAESCHE, *Commandant.*

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AMENDMENT TO ORDNANCE INSTRUCTIONS

8 May, 1939.

Amendment No. 1.

1. The 1938 edition of Ordnance Instructions, United States Coast Guard, issued herewith, is amended as follows:

Art. A-1. Add new paragraph, as follows: "(c) This publication is distributed to all units having permanent complements, to commissioned officers, chief boatswains, chief gunners, chief pay clerks, boatswains, gunners, and pay clerks.

Part A—GENERAL

Section 1.—INTRODUCTION

Scope.

A–1. (1) These instructions have been compiled for the purpose of presenting in brief and systematic form information necessary for a clear understanding of requirements concerning ordnance and gunnery. Careful compliance will promote uniform procedure and insure the maximum of efficiency. This publication in no way alters or amends any provisions of Coast Guard Regulations or general orders.

Sources.

(2) In general, these instructions have been taken from Navy publications (particularly the Bureau of Ordnance Manual and Ordnance Pamphlet No. 4), modifications having been made so that they apply to the Coast Guard. While the most important instructions have been incorporated, officers whose duties pertain to ordnance and gunnery are responsible for thorough familiarity with all information applying to material in the Coast Guard. (3)

Ans # 1

Suggestions.

A–2. Constructive criticism and suggestions concerning the arrangement, scope, and subject matter of these instructions are invited from the service, so that changes may contain such instructions, information and data as experience has shown to be necessary for the use of Coast Guard personnel.

Knowledge of material.

A–3. Officers whose duties pertain to ordnance and gunnery are responsible for thorough familiarity with all details of the mechanisms assigned to their charge. Through them the necessary knowledge must reach the enlisted personnel. It is important that no attempt be made to get results until this knowledge is first obtained. This can only be accomplished by hard work, study of pamphlets, blueprints, circulars, etc., without tearing down the material.

Damage from inexperience.

A–4. The permanent damage done in a single day of experimentation by inexperienced personnel has frequently exceeded that which, with proper care, might be expected during the normal life of the material.

Interpretation.

A–5. When in doubt as to the exact meaning of any instruction contained in this publication, an interpretation should be requested from headquarters.

Section 2.—PUBLICATIONS, ETC.

Publications to be available.

A–6. Ordnance publications and pamphlets furnished a unit shall at all times be available to the gunnery personnel, including the enlisted men detailed to duty with guns. Confidential publications shall be available whenever the preamble states that others than officers may have access to the information contained therein. The commanding officer shall see that warrant

gunners have access to all information, including books, pamphlets, drawings, Naval Gun Factory allowance lists, and confidential publications, pertaining to the ordnance and gunnery department. (See art. 1531, Coast Guard Regulations.)

Sources of information.

A–7. The following tabulations indicate the sources of information regarding ordnance and related subjects. A Coast Guard unit shall have the complete set of publications and working drawings indicated, corrected to date, available for use. Requests for additional books desired for personal use of officers will be given careful consideration.

(1) *Division commanders:*

(a) Naval Ordnance.
(b) Bureau of Ordnance Manual.
(c) Ordnance Pamphlet No. 0.
(d) Ordnance Pamphlet No. 4.
(e) Gunnery Instructions, United States Navy.
(f) Orders for Gunnery Exercises.
(g) Manual of Interior Control.
(h) Orders for Fall-of-Shot Observations.
(i) Landing Force Manual, United States Navy.
(j) Ship and Gunnery Drills, United States Navy.
(k) Small Arms Firing Regulations, United States Navy.
(l) TR–1350–A, Technical Regulations, War Department, Infantry and Aircraft Ammunition.
(m) Ordnance Field Service Bulletin, Small Arms Ammunition, War Department.
(n) United States Coast Guard, .30 caliber Shoulder Line-Throwing Equipment.
(o) Destruction of Derelicts and other Menaces to Navigation, United States Coast Guard.
(p) United States Coast Guard Firing Attachment, Lyle Line-Throwing Gun.
(q) Report of Gunnery Exercises and Small Arms Target Practice, United States Coast Guard.
(r) Regulations for the United States Coast Guard.

(2) *District commanders:*

(a) Ordnance Pamphlet No. 0.
(b) Ordnance Pamphlet No. 4.
(c) Such other naval ordnance pamphlets, listed in Ordnance Pamphlet No. 0, as may be needed to complete information concerning training and equipment at the unit.
(d) Landing Force Manual, United States Navy.
(e) Ship and Gunnery Drills, United States Navy.
(f) Small Arms Firing Regulations, United States Navy.
(g) TR–1350–A, Technical Regulations, War Department, Infantry and Aircraft Ammunition.
(h) Ordnance Field Service Bulletin, Small Arms Ammunition, War Department.
(i) United States Coast Guard, .30 caliber Shoulder Line-throwing Equipment.
(j) Destruction of Derelicts and other Menaces to Navigation, United States Coast Guard.

(k) United States Coast Guard Firing Attachment, Lyle Line-Throwing Gun.
(l) Report of Gunnery Exercises and Small Arms Target Practice, United States Coast Guard.
(m) Regulations for the United States Coast Guard.

(3) *Vessels required to hold short-range battle practice:*
(a) Naval Ordnance.
(b) Bureau of Ordnance Manual.
(c) Ordnance Pamphlet No. 0.
(d) Ordnance Pamphlet No. 4.
(e) Such other naval ordnance pamphlets, listed in Ordnance Pamphlet No. 0, as may be needed to complete information concerning training and equipment of the vessel.
(f) Gunnery Instructions, United States Navy.
(g) Orders for Gunnery Exercises.
(h) Manual of Interior Control.
(i) Orders for Fall-of-Shot Observations.
(j) Landing Force Manual, United States Navy.
(k) Ship and Gunnery Drills, United States Navy.
(l) Small Arms Firing Regulations, United States Navy.
(m) TR–1350–A, Technical Regulations, War Department, Infantry and Aircraft Ammunition.
(n) Ordnance Field Service Bulletin, Small Arms Ammunition, War Department.
(o) Set of blue prints, or photoprints, of guns, mounts, and other ordnance equipment carried on board.
(p) Two copies of ordnance allowance lists (NGF) covering each type of gun on board.
(q) United States Coast Guard .30 caliber Shoulder Line-Throwing Equipment.
(r) Destruction of Derelicts and other Menaces to Navigation, United States Coast Guard.
(s) Report of Gunnery Exercises and Small Arms Target Practice, United States Coast Guard.
(t) Regulations for the United States Coast Guard.

(4) *Vessels 100 feet or more in length required to hold target practice instructions:*
(a) Naval Ordnance.
(b) Bureau of Ordnance Manual.
(c) Ordnance Pamphlet No. 0.
(d) Ordnance Pamphlet No. 4.
(e) Such other naval ordnance pamphlets, listed in Ordnance Pamphlet No. 0, as may be needed to complete information concerning training and equipment of the vessel.
(f) Landing Force Manual, United States Navy.
(g) Ship and Gunnery Drills, United States Navy.
(h) Small Arms Firing Regulations, United States Navy.
(i) TR–1350–A, Technical Regulations, War Department, Infantry and Aircraft Ammunition.
(j) Ordnance Field Service Bulletin, Small Arms Ammunition, War Department.

(k) Set of blue prints, or photoprints, of guns, mounts, and other ordnance equipment carried.
(l) Two copies of ordnance allowance lists (NGF) covering each type of gun on board.
(m) United States Coast Guard, .30 caliber Shoulder Line-Throwing Equipment.
(n) Destruction of Derelicts and other Menaces to Navigation, United States Coast Guard.
(o) Report of Gunnery Exercises and Small Arms Target Practice, United States Coast Guard.
(p) Regulations for the United States Coast Guard.

(5) *Vessels less than 100 feet in length required to hold target practice instruction:*
(a) Such naval ordnance pamphlets, listed in Ordnance Pamphlet No. 0, as may be needed to complete information concerning ordnance equipment of the vessel.
(b) Landing Force Manual, United States Navy.
(c) Ship and Gunnery Drills, United States Navy.
(d) Small Arms Firing Regulations, United States Navy.
(e) TR–1350–A, Technical Regulations, War Department, Infantry and Aircraft Ammunition.
(f) Ordnance Field Service Bulletin, Small Arms Ammunition, War Department.
(g) Set of blue prints, or photoprints, of guns, mounts, and breech mechanism for 1-pounder gun.
(h) Copy of ordnance allowance list (NGF) covering 1-pounder gun.
(i) Regulations for the United States Coast Guard.

(6) *All other floating units for which an allowance of ordnance equipment is prescribed:*
(a) Landing Force Manual, United States Navy.
(b) Ship and Gunnery Drills, United States Navy.
(c) Small Arms Firing Regulations, United States Navy.
(d) TR–1350–A, Technical Regulations, War Department, Infantry and Aircraft Ammunition.
(e) Ordnance Field Service Bulletin, Small Arms Ammunition, War Department.
(f) Regulations for the United States Coast Guard.

(7) *Bases and air stations:*
(a) Naval Ordnance.
(b) Bureau of Ordnance Manual.
(c) Ordnance Pamphlet No. 0.
(d) Ordnance Pamphlet No. 4.
(e) Such other naval ordnance pamphlets, listed in Ordnance Pamphlet No. 0, as may be needed to complete information concerning training and equipment of the unit.
(f) Landing Force Manual, United States Navy.
(g) Ship and Gunnery Drills, United States Navy.
(h) Small Arms Firing Regulations, United States Navy.
(i) TR–1350–A, Technical Regulations, War Department, Infantry and Aircraft Ammunition.

(j) Ordnance Field Service Bulletin, Small Arms Ammunition, War Department.
(k) United States Coast Guard, .30 caliber Shoulder Line-Throwing Equipment.
(l) Destruction of Derelicts and Other Menaces to Navigation, United States Coast Guard.
(m) Report of Gunnery Exercises and Small Arms Target Practice, United States Coast Guard.
(n) Regulations for the United States Coast Guard.

(8) *Coast Guard stations:*
(a) Landing Force Manual, United States Navy.
(b) Small Arms Firing Regulations, United States Navy.
(c) TR-1350-A, Technical Regulations, War Department, Infantry and Aircraft Ammunition.
(d) Ordnance Field Service Bulletin, Small Arms Ammunition, War Department.
(e) Set of blue prints, or photoprints, of guns, mounts, and other ordnance equipment carried at station.
(f) United States Coast Guard, .30 caliber Shoulder Line-Throwing Equipment.
(g) Destruction of Derelicts and Other Menaces to Navigation, United States Coast Guard.
(h) United States Coast Guard Firing Attachment, Lyle Line-Throwing Gun.
(i) Regulations for the United States Coast Guard.

A-8. Bureau of Ordnance circulars and War Department training publications are additional sources of information pertaining to training and equipment.

Nomenclature and methods to be observed

A-9. Strict adherence to the nomenclature and terms used in instructions, blueprints, pamphlets, etc., must be observed. The use of names, terms, etc., other than those authorized is indicative of carelessness and results in confusion and loss of time, both on board ship and in official correspondence.

Section 3.—RESPONSIBILITY AND CUSTODY

Responsibility.

A-10. (1) Headquarters is responsible for purchase, supply, maintenance, and accounting. Requests for ordnance material, equipment, etc., shall be submitted as indicated in part K of these instructions.

(2) Officers in command of units are responsible for the proper care and expenditure of and accounting for all ordnance material and equipment in strict accordance with current regulations and instructions.

Custody.

A-11. (1) Ordnance material and equipment afloat and ashore are under the direct custody of the gunnery officer (or officer detailed to perform such duties), who is responsible to the commanding officer for proper handling, safe storage, preservation, inspection tests, and accounting.

(2) The responsible officers shall personally make thorough and detailed inspections to insure safe conditions and strict compliance with instructions.

Protection against loss.

(3) Conditions governing the protection of ordnance material, especially small arms and small arms ammunition, against loss

by theft vary so much that Headquarters cannot issue any set of regulations which would apply to all units. Each commanding officer will be held responsible for the safety of all ordnance material and shall make such regulations as may be necessary to prevent loss by theft. Wherever practicable, small arms shall be issued on custody receipts. (See arts. 855 and 899 (2) Regulations and K-18 and K-19 hereof.)

Section 4.—SAFETY PRECAUTIONS

General.

A-12. As familiarity with any work, no matter how dangerous, is apt to lead to carelessness, all persons who may supervise or perform work in connection with the inspection, care, preparation, or handling of ammunition or explosives—

(1) Shall exercise the utmost care that all regulations and instructions are rigidly observed.

(2) Shall carefully supervise those under them and frequently warn them of the necessity of using the utmost precaution in the performance of their work. No relaxation of vigilance shall ever be permitted.

A-13. In each part of the ship where ammunition is stored or handled or where gunnery appliances are operated, such safety orders as apply shall be posted in conspicuous places easy of access, and the personnel concerned shall be frequently and thoroughly instructed and drilled in them.

A-14. Conditions not covered by these safety orders may arise which, in the opinion of the commanding officer, may render firing unsafe. Nothing in these safety orders shall be construed as authorizing firing under such conditions.

A-15. The commanding officer shall at any time issue such additional safety orders as he may deem necessary, and a report thereof shall be made to headquarters.

A-16. When in doubt as to the exact meaning of any safety order, an interpretation should be requested from headquarters.

A-17. Headquarters shall be informed of any circumstances which conflict with these safety orders or which for any other reason require changes in or additions to them.

A-18. Helpful suggestions and constructive criticism of these orders are invited. They should be made to headquarters through official channels.

A-19. Changes, modifications in, or additions to ordnance material, or other material used in connection therewith, shall not be made without explicit authority from headquarters.

A-20. Safety devices provided shall always be used to prevent possibility of accident, and shall be kept in good order and operative at all times.

Ammunition, general.

A-21. No ammunition or explosive assembly shall be used in any gun or appliance for which it is not designated.

A-22. Handling of ammunition shall be reduced to the minimum to prevent immediate accident and the occurrence of leaky containers, damaged tanks and cartridge cases, loosened projectiles, torn powder bags, etc. Powder stored for a considerable period in a leaky container is likely to deteriorate rapidly, with the attendant danger of spontaneous combustion.

A–23. Service ammunition is supplied to ships for use in battle. It shall not be used for drill, for testing appliances, or for other similar purposes except upon the express authority of headquarters. It shall be regarded as a part of the vessel's outfit, shall be kept distinct from the ammunition used for gunnery exercises, and shall never be expended in gunnery exercises unless authorized in the orders for gunnery exercises or special instructions from headquarters.

A–24. Special ammunition is issued for gunnery exercises, except when a part of the ship's allowance of service ammunition is designated for that purpose.

A–25. Only such of the ammunition issued for gunnery exercises as does not contain a primer, fuze, or detonator may (at the discretion of the commanding officer) be used for testing the fit in guns and appliances. Article A–75 (*a*) (2) shall be complied with. Case ammunition may be fitted in the guns as prescribed in article A–83.

A–26. No other than drill ammunition shall be used for drill.

A–27. Since safety in handling and disposition of ammunition depend upon the correctness of reports and records, care shall be taken not to obliterate identification marks on ammunition or to put it into incorrectly marked containers. When ammunition in other than normal condition is returned to an ammunition depot in compliance with these safety precautions, it shall be marked to indicate its condition and the reason for its return. If smokeless powder is involved the weight of the smokeless powder rereturned shall also be indicated.

Projectiles, fuzes.

A–28. Projectiles shall not be altered, nor shall fuzes or any other parts be removed or disassembled on board ship without explicit instructions from headquarters. Projectiles shall not be allowed to rust or to become oversize through paint. Slings and grommets and other similar protective devices shall be removed before loading projectiles into guns.

Projectiles, etc., which have been dropped.

A–29. A fuzed projectile, or a cartridge case, whether in a container or not, if dropped from a height exceeding 5 feet shall be set aside and turned in to a naval ammunition depot at the first opportunity. (See article A–27.) Such ammunition shall be clearly marked to indicate its condition and shall be handled with the greatest care. However, if a shrapnel or an illuminating projectile with a 21-second fuze not set at "safety" is dropped or struck so as to deform the fuze, the complete cartridge, if it is fixed ammunition (otherwise the fuzed projectile only), shall at once be thrown overboard or immersed in water until this can be done.

A–30. When unloading certain types of case ammunition (such as uncrimped case ammunition), the projectile is apt to be left wedged in the bore, thus rendering the gun temporarily inoperative. A gun loaded with this type of ammunition shall not be unloaded while there is any probability of using the gun.

Minor caliber fuzes.

A–31. Certain minor caliber and time fuzes are armed by setback instead of centrifugal action. Care must be used to avoid tapping or otherwise striking projectiles so fuzed. This precaution is particularly applicable to attempts to loosen such a projec-

tile in the cartridge case by repeated light blows of a hammer or mallet. It also applies to unloading such a projectile wedged in the bore of a gun.

A-32. Nose fuzes being sensitive, care shall be taken to prevent them from being struck as by the gun in recoil, by ejected cases, by dropping, etc.

A-33. Time fuzes which have been set shall be reset on "safety" before sending them below.

A-34. In handling projectiles fitted with tracers, care shall be taken not to strike the tracer, as such a blow involves danger of igniting it.

A-35. Loaded, fuzed, or tracer projectiles shall not be used for subcaliber practice.

Smokeless powder.

A-36. Smokeless powder shall not be exposed to the direct rays of the sun. Powder in bulk, in tanks, cartridge cases, ammunition boxes, ready service boxes, or in any other containers shall be protected against abnormally high temperatures (over 100° F.).

A-37. Whenever smokeless powder has been exposed to adverse storage conditions or treated contrary to the provisions of article A-36, it shall be segregated and shall, for purposes of tests, inspections, and reports, be regarded as a separate index; if the ammunition be aboard ship it shall be landed at an ammunition depot at the first opportunity (see art. A-27), unless the tests unmistakably show normal results.

A-38. If any smokeless powder be exposed to temperature higher than 100° F. a special report shall be made to headquarters immediately, explaining the circumstances in detail and stating the temperature and length of time the powder was so exposed.

A-39. Smokeless powder which has been wet from any cause whatever must be regarded as dangerous for dry storage. Such powder shall be completely immersed in fresh water and kept immersed and landed at an ammunition depot at the first opportunity. (See art. A-27.)

A-40. Smokeless powder in leaky containers shall be segregated, labeled, and turned in to a naval ammunition depot at the earliest practicable moment after discovery. (See arts. A-27 and F-9.)

A-41. Powder which shows unmistakable signs of advanced decompositions shall be thrown overboard or destroyed. (See art. F-31.)

Magazines.

A-42. Naked lights, matches, or other flame-producing apparatus shall never be taken into magazines or other spaces used primarily as magazines while these compartments contain explosives. (See art. H-21.)

A-43. Magazines shall be kept scrupulously clean and dry at all times. Particular attention shall be paid that no oily rags, waste, or other materials susceptible to spontaneous combustion are stored in them or other compartments containing explosives of any kind.

A-44. Drill charges for bag guns soon become covered with oil and grease, and it is strictly forbidden to store such charges in magazines.

A–45. During firing no other ammunition than that immediately required shall be permitted to remain outside of the magazine.

A–46. During action and during target practice magazine blowers shall be shut down and covers of both supply and exhaust branches to magazines shall be closed.

A–47. Black powder is one of the most dangerous explosives and shall always be kept by itself. Only such quantities as will meet immediate needs shall be taken from the magazine. A container of black powder shall never be opened in a magazine nor in the vicinity of a container in which there is any explosive.

A–48. Pyrotechnic material shall always be kept by itself in regular pyrotechnic storage spaces. In using it only a minimum amount shall be exposed.

A–49. Intense heat will detonate cast TNT charges. TNT exudate is explosive and highly inflammable. Therefore the outsides of cast TNT containers shall be kept free from exudate, and it shall not be allowed to accumulate on decks nor to come into contact with wood, linoleum, or other materials into which it will soak. TNT exudate shall be removed before it hardens, shall not be scraped off with steel scrapers, and in scrubbing and wiping it up soap or alkaline solution shall not be used. Carbon tetrachloride is a safe and efficient solvent; but if cleared up in time, plain water and a stiff brush will generally remove the exudate from surfaces to which it adheres. (See art. H. 30 (2).)

Powder supply.

A–50. When either cartridges or bag charges are outside the magazines, wherever practicable, each flame-proof compartment or space which forms a stage of the ammunition train, including the magazines and gun compartments, shall be kept closed from all other compartments or spaces, except when the actual passage of ammunition requires it to be open. Where practicable, no flame-proof stage of the ammunition train shall be open to both the preceding and the following stages at the same time.

A–51. (1) In a magazine or handling room in which powder is removed from tanks to be sent to the guns in bags, not more than one charge per gun, for the guns being served by that magazine or handling room, shall be exposed by removal from tanks, by removal of tank tops, or by so loosening the tank tops that the bags may be exposed to flame.

(2) In each subsequent flame-proof stage of the ammunition train, not more than one charge per gun, for the guns being supplied, through that stage, shall be allowed to accumulate.

(3) If hand passing is used, there may be one bag of powder at the station of each man in the train.

(4) It is the intent of this article to permit sufficient powder to be exposed to provide an adequate supply for the guns being served. The maximum amount specified above should be exposed only if a smaller amount will not assure an adequate supply.

A–52. If flame seals be damaged during firing, except in action, so that they can not fulfill their purpose, the gun or guns concerned shall cease firing until the flame seals are again effective.

A–53. During gunnery exercises, charges in excess of the amount required to be available for one run shall not be assembled on deck. No charge for a bag gun shall be removed from its

tank, nor shall the tops of tanks be removed or so loosened that the bags may be exposed to flame until immediately before the charge is required for loading. For case guns the allowance required for the gun or guns that are to fire on the next run may be removed from the boxes.

"Bore clear."

A–54. As there is an inflammable gas present in the chamber of a gun after firing, which, under certain conditions, may constitute a danger by igniting the powder charge which is to be used for the next round, and as smoldering remnants of powder bag may also be present, the following precautions shall be observed:

(*a*) Bag guns shall not be loaded until a member of the crew has assured himself that the bore is clear of powder gases and remnants and has announced "Bore clear" either by voice or by approved signal, such as a whistle, gong, or horn, except that, when the gas-ejector system does not readily clear the bore, the combined sponge and rammer (where provided) may be used. It shall be dipped in water for each load.

(*b*) Until the "Bore clear" signal above described is given, or the projectile is rammed home with the wet combined sponge and rammer, powder shall not be exposed closer than 4 feet to a gun.

Service of the gun.

A–55. Care shall be exercised to see that all sections of powder charges are entered in the chamber with the ignition ends toward the breech, and that the rear section is so placed as to come within 4 inches of the mushroom when the breech is closed.

A–56. Care shall be exercised to insure projectiles against slipping back from their seats, as unseated projectiles may cause abnormally high pressures.

A–57. The ramming of projectiles in bag guns by interposing one or more sections of a powder charge between the head of the rammer and base of the projectile is prohibited.

A–58. Except when using a power rammer, no force greater than that which can be applied by the hand alone shall be used in loading a live cartridge into a gun. Any cartridge which does not freely and fully enter the chamber of the gun shall be carefully extracted and put aside, and in peace time no further attempt shall be made to fire such a cartridge.

A–59. As soon as a gun is loaded the breech shall be closed without delay.

A–60. The breech plug of a gun shall never be unlocked or opened while there is a live primer in the lock.

A–61. A firing lock into which a live primer has been inserted shall never be opened, either independently or by operation of the breech mechanism, unless the firing circuit is broken externally of the lock or breech mechanism (for example, at local pointer's key or gun captain's ready switch), except when it is known that the loaded gun has fired. This applies to the firing of primers at drill, to the operation of loaded guns, and the examination of primers referred to in article A–73.

A–62. The salvo latch shall be removed or made inoperative during any exercise which requires opening the breech, except when firing a loaded gun.

A–63. The loading of certain guns does not necessarily insure the functioning of their salvo latches. Care shall therefore be taken in loading, to open the plug sufficiently far to insure that the salvo latch trips into position to make it operative on the succeeding closure of the breech.

A–64. Effective measures shall be taken to guard against prematurely opening the breech of a loaded gun, whether or not the gun is fitted with a salvo latch.

A–65. A bag gun on which the firing pin can be alined with the primer before complete breech closure shall not be primed except when the breech is fully closed and locked.

A–66. The priming of a bag gun while the breech plug is open is forbidden, and the breech plug shall be closed and locked before the primer is inserted in the firing lock, except in a gun in which the wedge block containing the firing pin is arranged to operate automatically by the functioning of the breech mechanism, in such a manner that the firing pin cannot be brought opposite the primer until the breech plug is closed and locked. When priming a lock of the sliding-wedge type, care shall be taken to insure the primer being pushed in beyond the primer catch to prevent the primer coming out or being crushed by the operation of the wedge in closing.

A–67. On any gun the firing pin of which can be alined with the primer before complete breech closure the firing lanyard shall not be hooked to the lock until after the breech plug has been closed and locked and the gun primed, nor shall the breech plug of such a gun be unlocked or opened while the lock is cocked or while the lanyard is hooked to the lock. The lanyard shall be hooked just before cocking the lock.

A–68. The mushroom of every bag gun shall be wiped after each shot with a sponge or cloth dampened with fresh water.

A–69. In every case gun, except those of the sliding-wedge type, the breech plug shall not be closed until the plugman is assured by *actually feeling* that the front face of the plug is free from any projections, such as a protruding firing pin or fused metal, in order to prevent discharge of the gun when the breech plug is swung to but not rotated.

A–70. The utmost care shall be taken to insure that the firing pin and other parts of the firing mechanism of a case gun are in good condition and properly assembled in order to prevent premature discharge.

A–71. A gun captain's ready switch shall not be in the closed position except while the breech is fully closed and all personnel are clear of the recoil.

A–72. If a gun is loaded at the order "Cease firing"—

(*a*) The gun shall remain loaded and shall be pointed and trained in a safe direction.

(*b*) The breech mechanism shall be kept fully closed.

(*c*) The firing key shall be opened and the firing circuit broken elsewhere.

(*d*) The firing lanyard, if detachable, shall be unhooked.

(*e*) The primer shall be removed from the lock of a bag gun.

The crew shall never leave a loaded gun until these precautions have been carried out.

Misfires, hangfires.

A-73. (1) The possibility of a serious accident due to opening the breech of a gun too soon after a misfire demands the constant exercise of the utmost prudence and caution. After an unsuccessful attempt to fire a gun, it shall be assumed that a hangfire is under way, and the procedure outlined below shall be followed.

(*a*) Keep the gun pointed and trained in a safe direction.

(*b*) Continue attempts to fire, if desired, provided such efforts do not involve any movement tending to open the breech.

(*c*) Do not open the breech for 30 minutes (10 minutes for field and landing guns on shore) after the last attempt to fire. This, at the discretion of the commanding officer, is not obligatory in time of action.

(2) When the fire of a bag gun is interrupted otherwise than by a misfire and the gun remains loaded, a hangfire from an undetected ember from the last load shall be assumed to be in progress and the procedure above for hangfire shall apply.

(3) In a bag gun the primer may be extracted, using the priming tools supplied for this purpose, taking care to avoid danger from recoil or blowback. For this purpose, or for shifting primers, the firing lock should not be left open longer than necessary. If examination shows that the primer has not fired, and the gun has previously not fired within 30 minutes of the time of the unsuccessful attempt to fire or from the time of interruption, the gun may be unloaded if desired.

A-74. When the primer of a bag gun misfires during gunnery exercises and it can not later be fired by electricity, it shall be carefully preserved, distinctly marked, and turned in to an ammunition depot for examination. When a case gun misfires the primer and the other ammunition details shall be disposed of as directed in article A-75 (*b*).

A-75. Ammunition unloaded from a gun may be reloaded if the service of the gun is resumed within a reasonable time. When it is apparent that the service of the gun will not be resumed within a reasonable time, the powder unloaded from a gun shall be disposed of as follows:

(*a*) Powder unloaded from a *bag* gun.

(1) If the gun was warm from firing when loaded, the powder shall be emptied from its bag into fresh water and in that condition turned in to an ammunition depot at the first opportunity.

(2) If the gun was not warm from firing when loaded, the charge shall be carefully examined. If found dry, free from grease, and in good condition, it shall be sent back to its magazine. If injured or slightly greasy, an unstacked charge shall be rebagged and then sent back to its magazine; a stacked charge shall be emptied from its bags into containers, marked and turned in to an ammunition depot at the first opportunity. If grease or moisture has in any way gotten to the powder, the powder shall be emptied from its bag into fresh water and in this condition turned in to an ammunition depot at the first opportunity.

(*b*) Powder in cartridges unloaded from a *case* gun.

The cartridge shall be turned in to an ammunition depot at the first opportunity if—

(1) The gun was warm when loaded.

(2) An attempt was made to fire the gun.

(3) After careful examination the cartridge is found injured or out of alignment. also soaking of the firing ammunition

In the case of 1-pounder ammunition, if the inspection shows that the primer has been struck, the round shall be thrown overboard.

Crimped cartridges shall not be broken down before being turned in. Uncrimped cartridges shall be broken down and the powder immersed in fresh water before being turned in.

(*c*) When ammunition is returned to a depot in accordance with the above, article A–27 shall be complied with. When cartridges are broken down in accordance with subparagraph (*b*) above, all the ammunition details composing it, including primers, shall be similarly marked and turned in.

A–76. When a gun is being unloaded, all personnel not required for the unloading operation shall be kept at a safe distance from the gun. The division officer shall supervise the unloading.

Miscellaneous.

A–77. A circle shall be marked on the deck to indicate the limiting position of the breech of the gun on recoil, and the gun crew shall be instructed to keep clear.

A–78. Marks or indicators shall be provided to indicate whether or not the gun returns to battery, and a member of the gun crew shall be detailed to observe these marks or indicators after each shot. The service of the gun shall be stopped should the gun fail to return to battery.

A–79. If a powder bag is broken to the extent of allowing powder to fall out, the command "Silence" shall be given and the loose powder shall be gathered up. If it is impracticable to utilize this section of the charge in loading, it shall be secured in a flame-proof container or immersed in water. (See art. G–23.)

A–80. When these safety precautions require the removal of smokeless powder from its bag, the ignition charge, together with the bag, shall be thrown overboard.

A–81. It shall be the duty of one man of each gun crew to insure that the loading tray is properly seated before a projectile is rammed.

A–82. Fired cartridge cases shall, before storing below, be stood on their bases in the open air for ten minutes in order to avoid danger from inflammable gases.

A–83. Fitting fixed ammunition in guns by hand prior to firing may defeat its purpose by canting or loosening the projectile in its case. Such fitting shall not be done except by order of the commanding officer, and then not until the firing pins have been removed from the breech blocks and the firing circuits have been disconnected.

A–84. In testing primers outside of closed firing locks, no magneto or other device which can possibly supply current sufficient to fire the primer shall be used.

A–85. When using director train while firing at gunnery exercises, an observer from the firing vessel for each gun shall cause

the firing circuit to be broken whenever the gun is trained dangerously near any object other than the designated target.

A–86. Except in action or when specifically authorized antiaircraft guns shall not be fired at elevations greater than those prescribed in the current orders for Gunnery Exercises. When firing antiaircraft guns as such, all personnel not required to be exposed shall be kept under cover.

A–87. Except in action, whenever a circuit breaker becomes so sensitive as to function due to the shock of firing, the circuit breaker shall be either overhauled or replaced and shall not be tied or fixed in position so as to be inoperative for the purpose for which designed.

A–88. The covers of switches, circuit breakers, etc., shall be kept securely closed while powder is exposed in the vicinity.

A–89. Whenever the guns of a vessel are fired, the fire hose shall be connected and pressure shall be maintained on the fire main. This does not require water to be running through the hose.

A–90. (1) Before firing in time of peace the commanding officer shall require a report that the recoil cylinders have been inspected and filled in the presence of the gunnery officer and that such officer has checked the recoil cylinders.

(2) Whenever there is a possibility of action, the commanding officer shall require all recoil systems to be kept ready for immediate use and inspected as frequently as safety demands.

A–91. After filling recoil cylinders not fitted with expansion tanks, the prescribed amount of liquid necessary to allow for the expansion of the liquid due to heat, and no more, shall be withdrawn.

A–92. Before firing primers, the division officer will see that gun tompions are removed and mushroom vents clear. In preparing the battery for firing he shall, in addition, see that the gas-ejector system is working satisfactorily and that the bore of the gun is in satisfactory condition.

Bore constriction.

A–93. Steel constrictions of the bore, usually caused by the gun liner overriding the retaining shoulders in the tube, are a source of possible danger in firing. It is not always possible to distinguish copper constrictions from steel constrictions. Therefore no gun shall be fired in target practice unless the bore gage will pass through the entire bore without undue forcing. After target practice the gage shall be tried in each gun and the bore enlarged, if necessary, until the gage will pass.

Mines, etc.

A–94. Current instructions prescribe effective measures to prevent the accidental arming or launching of mines and aircraft bombs in storage or in handling. Mines and aircraft bombs shall at all times be handled and treated as if armed.

A–95. Fuzes, firing mechanisms, or primer mechanisms normally kept in bombs or mines shall not, except as covered by special orders or current instructions of headquarters or the Bureau of Ordnance, be removed, disassembled, repaired or in any way altered.

A–96. (1) Bombs containing detonators, or containing fuzes having detonators or other explosive components shall not be stowed in or near magazines containing explosives. Bombs.

(2) Bomb fuzes containing integral detonators or other explosive components shall be stored only in specially designated fuze magazines which shall not be located adjacent to magazines containing high explosives.

(3) Detonators for bombs, or other detonators which are not assembled integrally with fuzes, shall be stored only in standard type detonator lockers located in approved places. These places may be above the weather deck or in the mast.

(4) Electric detonators shall not be located in the same compartment with or near radio apparatus or antenna leads.

A–97. Defective mines shall be turned in to an ammunition depot at the first opportunity. (See art. A–27.)

A–98. In firing small arms, machine guns, and submachine guns, whenever a blowback occurs the bore shall be examined for foul bore before firing another round.

A–99. When a misfire occurs in small arms, machine guns, or submachine guns, another attempt may be made to fire the weapon provided it can be recocked without opening the bolt; the bolt should not be opened until at least 10 seconds have elapsed after the last attempt to fire the weapon, except in installations such as distant control in aircraft where the opening of the bolt of the weapon would not endanger personnel.

A–100. The safety precautions contained in United States Navy Small Arms Firing Regulations and Instructions shall be followed. The rules pertaining to the handling of small arms shall be impressed upon all officers and enlisted men by constant repetition and coaching until their observance of all safety precautions becomes a fixed habit when handling small arms. The following precaution shall be drilled into every man using small arms: "Never point a pistol, rifle, machine gun, or any small arm at anyone you do not intend to shoot, nor in a direction where accidental discharge may do harm."

A–101. Additional safety precautions and instructions will be found under the sections of this publication to which they apply.

Part B.—BROADSIDE MOUNTS

Section 1.—GENERAL

Sources of information.

B–1. (1) Detailed information on the various types of mounts is contained in pamphlets, the numbers of which may be found in Ordnance Pamphlet O. The pamphlet, also drawings, etc., must be thoroughly understood before disassembly or assembly is attempted.

(2) Safety precautions are contained in part A, section 4, of this publication. Additional instructions applicable to the subject matter are included in this part.

Routine lifting, etc.

B–2. (1) At least once a year each 3-inch 50-caliber or larger gun carriage shall be lifted for inspection, in order to insure proper care and preservation of the roller paths and bearings. Three-inch 50-caliber, and 5-inch carriages shall be lifted at navy yards, after estimates have been obtained and authority for the work has been granted, the ship's force performing all possible work. One-pounder, 6-pounder, and 3-inch 23-caliber guns on patrol boats shall be lifted quarterly, on other vessels semiannually. The date on which guns were last lifted shall be shown on the face of the gun-mount card, N. Ord. 40. (See art. K–22.)

Routine inspection.

(2) The routine of the ship shall provide for jacking up 5-inch carriages and making thorough inspection of rollers, roller paths, etc., at least quarterly.

Special lifting.

(3) In addition, carriages shall be lifted whenever binding occurs or at any other time the gunnery officer considers it necessary due to unforeseen conditions.

Removal of cover plates.

(4) The cover plate of the 3-inch 50-caliber antiaircraft carriage Mark XI should be removed at least quarterly for inspection of balls and ball races. Care should be taken that in replacing cover it is made watertight in all respects.

Lubricant or preservative.

B–3. Cleaning, renewal of parts, and lubrication will be effected when mounts are open for inspection. The lubricant or preservative shall be the latest approved by the Bureau of Ordnance. (Consult current circular letters for changes.)

Effect of salt water.

B–4. (1) Corrosion of rollers and roller paths, and balls and ball races, is caused primarily by flooding with salt water and failure to remove it promptly. Whenever gun mounts have been subjected to conditions likely to flood their roller paths or ball races, steps should be taken at once to remove all water and to properly lubricate the working parts with an authorized lubricant. All spaces between rollers and roller paths should be completely filled and kept filled with an authorized lubricant.

Clearing of salt water.

(2) Roller paths or ball races may be cleared of salt water by applying a large amount of authorized lubricant or ordinary

lubricating oil, while training the gun to force all of the water out through the drain holes. After all salt water has been forced out, the spaces between rollers and roller paths, also between balls and ball races, should be completely refilled with the proper lubricant.

Special attention to drain holes.

(3) To prevent water remaining in paths, the drain holes just above the outer edge of the lower path shall be cleared frequently, especially after a rain or heavy weather at sea. This may be done by removing the handhole plates in the carriage and training the gun in order to reach each of them. The roller paths can also be inspected through these handholes.

Adding lubricant or preservative.

(4) Lubricant or preservative can be added from time to time by ship's force by removing the separator supports and forcing it in with a grease gun.

Badly pitted rollers.

B-5. Rollers found to be badly pitted should be replaced rather than reground. A variation of as much as 0.002 inch in the diameter of the roller will cause unequal loading. If new rollers are used with old ones which have been reground, the new rollers will necessarily carry all the load.

Storage ashore.

B-6. When stored ashore, all parts of the working surface of the mount (including roller paths) must be protected by the gun slushing compound, grade A, approved by the Bureau of Ordnance. All bright parts of the mount should be coated with slushing compound. Care should be taken to prevent water from entering the roller or ball bearings. The remainder of the mount should be red leaded to prevent rust. The training and elevating gear should be turned over every three months. Prior to issue, the gun slushing compound shall be removed and the prescribed lubricants applied to working parts.

Lubricating slide.

B-7. Slides should be well lubricated, particularly before firing. Guns should be run in quarterly for further lubrication of slides. Slides should be inspected before running in or firing to see that working surfaces are free from dust and paint.

Inspection of stand.

B-8. Holding down bolts and clips shall be examined regularly, especially before and after firing. Training circles shall be inspected for corrosion and proper lubrication. Worn training circles may be shifted so that the worm will engage a new section. All drain holes in stands must be kept clean and open.

Adjusting nuts.

B-9. As the adjusting nuts of the frictionless bearings transfer the weight of the gun and slide to the spring bars, most careful adjustment is necessary. This is accomplished by turning the adjusting nuts until a feeler or test strip of paper may be inserted between the trunnions and their surfaces, at which point the nuts may be locked with the locking clamps.

Liquid for recoil cylinders.

B-10. (1) The liquid used in recoil cylinders shall be glycerin (80 parts by measure) and water (20 parts by measure). The glycerin must be free from fatty acids and the water free from alkali or mineral salts.

Tests.

(2) The liquid shall be tested in accordance with circular letters issued by the Bureau of Ordnance.

Expansion of liquid.

(3) Cylinders filled in cold weather may weep or leak during hot weather, due to expansion. Failure of the gun to return to battery may be caused by expansion of the liquid, in which case

enough should be withdrawn to permit the gun to return. (See art. A-91.)

Equalizer circulation pipes.

B-11. Slides fitted with two recoil cylinders containing recoil liquid require equalizer circulation pipes. These should be examined to guard against clogging. They should be thoroughly cleaned when filling cylinders. Blow through the filling holes to see whether proper circulation of liquid is obtained. Some old-type slides with cast cylinders have plugs opposite the opening between the cylinders, which permit cleaning when necessary.

Daily inspection.

B-12. As recoil cylinders occasionally leak even when apparently quite tight, special attention should be directed to them during daily inspection. Any loss of liquid should be supplied at once.

Inspection before firing.

B-13. Before firing, the commanding officer shall require a report that the recoil cylinders have been inspected and filled in the presence of the gunnery officer.

How to fill cylinders.

B-14. (1) To fill 6-inch gun recoil cylinders, depress gun slightly remove the filling plugs of each cylinder, or the air-hole plug of the cylinder opposite the one into which the liquid is to be poured; pour until the liquid runs out of the opposite cylinder. Always strain the liquid through bunting or cheese cloth to prevent entrance of dirt. Test cylinders for air pockets by slightly elevating and depressing the gun. If air pockets exist the liquid will recede. Refill, then elevate and depress if necessary. When certain that the cylinder is entirely filled, remove the amount of liquid specified on the instruction plate.

(2) If filling plugs are in the front end of the cylinder, elevate the gun slightly to fill; if in the rear, depress the gun; if located elsewhere, keep the gun level.

(3) If the cylinder has but one hole and no air-vent hole exists, be careful to pour the liquid into the funnel in an extremely fine stream in order to permit trapped air to escape. Mounts with cylinders of this type have been wrecked when cylinders have not been properly filled.

(4) Most of the 1-pounder and 6-pounder mounts with hydraulic recoil have but one filling hole.

(5) In repacking glands, packing containing rubber should never be used with glycerin. Renew packing found to be ragged.

Clearances.

B-15. (1) Mounts which balance with gun shoulders against slide require a clearance between cylinder bonnet and piston heads.

(2) Mounts which balance in a position determined by recoil piston rod nuts, and have liquid and spring in the same cylinder, do not require clearance between cylinder bonnet and piston heads.

(3) Mounts which balance in a position determined by recoil piston rod nuts, and have separate liquid and spring cylinders, require clearance between spring cylinder bonnet and spring cylinder rod piston, but do not require clearance between liquid cylinder bonnet and liquid cylinder rod piston.

(4) The clearances in above-mentioned types vary considerably. Check drawings and ordnance pamphlets for types concerned as a serious casualty may result from improper piston clearance.

(5) After proof firing, adjustable counterrecoil plungers are set and should not be changed when overhauling cylinders.

Length of recoil.

B-16. (1) Each gun shall be hauled out of battery quarterly and the length of recoil shall be recorded. Excessive recoil is likely to cause piston rod trouble and final rupture.

(2) Excessive recoil usually indicates partially filled cylinders, excessive powder pressure, or worn cylinder liners and pistons. In case of excessive recoil, each of these items should be carefully checked and a report made to headquarters with appropriate recommendations.

Counterrecoil.

B-17. (1) If the counterrecoil plunger becomes burred during overhaul, replace it with a new plunger. Never use a counterrecoil plunger that has been touched up with a file or emery cloth, as violent counterrecoil shock may result.

(2) If counterrecoil is violent, the plunger shall be checked with drawing dimensions and replaced, if necessary.

(3) Permanent set in counterrecoil spring may cause failure of gun to return to battery at maximum elevation. This is not considered serious, as the gun can be returned by a slight decrease of elevation, but, if the gun slips out of battery at maximum elevation, springs should be replaced immediately. Never fire a gun which is out of battery more than 0.25 inch.

Section 2.—ELEVATING AND TRAINING GEAR

Care.

B-18. In order to prevent deterioration, the following routine is prescribed for the broadside battery of a vessel in commission:

(*a*) Move every part daily except when weather interferes.

(*b*) Keep elevating and training gear clean, properly lubricated, and well exercised.

(*c*) Brick dust or gritty substances should never be used. These gears must never be scraped with knives or metal scrapers or be defaced or roughened in any way.

(*d*) Keep mounts well covered when necessary.

(*e*) If a mount is hard to elevate or train, thoroughly examine it to ascertain the reason. Sometimes bent shafts, burrs on worms or arc, waste or rags are the cause and forcing will increase the damage. The difficulty is due to some local defect, not to design, and can be discovered by progressive search.

(*f*) The ship's force shall employ the means provided for removing lost motion from elevating and training gears. If the condition is beyond correction, excessively worn parts shall be replaced or request shall be made for overhaul of gears at a navy yard.

Friction disks.

B-19. To prevent the gun from squatting, keep friction disks clean and perfectly free from oil or other lubricant, particularly before firing. To remove oil and grease, wash the disks in lye water and then thoroughly rinse in fresh water. Set the friction disks up tight before firing the gun.

Lubrication.

B-20. Keep oil channels, oil holes, and forced lubrication nipples clean and free from paint, and filled. After seeing that all working surfaces are clean, thoroughly lubricate.

Section 3.—SIGHTS

Telescopes.

B-21. Officers and others concerned shall be familiar with telescopes on board, ordnance pamphlets being used as a guide. Telescopes must have efficient care. Never disassemble them on board ship. Make every effort to protect telescopes from undue exposure to weather. Lenses should be cleaned with lens paper. If alcohol is used, exercise care to prevent its entering the optical assemblies, as it has a tendency to act on the substance with which lenses are cemented.

Sights.

B-22. (1) All sights are provided with adjustments for range and deflection scales, telescope holders, or telescope cross wires, or adjustment of the telescope itself in the holder, and require frequent bore sighting.

Range dials.

(2) Range dials are usually graduated on both sides, one side in yards for full charge and the reverse in yards for reduced charge.

Range bars.

(3) Range bars are graduated with both range in yards for full charge and minutes of elevation of sight. They are for use at elevations not given on the range dials but should check with graduations on the dials for full charge. On sights which permit about 3° right or left deflection, scales are graduated with arbitrary units from 0 to 100, the 50 division line being opposite the index line on the pointer when the sight is set at zero azimuth; each division represents one-tenth of an inch on a 100-inch radius. On sights which permit 5°45′ right or left deflection the scales have been graduated from 0 to 200 with the 100 division line opposite the index line on the pointer. When the sight is set at zero azimuth each division represents 0.10 inch on a 100-inch radius, or 1/1000 part of the range.

Deflection scales.

(4) Deflection scales on 3-inch 23-caliber antiaircraft sights, Mark XII and Mark XVII, and on 3-inch 50-caliber antiaircraft sights, Mark XVI and Mark XVI (Mod. 1), are graduated from 0 to 100 with the 50 division as the zero setting, but each division represents 0.20 inch on a 100-inch radius, or 2/1000 of the range. The DIVISIONS ARE NOT MILS, but are arbitrary units each equal to 2 mils. The graduations are designed to give 2 yards deflection at 1,000 yards in order to provide a wide azimuth deflection. A new type of celluloid for the 3-inch 50-caliber antiaircraft azimuth scales issued to the service is graduated with 500 as the 0 setting and each division is equal to 1 mil.

Care and adjustment.

B-23. (1) Keep working parts of the sight mechanism free from grit and rust, and coated with good lubricating oil. Oil holes in the different parts provide for proper lubrication. If sights are exposed to salt spray, disassemble, clean with alcohol, cover with a fresh coating of oil, and reassemble. Never use emery paper or any gritty substance as it may cause lost motion in the bearings and working parts which will materially affect accuracy.

Lost motion.

(2) Carefully test for lost motion sights which are constantly used for dotter practice, proceeding as in boresighting. If lost motion has developed, refitting must be effected only by a skilled mechanic.

Graduation dial.

(3) Sights are fitted with an elevation graduation dial which is used instead of the direct-reading sight bar graduations, the dial admitting finer adjustment of the graduation scale. Lost motion in the sight elevating gear will more readily affect readings on the dial and should be tested as follows:

(*a*) Lay the sight on a distant mark and elevate it well and depress it back to the distant mark by means of the sight-elevating mechanism. Then, depress below the mark and bring it back to the distant mark. The ship being stationary, the dial reading should be the same each time the horizontal cross wire of the telescope is accurately laid on the distant mark; if not there is lost motion in the gearing.

(*b*) Test the azimuth drum in a similar manner, using the vertical cross wires of the telescope instead of the horizontal wires.

Lost motion in azimuth mechanism.

(4) Lost motion in the azimuth mechanism is eliminated by the adjustable arc in the yoke teeth or by the split pinion. In the earlier marks no means are provided for taking up lost motion in elevating mechanism, as the weight of the sight bar and head should always keep the teeth of the rack and pinion well in contact. Sights of later mark have adjustable elevating arcs. Adjustment is accomplished by an adjustable steel key which carries the center section of each tooth and can be set up to diminish the lost motion due to wear of the pinion by advancing the center part of each tooth sufficiently to take up the play.

Check for parallelism.

(5) While a vessel is in drydock, take the opportunity to check parallelism of planes of elevation of guns and sights. Any error in this respect introduces error in both range and elevation, varying with the range. With guns and sights practically horizontal, bring the sight on some definite mark on ship or shore (preferably shore). Elevate the gun and depress the sight to extreme elevation and sight depression respectively, by steps, checking the vertical wire of the sight on each step. Five degree steps are satisfactory. If the vertical wire of the sight checks on the mark throughout the entire arc of elevation, then the gun and sight travel in parallel planes throughout the full arc of elevation, and no further check for parallelism is necessary.

Checking in drydock.

B–24. A gunner's quadrant should be used for checking sights in elevation, the vessel being in drydock. The sight depression scale should indicate increments of sight depression corresponding to increments obtained from reading the quadrant mounted on the movable part of the sight. If yoke sights are properly installed and cared for, improper alinement will result only from natural wear of working parts and this error will be very slight.

Overhaul.

B–25. Indiscriminate overhaul shall not be allowed. The necessity for overhaul of sights will always be apparent and such work will be performed only by experienced personnel. Use of proper tools is mandatory.

To bore-sight a gun.

B–26. (1) Preliminary to bore-sighting a gun check the following:

(*a*) Examine the pointer's and trainer's telescopes to see that they are clean, properly focused, free from parallax, and that the

cross wires are clearly visible and in vertical and horizontal position. Unsatisfactory telescopes should be replaced with spare telescopes.

(b) Run the sight through its full arc in elevation and azimuth to see that it works freely and is free from excessive lost motion and that parts are properly lubricated. Set the sight bar at zero range against the reference mark of the sight-bar bracket. Set the pivot bar at the point of parallelism with the axis of the bore in horizontal plane.

(2) Open the breech plug and lash it open, so as to prevent its swinging part way shut and injuring the bore sight.

(3) Secure the breech bar (adaptor) across the face of the breech by means of the bolts.

(4) Enter the telescope holder in the threaded hole in the breech bar, and screw home. Before setting up tight on locking ring, see that the two pairs of thumb screws are respectively in a vertical and horizontal position. Should the cross wires appear to be canted to one side, loosen the thumb screws and rotate the telescope (not the telescope holder) until the cross wires are horizontal and vertical, or better still, make them coincide with the horizontal and vertical stripes on the target on which gun is to be bore-sighted. This will facilitate getting the bore-sight cross wires on center of point of aim. Check telescope for parallax and see that cross lines are in sharp focus.

(5) Ship muzzle disk and see that the lip or a line on its periphery touches the muzzle face all the way around.

(6) Center cross-line intersection on central hole in muzzle disk by means of telescope adjusting screws. Grasp rotating ring and rotate telescope through 360°. At the same time observe whether or not the cross-line intersection remains centered on the central hole in muzzle disk for each 90° position. If it does not shift, the cross-line intersection is truly central. All telescopes are shipped correctly adjusted and should remain so unless they are tampered with. If the cross lines shift while telescope is being rotated, unship the telescope and use a spare telescope that does not require cross-line adjustment.

NOTE.—Telescopes that require cross-line adjustment are adjusted as follows:

Center the cross-line intersection on the central hole in the muzzle disk by means of telescope adjusting screws. Rotate telescope 180°. Move the vertical cross line half the distance of the error toward the center by cross-line adjusting screws and the remaining half by means of telescope adjusting screws. Perform same operation for error in horizontal cross line. Recheck and repeat the operation until telescope is perfectly centered. In connection with the above we must differentiate between the telescope adjusting screws and the cross-line adjusting screws.

(7) Remove the muzzle disk and focus the telescope on target as required, noting that there is no parallax.

(8) Man stations at pointer's, trainer's, and bore-sight telescopes. Normally the division officers take station at the bore-sight telescope with the regular pointer and trainer at their stations. First one set of wires (horizontal or vertical) is made to converge on the target and then the other set is checked and

finally the cross wires are checked on the target. The officer or man at the bore-sight telescope calls out "mark" and the wires in the gun-sight telescope are adjusted to agree with those in the bore-sight telescope. The manner of making this adjustment depends upon the type of gun sight. A careful examination of the sight will show the method to be employed. The following methods of adjustment may be found on the different gun sights now in use:

(*a*) Move entire sight in range and deflection. (This will adjust only one telescope on any yoke sight.)

(*b*) Adjust cross-line lens in telescope.

(*c*) Adjust telescope holder.

(*d*) Adjust telescope in tube. (These telescopes are mounted in a tube with ball joint on forward end of telescope and tube and adjusting screws on after end of tube.)

(9) Having made the gun-sight adjustment to converge both sights with the bore sight, maintain this condition and slip the sight scales to read zero range and zero deflection. While maintaining this condition, secure the sight scales. Then make another check on the target to verify the bore-sighting. Having done this, the checking personnel should change stations, each checking at each telescope in order to insure that all telescopes are being checked on the correct target.

(10) Run sights up and down, to right and to left, set on zero range and zero deflection, and again check cross wires.

(11) Test for looseness of parts and lost motion. Shake telescopes, telescope holders, etc. See if adjusting screws and sight scales are rigidly secured and again check cross wires.

(12) Put muzzle disk in again and see if the bore-sight line of sight is still coincident with the axis of the bore.

(13) Report to the gunnery officer that the gun is bore-sighted and ready for inspection.

(14) After inspection place a large placard on the gun announcing "Hands off—Bore sighted," or similar warning. Move to the next gun or stow gear.

Section 4.—FIRING AND LIGHTING CIRCUITS

Wiring and insulation tests, etc.

B–27. (1) In addition to the prescribed electrical tests for firing circuits, the batteries should be frequently tested and the various parts of the attachments should also be tested before use. Actual tests should also be made by firing primers. Unless the electric firing connections are perfect and securely held in place, there will be frequent failures to fire, due to insufficient current passing through to the primer.

(2) Care should be taken that unnecessary bending of wiring is avoided, as this usually results in a broken wire. Oil should also be kept from the firing attachment; this usually rots the rubber material.

(3) The faults most frequently found in the circuit are broken wires, or grease, or other foreign matter on the connections. The firing of the gun will sometimes jar the connections loose. It

is important that this should not occur. In order to guard against this it is necessary that the connections be well secured. Particular care must be taken to see that the primer seat, the primer, and all contacts are perfectly clean and free from grease or oil. Whenever there is danger of a short circuit, renew wiring or properly insulate. The failure of the primer when using electric firing is generally due to poor contacts.

Section 5.—ACCESSORIES AND SPARE PARTS

Allowance lists.

B-28. (1) A list of all accessories and spare parts allowed the vessel, which are supplied upon commissioning, is included in the ship's allowance list furnished by the Bureau of Ordnance. The gunnery officer, division officers, and gunners should be familiar with the uses, the amount, and the stowage of all gear included therein.

Spare parts.

(2) These are supplied to ships not only for the minor portions of the breech mechanism, sights, etc., but for many parts of the gun mount. At clear ship for action these parts should be placed in a previously designated position, convenient to the battery, but so removed as to be no source of danger to the personnel. The shifting of these parts should be included in the instruction of the gun crews, and they should be drilled until proficient in rapidly replacing all parts that may be damaged in action.

Shifting of parts.

(3) Means should always be at hand at general quarters for promptly shifting every part of the sight, breech mechanism, and gun mount, but unless the spare parts are permanently stowed near the guns they should be obtained as needed from the storeroom and returned upon completion of drill. It is preferable, however, to arrange such spare parts permanently in brackets on bulkheads convenient to but removed from the guns.

Part C.—GUNS AND ATTACHMENTS

Section 1.—GUNS

General.

C–1. (1) Details regarding guns, breech mechanisms and attachments are fully covered in ordnance pamphlets listed in Ordnance Pamphlet No. 0.

Safety precautions.

(2) Safety precautions are contained in part A, section 4, of this publication. Additional safety instructions applicable to the subject matter are included in this part.

Routine care.

C–2. The following routine care of guns is prescribed for a vessel in commission (see art. B–18):

(*a*) Keep guns securely covered when not in use, except on clear days when there is no spray or dust flying.

(*b*) Move every part daily except when weather interferes.

(*c*) Cover all steel work with oil, vaseline, or cosmoline. (See art. C–5.)

(*d*) Keep bores thoroughly clean and coated with oil. Take particular care that the slope and origin of rifling are clean and well oiled. Remove oil frequently and renew it. (See art. C–16.)

(*e*) Never use brick dust, any gritty substance, knife or metal scraper, or in any way deface or roughen surfaces.

(*f*) After firing, completely dismount the breech mechanism, wash every part with fresh water and soap, dry carefully, then rub with a well-oiled rag before assembling.

(*g*) Do not paint the gun in rear of the slide. (See art. C–5.)

(*h*) Do not bend or stub the firing-pin points.

(*i*) Have guns accurately bore sighted at all times. (See art. B–20.)

(*j*) See that guns are swung on knife edges and that proper trunnion clearances are maintained.

(*k*) Remove tompion before firing. While a vessel is on patrol, the tompion shall be removed from any gun likely to be used in law enforcement. Secure on the muzzle a light canvas bag thinly coated with paint as a substitute for the tompion. Muzzle bags shall be made on board ship; they will not be furnished on requisition. Their use may result in some salt water getting into the bore, but attention and careful cleaning will prevent any undue corrosion.

Spare parts.

C–3. Suitable and ample spare parts for emergent needs are issued. Keep them near the gun when in action, as access to the storeroom may be cut off. Requisitions for spare parts must show drawing and piece numbers as well as correct nomenclature, to avoid unnecessary correspondence. (See art. K–3.)

Tools.

C–4. Tools of special design are issued for the different types of mechanism. Keep them in good condition and have them stowed near the gun. Replace any unfit for use. Use of proper tools is mandatory to prevent damage to parts.

Care.

C–5. All outside parts of the gun and breech mechanism which are supplied bright are to be kept clean by the use of oil only. With the above exceptions, keep the outside of the gun red leaded and painted. On vessels with hull and structure painted white or black, guns and mounts shall be painted black, except stands which shall be painted straw color. On vessels painted war color or gray, paint guns, mounts and stands gray. (See art. C–2.)

Bore gage.

C–6. The allowance list of a vessel includes a gun bore plug gage for each caliber of gun forming its battery. Pass the proper gage through the bore before and after each target practice or series of firings and at such other times as may be necessary. If it will not pass, the gun must be lapped out using lapping head furnished. The gage should pass through without undue forcing. Be sure parts are absolutely free from rust and residue.

Erosion.

C–7. Erosion has been found on the 3-inch, Mark XIV, gun inside of the slide, apparently caused by spray and rain entering the slide through the hollow trunnions. Run the guns in quarterly to insure proper condition. Clean out accumulated water, then clean and slush the gun. If the canvas covers do not serve to prevent water entering the slide, fit the hollow trunnions with short wooden plugs coated with white lead and attach lanyards to the plugs and cap square bolts. Remove the plugs before firing in order to avoid splitting the slide during the recoil of the gun. (See art. B–7.)

Yoke and gun one unit.

C–8. (1) The yoke is a part of the gun. The yoke and gun, up to 7-inch, are considered one unit and should not be separated. In reporting assemblies, the mark and modification of the yoke are of importance in connection with the issue of proper gas ejector and fittings.

Inspection, yoke screws.

(2) Before firing 5-inch 51-caliber guns, make an inspection to see that all yoke screws are screwed home. The metal around the head of screw should be slightly upset with center punch to prevent backing out. Be sure the seven-eights inch yoke screws (drawing No. 31246, piece 2, revision F) are installed on the 5-inch 51-caliber, Mark VIII, gun yoke.

Inspection of liners.

C–9. After each target practice or series of firings inspect gun liners; record for each gun the distance from breech face to rear face of liner, the protrusion of the liner beyond the tube at the muzzle, and the amount the liner has turned at the muzzle relative to tube. At the end of each gunnery year report to headquarters data so obtained, giving the mark, modification, and serial number of each gun. (See art. C–15.)

Constriction.

C–10. It is unsafe to fire a gun which has a constriction of the bore due to steel. The constriction may be caused by gun liner overriding the retaining shoulders. It usually appears in the form of a ring in the immediate vicinity of the shoulder of the liner near the muzzle and may be seen immediately after cleaning the gun by looking through the bore toward a strong light, the observer moving his point of vision around the end of the bore. If there is constriction, it will appear as a ring of light and shadow,

and will be immediately reported to headquarters. A study of the general arrangement drawings will show the position where constrictions are most likely to occur.

Preparation for firing.

C-11. In preparing a battery for firing, the division officer shall assure himself that the tompion is removed from each gun, that the bore is clear, and that the gas-ejecting system is working satisfactorily and is free from water. One hundred pounds of air shall be delivered at the gun.

Inspection after loading drills.

C-12. After any loading drills in which drill projectiles are used, carefully inspect the gun and remove any fragments of drill projectile which may have broken off. Pay particular attention to the bore of gun, chamber, pad, and screw box.

Loading machines.

C-13. Loading machines are provided to train personnel in loading broadside guns. If the gun itself is used for training the constant wear will result in lost motion and may damage the breech mechanism. Improperly loaded projectiles may damage the gas check slope or burr the threads in the screw box liner. When loading machines are provided, it is desired that they be normally used for the purpose of training loading crews.

Equalization of firing.

C-14. (1) As far as possible, divide firings on board ship among the different guns so that the number of rounds fired from each will be the same. This applies particularly to spotting practices and firing illuminating projectiles in broadside guns.

Shifting of guns.

(2) When the rounds fired from a particular gun exceed the average fired from the remainder of the battery by the following amounts, arrange to have a gun or guns shifted during overhaul:

	Rounds
8-inch 50-caliber	100
5-inch 51-caliber	40

Mounts and fire control equipment.

(3) Mounts and fire-control equipment will not be shifted with the guns, and no readjustment of fire-control instruments should be necessary.

Work by ship's force.

(4) To avoid unnecessary expense, work shall be performed by the ship's force, navy yard forces assisting only when necessary.

Reports.

(5) After such shifts, submit gun and mount cards to headquarters immediately, showing by serial numbers the new location of all guns with reference to mounts.

Liner creeping; overhaul and repairs.

C-15. Aside from lapping to remove bore constriction covered in article C-6 above, the principal repairs necessary on guns on board ship are those connected with liner creeping. When a liner protrudes at the muzzle 0.50 inch or more, cut off the excess metal flush and inform headquarters of the action. When the creeping of a liner to the rear of the breech interferes with operation of the breech mechanism, the liner shall be faced off (to drawing dimensions for distance from breech face of gun) and the gas check seat reamed. Certain navy yards carry special tools for accomplishing this in 5-inch guns. Submit a special report to headquarters whenever liners are faced at the breech or gas check seats are reamed. In the report give the serial number, mark and modification of the gun, the amount of metal cut off, and a complete history of the liner movement since the gun was installed, with rounds fired and movement occurring in each tar-

get practice. In listing rounds fired, the kind of charges—full, special or reduced—should be indicated. Forward movement of the breech end of liners sometimes occurs. Up to a certain point this movement is of no consequence, but if excessive it may result in leakage of gas past the gas check seat. It is necessary to replace the gun if this leakage is excessive. (See art. C-9.)

Care of bore. C-16. On board ships in commission keep bores of guns clean and oiled. Wash the bore as soon as possible after firing and, as soon as dry, oil it well, taking care to leave no excess oil. Prior to firing, remove all superfluous oil from the bore.

Care of guns laid up. C-17. Whenever guns are laid up, whether in the open or in store, thoroughly coat both the bore and the entire inner and outer surfaces with a gun slushing compound grade A approved by the Bureau of Ordnance. Prior to the application of this coating, thoroughly clean the gun. When applying in cold weather, the gun slushing compound grade A may be warmed to facilitate application, but must never be heated to a temperature greater than 180° F., as the ingredients which prevent rust will be driven off. When guns are laid up in the open, remove the breech mechanism and place in the storehouse, fill screw holes with slushing compound and, in addition, put in solidly muzzle tompions and breech tompions fitted with expansion wedges. Heavily slush around edges of tompions to prevent water seeping in. Stow guns almost level, but with a slight incline toward the breech. Fill extractor slots with greasy waste, to prevent entrance of water.

Inspection of guns laid up. C-18. At periodic intervals carefully inspect guns laid up in order to ascertain the condition. The interval between inspections will vary with the place where guns are laid up—that is, on board ship, in the open or in storehouses, and with the locality of the base. In general, for guns stowed in buildings an inspection once a year should be sufficient to determine freedom from rust. For guns laid up in the open an inspection should be made every three months or oftener, depending upon climatic conditions. At these inspections it will not be necessary to remove the entire coating from the bore of the gun, but sufficient should be removed to enable the inspecting officer to be sure of their condition. If any signs of rust are found, thoroughly clean and recoat the gun with gun slushing compound grade A.

Star-gaging guns. C-19. Make requests to have gun star-gaged only when in the opinion of the commanding officer there is some particular necessity, such as badly worn guns. Set forth reasons fully and completely. The fact that a poor target practice was recently conducted is not sufficient, unless it is apparent that poor performance was directly due to badly worn guns. This would be shown by very erratic behavior of the guns.

Section 2.—GAS CHECKS; OBTURATORS

Containers. C-20. Spare gas-check pads and rings complete are issued in containers in which they shall be habitually stowed. When a pad is surveyed and condemned, carefully pack pad and rings

in the original container and ship to the Naval Gun Factory for examination. Notify headquarters immediately.

Handling and stowage.

C-21. In handling pads, take great care to prevent damage or deformation. If possible, stow pads carefully in a storeroom in which the temperature does not go below 50° F. or above 90° F. Do not stow them close to the source of heat for the room.

Safety precautions, inspections, and tests.

C-22. Prior to assembling, carefully examine the pad to see that the canvas cover is intact and in proper condition for use. If the cover appears to be slack, do not use the pad. When assembling on a breech mechanism, test the fitting of the pad on the gas-check seat by bluing the gas-check seat or covering with a thin coating of chalk or grease, closing and opening the breech and seeing that the pad is marked all over. Then, lightly coat the pad with a mixture of one part white lead and two parts tallow by weight. Rub the mixture in well and leave a thin coating on pad and rings. Keep the mixture in a closed container and carefully inspect to insure freedom from grit, etc. With a new pad the breech should close a little stiffly. If this stiffness cannot be obtained, substitute another pad. While the breech mechanism may operate a little stiffly at first, most of the stiffness will be removed prior to firing by opening and closing the breech and the pad will take the form of the gas-check seat.

Repair.

C-23. Survey pads which have the canvas cut or torn. Do not repair on board ship. Pads which are deformed may be reformed in presses, if supplied, or in the gun as described above. In any case, reforming in the gun is the final step in fitting the pad.

Operation.

C-24. Temperature affects the operation of the gas check pad. If the temperature of the pad is below 50° F., thoroughly soften it by leaving the pad, in its container, in a warm storeroom, as provided above, for several hours prior to firing. If a pad becomes too soft from rapid firing, substitute a new one. In an emergency a cold pad may be softened by immersion in warm water or a soft pad hardened by immersion in cold water or by using cold water on the pad. The mushroom of every bag gun shall be wiped after each shot with a sponge or cloth dampened with fresh water. Attention is invited to the necessity of preventing cuts in the canvas of the pad and to the inspections prescribed above under "Guns," to insure that no material which might cut the pad is left in the gun.

Spare and tools.

C-25. Take care in loading to prevent the projectile from hitting the obturator and to avoid damage to gas-check seat. When using a newly fitted pad, watch during the first few rounds to see whether any gas escapes past the pad. If it does, the pad must be readjusted before firing is continued. While ordinarily pads and rings in their containers are kept in storerooms, it is advisable in action to keep spare pads, rings, and necessary tools near the gun where they are readily accessible.

Section 3.—FIRING MECHANISMS

General.

C-26. The term "firing mechanism" is used to designate that part of the breech mechanism which directly explodes the primer

and thus fires the gun. Guns are fired by percussion and by electricity. Percussion primers are used for 3-inch caliber and below, while guns of larger caliber use combination primers, which may be fired either by percussion or by electricity. For large-caliber guns electric firing is considered preferable, percussion firing being used only as an alternative. Current for electric firing is furnished by batteries and by motor generators, connections being made so that either may be used as desired.

Definition, firing mechanism.

C-27. A percussion firing mechanism is one in which the blow of the hammer or firing pin explodes a cap in the primer. An electric firing mechanism is one in which an insulated firing pin, suitably connected to a firing battery or other source of electricity, transmits an electric current to a primer and heats a fine wire or bridge therein to a sufficiently high temperature to explode the primer charge of powder.

Definition, firing-attachments.

C-28. Firing attachments are appliances used for operating the firing mechanism and are parts neither of the firing mechanism nor the breach mechanism. The firing lanyard, electric firing battery, wires, terminals, firing keys, etc., are attachments. The two terms "firing mechanism" and "firing attachments" should not be confused.

Care of firing attachments.

C-29. (1) Batteries shall be frequently tested with a voltmeter, the various parts of the circuit with a battery tester, and the circuit as a whole with an ammeter. At regular intervals measure the resistance of each part of the circuit and record for comparison with subsequent readings. Also make actual tests by firing primers. Unless electric firing connections are perfect and securely held in place, there will be frequent failures to fire, due to insufficient current passing through the primer. The best test (and the only sure one) of electric firing connections and battery strength is the firing of primers. The battery tester, ammeter, voltmeter, Wheatstone bridge, etc., are mainly useful in locating faults. Broken wires, or some foreign matter such as grease on the connections, are the most frequent faults. Sometimes the firing of the gun jars out the plugs. They must be well secured so that this will not occur.

(2) Take particular care to see that the primer seat, primer, and all contacts are perfectly clean and free from grease or oil. Where there is danger of a short circuit, cover the parts with insulating tape. In electric firing failure of the primer is generally due to poor contacts.

(3) On an open circuit a satisfactory firing circuit should show resistance of at least one megohm and, on a closed circuit, not over one ohm.

Care of firing locks.

C-30. Before practice, the locks must be thoroughly overhauled by competent personnel and all contacts washed in alcohol or gasoline to remove all grease and to insure good contact. Examine extractor to see that it is not sprung, for if it is the lock will jam after discharge. When through firing, overhaul the lock, clean all parts, and give them a light coat of preservative to prevent rust. Then place the lock in its case and put in the place provided for locks when not kept on the gun.

Section 4.—BREECH MECHANISMS

General.

C–31. The following covers in general the care of breech mechanisms now issued to the service. Additional information required may be found in the proper pamphlets listed in Bureau of Ordnance Pamphlet No. 0 of latest date.

Care in handling.

C–32. (1) Breech mechanisms must be handled with great care to prevent burrs, etc. See that all parts are working freely, examine all bearing surfaces and teeth on gears, racks, etc., carefully, and if any burrs are found, carefully remove them before any operation of the breech mechanism. The plug must be in alignment when closing. Where oil holes are provided keep them clear and oil them from time to time.

Using force to close.

(2) *Breech mechanisms must not be closed by force;* the free, easy swing of the mechanism will close it without force if kept in good operative condition. (See Gas Checks.)

Emery paper, etc.

(3) Use *no emery paper, dust, or like substance* on breech mechanisms.

Adjustment of mechanism, Hotchkiss semiautomatic.

C–33. With Hotchkiss semiautomatic mechanisms, 1- and 6-pounders, the breech-closing spring should be so adjusted that it is just strong enough to close the breech securely when a cartridge is loaded. If too strong, the breech block may catch the empty cases when they are extracted, extractor guide stud and other parts may break, or gun may fire on breech closure. If gun-recoil cylinders are filled very full or clogged, the gun may not recoil enough to open the breech. The preventer sear should be so adjusted that it releases the hammer just as the block gets all the way up.

Precautions, 3-inch breech mechanism semiautomatic, Mark V.

C–34. (1) With the 3-inch breech mechanism, semiautomatic, Mark V, using ammunition with projectile loose in cartridge case usually causes a jam in loading. A jam may also be caused by bent extractors and burrs in the chamber of the gun.

(2) See that nuts on operating spring piston rod are set up tight before firing.

(3) Be prepared to tap breech block underneath with a mallet in case it does not come all the way up after loading.

Care of 5-inch, Mark VII, breech mechanism.

C–35. (1) In caring for 5-inch, Mark VII, breech mechanism keep all metal parts clean and free from corrosion and grit; keep working parts well lubricated. Oil holes are provided in the crank-shaft bearing and carrier for oiling the crank shaft and sleeve. An oiler in the head of the hinge pin communicates with an oil groove extending around and along this piece, and serves to carry the lubricant to the carrier hinge. The crosshead and bearing may be lubricated through the opening in the side of this piece.

(2) If, by reason of wear in the carrier hinge, the plug droops so that the threads do not engage those of the screw box fairly when the mechanism is closed, the trouble may be remedied by using a carrier washer of greater thickness.

Decommissioning instructions, storage, and preservation.

C–36. (1) Whenever breech mechanisms are laid up they shall be thoroughly coated with an approved gun slushing compound, grade A, authorized by the Bureau of Ordnance. When applying in cold weather these compounds may be warmed to facili-

tate application, but they must never be heated to a temperature higher than 180° F., as the ingredients which prevent rust will be driven off.

(2) The breech mechanism will be removed from the gun, thoroughly slushed, and stowed in a dry storeroom. Breech-mechanism spare parts are to be thoroughly slushed and stowed the same way. Tag all parts with name of ship and serial number of gun from which removed.

Preservation on board ship.

(3) For preservation on board ship the breech mechanism will be coated with the prescribed oil.

Blowing out of primers.

C–37. (1) A Bureau of Ordnance circular letter prohibited "riding the plug," due to action of the hand having a tendency through inertia effects to open the firing lock during recoil, allowing the primer to blow out. Recent experiments have shown more convincing explanations, in view of which the prohibition seems no longer required. Instead, to guard against blowing out of primers, exercise care in closing the breech of a bag gun with a live primer in the lock, that the operating lever is followed through during the last part of its travel to prevent opening due to rebound.

(2) Experiments at the naval proving ground, with voltage on the firing circuit, have shown frequently that if the operating lever was slammed, the primer, starting to fire on closure when the firing pin made contact, was uncovered so soon afterward by the rebound of the operating lever that it blew out of the lock. The movement of the operating lever in the last part of closure was too rapid to allow the salvo latch to function. The modification of salvo latches on certain bag guns has been undertaken to make latching action or closure more positive.

Section 5.—GAS EJECTORS

C–38. It is the policy of the Navy Department to install a gas ejector system on all "bag" guns.

C–39. (1) In preparing a battery for firing the division officer shall assure himself that the gas-ejecting system is working satisfactorily. This includes the inspection of the line to insure freedom from water, checking of the pressures obtained, functioning of valves, setting of automatic cut-out valves, etc. (See arts. A–90 and C–11.)

(2) In connection with gas ejectors, attention is invited to safety precautions in part A of this publication. These orders cover both guns provided with approved type of gas-ejector system and guns on which an approved system is not installed.

Section 6.—CHECK-OFF LISTS

C–40. The check-off list for broadside guns outlined in Bureau of Ordnance Manual is to be used as a guide. The list should be modified by the ship to suit its individual requirements.

Section 7.—SUBCALIBER ATTACHMENTS

General.

C–41. The subcaliber attachment is a minor caliber gun mount attached to the chase of a major caliber gun or to some part of

its mount. It may be secured in such a manner that the bore of the subcaliber gun or rifle can be made parallel to the bore of the large gun or parallel to the line of sight of the large gun's telescope.

Firing mechanism.

C–42. The firing mechanism of the subcaliber gun is arranged so that it can be operated by the regular firing key from the pointer's position at the sight of the large gun. The small gun can be fired at drill or at elementary target practice instead of the large gun, thus greatly reducing the expenditure and cost of target practice ammunition.

Types.

C–43. There are two types now in use, viz, the 1-pounder subcaliber attachment and the rifle subcaliber attachment.

1-pounder attachment.

C–44. The 1-pounder attachment consists of a 1-pounder gun and breech mechanism fitted with a sleeve; a slide in which the gun recoils; a recoil cylinder, an azimuth plate, a saddle, and a solenoid to fire the gun electrically from the firing key of the large gun. The solenoid is wound so that it can be connected directly to the ship's circuit. When the attachment is mounted on the gun, the saddle is clamped to the chase of the large gun by two round steel straps which encircle the gun and are drawn taut by turnbuckles. These straps are hinged in the middle to facilitate mounting and dismounting. Both sides of the saddle have projections on which can be mounted a rifle subcaliber attachment. After the gun is set so as to be in perfect alignment with the large gun or the large gun's sight it should be securely clamped to prevent its shifting. The sleeve should be kept well lubricated to prevent galling and consequent sticking in the slide.

Rifle subcaliber attachment.

C–45. The rifle subcaliber attachment consists of a rifle sleeve, slide, recoil system, adjusting plate, solenoid, and mounting bracket. The rifle is a .30-caliber rifle, United States Army Model of 1898, without its stock. The sleeve is fitted over the rifle and secured by screws which are just forward of the magazine. It forms a bearing surface for recoil and counterrecoil. The slide is cylindrical and also serves as a recoil cylinder. A spring relieves the shock of recoil, and a leather air buffer prevents jar when the rifle comes back to battery. A plate beneath the slide provides bearings and adjustments for elevation. After the rifle is bore sighted, the screws on the left side of the slide should be secured with lock nuts. The firing solenoid is identical with the one used on the 1-pounder attachment, except that it has a shorter armature to reduce the length of stroke, and is secured to the sleeve and rifle in such position as to be in line with the trigger of the rifle. The mounting bracket is provided with elongated slots for adjustments in azimuth. Keep the slide well lubricated. Lock all screws and bolts in position after adjustments are made.

Section 8.—DOTTERS

General.

C–46. A dotter is a device for training gun pointers. For a description of any particular dotter and its method of operation, see the instructions which accompany the dotter, or apply to headquarters for necessary pamphlets or ordnance data.

Section 9.—LINE-THROWING GUNS

C–47. (1) The crew shall be instructed thoroughly in the use of line-throwing guns.

6-pounder. (2) Six-pounder line-throwing equipment shall be tested semi-annually and a complete report shall be submitted to headquarters, as of January 1 and July 1. In addition, whenever the 6-pounder guns are used to establish communication with a vessel in distress or for any similar purpose, a detailed report shall be submitted to headquarters. The report shall cover: Weight of charge used, type of line, elevation of gun, direction and force of wind, direction of fire, allowance for drift, and the distance obtained. If more than one attempt was made before the line was projected successfully, that fact shall be stated.

Lyle gun. (3) Lyle guns shall be tested as specified in "Instructions for United States Coast Guard Stations."

(4) A brief letter report shall be submitted to headquarters whenever line-throwing equipment is used in carrying out Coast Guard duty such as assistance to vessels in distress and destruction of derelicts.

Precautions, 6-pounder. C–48. (1) The following precautions shall be observed in using the 6-pounder gun for line throwing:

(*a*) Make sure the projectile is seated in the end of the cartridge.

(*b*) Attach the line to the eye of the shank with three loose half-hitches.

(*c*) Wet end of line for about 6 feet to prevent burning.

(*d*) Lead line clear of all obstructions. Do not pay out much slack from the faking box or canister.

(*e*) Place faking box or canister to leeward, a few feet to the rear of muzzle of gun.

(*f*) Do not use deteriorated lines. They must be very carefully faked down or wound on the rewinding machine; otherwise they will be likely to break.

(*g*) Personnel should stand clear of the firing gun and line.

(*h*) It is important that the 6-pounder recoil cylinders be properly filled as the heavy projectile will cause considerable recoil.

(*i*) Considerable allowance must be made for drift of the line in a cross wind.

(*j*) Elevate the gun approximately 30°. (See art. G–81.)

Precautions, Lyle gun. (2) The following precautions shall be observed in firing the Lyle gun:

(*a*) Swab the gun out with water after each shot.

(*b*) After loading *do not* stand behind the gun, *do not* cross directly to the rear of the gun, and *do not* cross in front of it.

Shoulder gun. C–49. For information relating to the shoulder line-throwing equipment, see part E, section 4, of this publication.

Ammunition. C–50. Information pertaining to line-throwing ammunition is contained in part G, section 7.

Firing attachment. C–51. A complete description of the firing attachment for the Lyle line-throwing gun is contained in the pamphlet "United States Coast Guard Firing Attachment, Lyle Line-Throwing Gun."

Part D.—FIRE CONTROL AND OPTICAL EQUIPMENT

Section 1.—GENERAL

Sources of information.

D–1. The general instructions on fire control and optical material contained in the Bureau of Ordnance Manual shall be followed, but they must be supplemented by the detailed instructions in ordnance pamphlets pertaining to the particular instruments, as all fire-control material is confidential. No pamphlet is available on the sound powered telephones at this time. Sufficient instructions covering care are contained in article D–7 below.

Classes.

D–2. Fire-control material, other than optical, may be divided into two general classes—mechanical instruments (such as Ford range keeper Mark II and mods., plotting and tracking boards), and electromechanical instruments.

Records.

D–3. Records of every instrument are kept at the Bureau of Ordnance and headquarters. The accuracy of these records depends upon the reports made annually and on receipt or transfer of material. To insure accurate reports and to systematize care of optical instruments, a card-index record should be kept on each one, showing the items of allowance on hand in serviceable condition and items in need of repair, so that the condition of the ship's equipment may be readily ascertained.

Section 2.—CARE AND PRESERVATION

Knowledge of instruments.

D–4. Use all instruments as designed. Personnel should be familiar with proper use through study of ordnance pamphlets and manipulation of the instruments.

Inspection.

D–5. Inspect all instruments regularly, whether in storage or in use, to insure proper care. Material not in serviceable condition should be repaired or replaced.

Daily use.

D–6. The best means of preserving fire-control material is to test or use it daily.

Sound powered telephones.

D–7. Due to the delicate construction and high cost of sound powered telephones, extreme care in handling and stowage must be observed. No attempts will be made to disassemble and repair them on board. Repairs to instruments will be made at the Coast Guard Depot. Care should be taken that phones are not dropped or knocked against any object. Care should also be taken to protect these phones against the weather as much as possible. Contacts must be secure at all times. There have been cases where the plugs were not properly secured in the jack boxes and the retaining ring set up. It is recommended that individual stowage boxes be constructed so that the phones

may be placed in them and wire leads coiled so as not to cause crimps and breaks in connecting wires.

Prevention of damage. D-8. Care must be exercised to prevent damage to optical instruments, particularly binoculars. The chief causes of damage are:

(*a*) Dirt in the instruments.

(*b*) Being left where they become wet by rain, salt water, or spray.

(*c*) Being put away while still damp.

(*d*) Being placed where the roll of the ship causes them to fall to the deck or to bang against other objects.

(*e*) Efforts by persons unfamiliar with proper procedure to clean lenses and prisms, resulting in lenses being scratched, chipped, or broken.

Protection. D-9. Instruments installed shall be protected by covers when not in actual use, except as follows:

Drying covers and instruments. (*a*) If the canvas cover becomes wet or damp remove and thoroughly dry it as soon as the weather conditions permit, at the same time allowing the instrument an opportunity to dry out insofar as is practicable. This is particularly important in the case of instruments which are not pressure tight.

Procedure before use. (*b*) If the weather conditions permit, without subjecting the instrument to rain or other moisture, uncover range finders several hours before they are to be used, in order that they may become stabilized to the temperature of the atmosphere.

Protection from sun. (*c*) Whenever an instrument is uncovered, protect the optical parts from direct rays of the sun by suitable caps, plugs, or small covers.

Storage. D-10. Instruments in store shall be in a dry storeroom and boxed if boxes are provided. Proper care shall be insured by systematic inspection. Range keepers in storage should be operated monthly. All boxed material must be tagged showing ship from which taken, name of instrument, the mark and serial number.

Disassembly. D-11. Do not disassemble instruments unless absolutely necessary. Gun-sight telescopes are designed to be interchangeable. If disassembled and reassembled without a collimator, the axis of collimation is likely not to coincide with the axis of the bearings and the property of interchangeability will be destroyed until the instrument is collimated.

Submerged timepieces. D-12. All timepieces that have been submerged in water shall be opened back and front, drained, and immersed in glycerin for at least an hour. Then they shall be tightly closed with as much glycerin as possible retained in the case, carefully packed and shipped at the earliest practicable date to the naval unit designated by headquarters for overhaul.

Lubricating oil. D-13. Use the standard oil approved for the purpose by the Bureau of Ordnance.

Painting, etc. D-14. The paints and enamels used for coating fire-control instruments shall be those prescribed in the latest edition of the Bureau of Ordnance Manual.

Custody; loss of watches and binoculars. D-15. (1) Stop watches and binoculars shall be issued only on the specific custody receipt of an officer or responsible petty

officer. The individual giving the custody receipt will in every case be held responsible for loss unless he can relieve himself of such responsibility by direct and positive evidence that the loss was in no sense due to his carelessness. A simple statement that the article was found missing from the officer's stateroom or was stolen by some unknown person will not be considered sufficient to relieve the officer of responsibility. He must definitely show that he exercised the same care which might be reasonably expected in the case of equally valuable property belonging to himself.

(2) Appropriate disciplinary action will be taken against the person found responsible for the loss.

(3) In case of discovery of loss, the commanding officer shall institute a rigorous search on board ship. In the event of failure to discover the lost article on board, he shall, when theft may be suspected, communicate with the local police authorities, giving numbers and marks of the lost article, with a view to its recovery in case it is offered for sale or pawned at a local pawnshop.

Section 3.—INSTALLATION

Installation.

D–16. All details of fire-control installations shall be carefully inspected by the gunnery officer of the vessel, with his assistants, whether the installation is made at a navy yard or elsewhere. It is the duty of the gunnery officer to see that all fire-control material is in good condition before completion of work is certified.

Section 4.—OVERHAUL

Facilities.

D–17. The navy maintains repair ships capable of making repairs and adjustments up to so-called major repairs. For major repairs instruments are sent to the optical shops either at the navy yard, Mare Island, Calif., or at the navy yard, Washington, D. C.

Trained personnel.

D–18. To provide qualified personnel for repair work, two optical schools have been established, one at the navy yard, Washington, D. C., the other at the navy yard, Mare Island, Calif.

Overhaul.

D–19. (1) The overhaul of fire-control instruments shall not be undertaken on board ship, except by specially trained personnel. Whenever a Coast Guard vessel is so placed that the services of a naval repair-ship expert may be had to examine the instruments and effect minor adjustments, an effort shall be made to obtain such services in order that the expense of shipping the instrument to a navy yard may be avoided if possible. With this same end in view, opportunity shall be taken to have ordnance installations checked and adjusted while a vessel is at a navy yard equipped for such work.

Authority for expense.

(2) Authority must be requested from headquarters for any expense.

Proper designation.

(3) In all correspondence the instrument shall be designated by mark, modification, and serial number.

Shipment of instruments.

D–20. When necessary to ship fire-control instruments they must be carefully and securely packed to prevent damage in

transportation. When possible, original packing cases should be retained. The packing cases or boxes shall be conspicuously marked on the outside "Delicate instrument—Handle carefully." Shipment shall be by express.

Section 5.—SPECIAL INSTRUCTIONS REGARDING RANGEFINDERS

Study O. P. 105.

D-21. All officers and personnel assigned to the care and operation of rangefinders shall study Ordnance Pamphlet No. 105 carefully.

Selection of operators.

D-22. Select as rangefinder operators only personnel with strong, healthy eyes, having visual acuity of 20/20 with each unaided eye. They must also be capable of intense concentration and patience. Assignment should be permanent.

Curves prepared and corrected.

D-23. The gunnery officer shall prepare rangefinder curves A and B in accordance with instructions in Ordnance Pamphlet No. 105. The curves shall be checked quarterly and corrections will be made if found necessary.

Part E.—SMALL ARMS AND EQUIPMENT

Section 1.—RIFLES AND RIFLE EQUIPMENT

Rifle.

E–1. The rifle is a precision instrument and must be handled with care if it is to maintain accuracy. Detailed information on inspection, cleaning, adjustment, repair, etc., will be found in the Landing Force Manual, United States Navy, and War Department technical and training publications. The instructions contained in these publications shall be carefully followed. In case of conflict, Coast Guard instructions shall govern.

E–2. The safety precautions given in the Landing Force Manual and in United States Navy Small Arms Firing Regulations shall be observed. (See art. A–98 et seq.)

Section 2.—PISTOLS

Pistols.

E–3. Instructions contained in the Landing Force Manual and in War Department technical and training publications shall be followed with regard to inspection, cleaning, adjustment, repair, etc., of pistols. The safety precautions contained in the Landing Force Manual and United States Navy Small Arms Firing Regulations shall be observed. (See art. A–98 et seq.)

Section 3.—MACHINE GUNS

Machine Guns.

E–4. Instructions contained in Ordnance Pamphlet No. 406, covering the Lewis machine gun, and in Ordnance Pamphlet No. 529, covering the Thompson submachine gun, and SNL A–36, covering the .50-caliber machine gun, shall be carefully followed with regard to the care, operation, and handling of machine guns.

E–5. (1) A machine gun should never be loaded, nor shall a loaded magazine be mounted in the gun, except when the gun is in position for actual firing or where accidental discharge will do no damage.

(2) Fifty-caliber machine gun water jackets shall be flushed with fresh water before securing whenever salt water service has been used.

E–6. Adjustments by use of file, oilstone, or emery shall be made only by highly trained mechanics.

Section 4.—.30 CALIBER SHOULDER LINE-THROWING EQUIPMENT

E–7. (1) Instructions pertaining to use of the .30-caliber line-throwing equipment are contained in the pamphlet "United States Coast Guard .30 Caliber Shoulder Line-Throwing Equipment."

(2) The shoulder line-throwing equipment shall be tested semiannually, and a complete report rendered as of January 1 and July 1. The report shall cover elevation of gun, direction and force of wind, direction of fire, allowance for drift, and the distance obtained. If more than one attempt was made before the line was projected successfully, that fact shall be stated.

(3) A brief letter report shall be submitted to headquarters whenever line-throwing equipment is used in assistance work.

Section 5.—FLARE SIGNAL EQUIPMENT

Description. E-8. A flare kit consists of the following equipment: 1 signal pistol, 1 torch holder, 12 signal cartridges, 12 scratcher sticks, 1 kit box.

Safeguarding pyrotechnic pistols. E-9. The same care shall be exercised in safeguarding pyrotechnic pistols (including Very's, International, Driggs-Faber, and M-2) as is prescribed for other small arms. Reports on such equipment shall be made as specified in part K hereof. Allowances are shown in articles E-18 and G-71.

Stowage. E-10. In the stowage of flare-signal cartridges, officers shall be governed by regulations and instructions covering the care, handling, and stowage of other pyrotechnics. (See art. H-34.)

Requisitions. E-11. Requisitions for flares and for other flare-signal replacements shall be made on Coast Guard Depot, via Headquarters. (See arts. K-2 and K-5.)

Tests. E-12. See chapter G, section 5 of this publication for instructions regarding testing of pyrotechnics.

Uses. E-13. (1) The primary use of the flare signal is POSITIVE IDENTIFICATION OF A COAST GUARD VESSEL AT NIGHT, BEFORE ANY WARNING SHOTS ARE FIRED. Other important uses are as follows:

(*a*) To provide local illumination at night by which picket boats and other small craft may identify a suspected vessel and direct gunfire after contact is made with a smuggling vessel, if firing is necessary.

(*b*) To provide local illumination at night in case of surprise attack upon smugglers in the act of landing contraband on shore.

(*c*) To provide local illumination at night for short periods in special cases such as man overboard, wrecking operations, etc.

(*d*) Distress signal.

(2) The following instructions shall be followed:

(*a*) Every floating unit shall have flare-signal equipment ready for use when on patrol at night.

(*b*) Before firing a blank cartridge, a warning shot, or any other shot at night, a Coast Guard parachute flare shall be fired into the air showing the combination color signal white-red-white. If, for any reason, this flare signal cannot be fired from a pistol, a similar flare shall be burned as a hand torch. Care shall be taken to see that the flare functions properly and unmistakably identifies the Coast Guard craft.

(*c*) If a floating unit of this service is in the vicinity where a flare has been fired for identification purposes and there is any possibility of being mistaken for a suspected vessel, that unit

shall fire an answering flare for identification. If it cannot be fired from the pistol, the flare shall be burned as a hand torch.

Precautions.

E–14. (1) The flare shall not be fired into the air in close proximity to wharfs, warehouses, or other structures where there may be danger of fire should the parachute fail to function properly.

(2) Before placing the flare in the pistol be sure the flare proper is screwed securely into the cartridge or base.

Display of ensign.

E–15. The use of this equipment in no way affects the display and illumination of the Coast Guard ensign, etc., instructions for which are promulgated by Headquarters.

Economy in use.

E–16. In view of the expense attached to keeping units supplied with these signal flares, care shall be taken that they are not fired indiscriminately, but always to accomplish a definite purpose.

Section 6.—PROTECTION AGAINST LOSS

Protection.

E–17. For instructions pertaining to the protection of small arms against loss, see article A–11.

Section 7.—SMALL ARMS ALLOWANCE

Small-arms allowance.

E–18. (1) The allowance of small arms is prescribed in the following table. Should any unit have an excess, a report shall be made to headquarters with a request for instructions as to disposition. Requisition shall be submitted to make up deficiencies. (See arts. K–2 and K–5.)

Allowance—Small arms

	Rifles, .30 cal. M–1903	Rifles, .22 caliber	Pistols, .45 caliber	Machine guns, Lewis M–1917	Shoulder line-throwing guns	Very's pistols	Flare kits	.22 caliber pistol	.45 cal. sub mach. gun	M–2 pyrotechnic pistol
Vessel with authorized enlisted complement of more than 74	60	2	25	2	2	4	2	2	1	0
Vessel with authorized enlisted complement of more than 60 and less than 75	50	2	25	2	2	4	2	2	0	0
Vessel with authorized enlisted complement of more than 50 and less than 61	40	2	15	2	2	4	2	2	0	0
Vessel with authorized enlisted complement of more than 30 and less than 51	30	2	12	2	2	4	1	2	0	0
Vessel with authorized enlisted complement of more than 13 and less than 31	10	1	10	1	1	2	1	1	0	0
Vessel with authorized enlisted complement of more than 5 and less than 14, except harbor craft	(1)	0	(1)	1	0	0	1	1	0	0
Harbor craft	0	1	5	0	0	0	0	1	0	0
Station (active)	8	1	4	0	(2)	0	(3)	1	0	0
Air detachment	0	0	6	0	0	0	(4)	0	1	(5)
Air station	9	1	6	0	0	0	(4)	2	3	(5)

[1] 1 for each man.
[2] In special cases additional guns will be authorized.
[3] 1 for each lifeboat.
[4] 1 for each crash boat.
[5] 1 pyrotechnic pistol, M–2, or similar type, will be issued for each plane attached. Allowances will change to correspond with the number of planes attached.

(2) Units having an authorized enlisted complement of less than six men shall not carry small arms as a part of their permanent equipment. The unit to which they are attached shall issue to individual members of the crew, for temporary use, such small arms as may be necessary. The arms shall be issued on custody receipts.

(3) Units operating small craft shall carry as a part of their permanent equipment sufficient small arms to supply the needs of such craft.

(4) Units not listed in the above table will be supplied with such small arms as headquarters may from time to time determine. Forty-five caliber submachine gun issues to activities not tabulated above will be on headquarter's specific authority after due consideration of recommendations received.

Section 8.—SMALL-ARM AND LANDING FORCE EQUIPMENT ALLOWANCE

Equipment allowance.

E-19. (1) The allowance of small-arm and landing-force equipment is prescribed in the following table. A complete description of the various items will be found in the Landing Force Manual.

Allowance—Small-arm and landing-force equipment

	Bayonets	Bayonet scabbards	Rifle belts	Pistol magazines	Machine pockets	Pistol belts	Pistol holsters	Canteens	Canteen cups	Canteen covers	Landing force kits
Vessel with authorized enlisted complement of more than 74	60	60	60	50	25	25	25	60	60	60	53
Vessel with authorized enlisted complement of more than 60 and less than 75	50	50	50	50	25	25	25	50	50	50	38
Vessel with authorized enlisted complement of more than 50 and less than 61	40	40	40	30	15	15	15	40	40	40	30
Vessel with authorized enlisted complement of more than 30 and less than 51	30	30	30	24	12	12	12	30	30	30	22
Vessel with authorized enlisted complement of more than 13 and less than 31	10	10	10	20	10	10	10	10	10	10	10
Vessel with authorized enlisted complement of more than 5 and less than 14, except harbor craft	(1)	(1)	(1)	(2)	(1)	(1)	(1)	0	0	0	0
Harbor craft	0	0	0	10	5	5	5	0	0	0	0
Station (active)	8	8	8	8	4	4	4	0	0	0	0

[1] 1 for each man.
[2] 2 for each man.

NOTE.—One landing-force kit consists of one of each of the following: First-aid packet, first-aid pouch, knife, fork, spoon, meat can, haversack, pack carrier.

(2) Due to limited storage space and lack of facilities for taking care of equipment, the number of landing-force kits allowed has been limited to the number of riflemen in the prescribed landing force for the various classes of vessels. Equipment for

machine-gun squads is not provided as it can be furnished upon short notice when required for emergency.

(3) Units for which the foregoing table does not provide will be allowed bayonets, bayonet scabbards, rifle belts, pistol belts, pistol magazines, pistol holsters, and magazine pockets to conform to the number of rifles and pistols allowed. Except in special cases, they will not be provided with canteens, canteen cups, canteen covers, and landing-force kits.

Part F.—EXPLOSIVES

Section 1.—GENERAL

Definition.

F–1. The term "explosives" as used in these instructions includes all propellant powders; bursting charges for projectiles, mines, etc.; blasting charges; fireworks and pyrotechnics; ignition charges; percussion and electric caps and squibs; detonators and detonating materials, safety fuzes; live ammunition of all kinds, including small-arms ammunition, and fixed ammunition; and every adaptation or combination of an explosive.

Danger.

F–2. Personnel engaged in handling or working with explosives should be repeatedly reminded by appropriate signs and oral admonitions that—

(1) Such substances are designed to explode, and are

(2) Always dangerous, and that

(3) A grain of explosive spilled from a container and ground between two hard surfaces, as between the nails of a shoe and a concrete or metal floor, is likely to cause an explosion which may be communicated to other explosives in the vicinity.

(4) Explosives and articles containing explosives must not be subjected to rough handling but, on the contrary, should be handled carefully and gently without being subjected to drops, jolts, or jars. All explosives should be kept in tight containers, in cool, dry places protected from the direct rays of the sun or strong artificial light.

Thorough knowledge.

F–3. No one should undertake the use of a strange or new explosive without a thorough knowledge of its characteristics, its suitability for the purpose intended, and the safety precautions pertaining to it.

Examination and tests.

F–4. (1) *Surveillance*, as used in these instructions, means close observation, rigid inspection, careful examination, and thorough testing (physically, chemically, and ballistically) of explosives and ammunition to determine suitability for the intended purpose or for its safety for further storage. It applies not only to the explosive elements themselves, but also to methods of handling, packing, marking, storing, segregation, shipping; to condition of containers, and to reports of conditions; and in general all precautions and instructions tending to protect property and personnel against the hazards inherent in all explosives.

(2) *Officers are to be familiar with the practical methods of examinations and tests*, and shall be held responsible for the accuracy thereof and for the correctness of the official reports thereon. In order that the tests may be of value as indicating stability, it is essential that methods be uniform in all details throughout the service. (See article F–21 et seq.)

Storage and handling.

F–5. (1) The principles governing storage and handling of explosives are covered in part H hereof.

(2) Safety precautions are found in part A, section 4, of this publication. Additional safety instructions applicable to the subject matter are included in this part.

Section 2.—BLACK POWDER

General.

F-6. General information regarding the composition, granulations, stability, etc., of black powder may be found in the Bureau of Ordnance Manual and Ordnance Pamphlet No. 4.

Section 3.—SMOKELESS POWDER

Composition.

F-7. For information relating to composition, properties, ignition, granulations, color, etc., of smokeless powders, refer to Bureau of Ordnance Manual and Ordnance Pamphlet No. 4.

Identification.

F-8. (1) All Navy smokeless powders are identified by class designating letters and index numbers. Smokeless powder is manufactured in lots varying in weight from 25,000 to 125,000 pounds, depending on granulation. After proof firing and acceptance, a lot of powder is given a service index number. Index numbers are assigned in regular numerical sequence to the lots in order of their acceptance. In addition to the number it is customary to designate indexes with the letters "S. P.," followed in certain cases by other letters.

(*a*) "S. P." means smokeless powder, and used alone, without other designating letters, means unstabilized powder.

(*b*) "S. P. R." indicates an addition of rosaniline and designates certain powders manufactured in 1908 and 1909. These powders are unstabilized.

(*c*) "S. P. D." indicates the addition of a small percentage of diphenylamine. This chemical serves to neutralize any acids formed by decomposition and prevents progressive deterioration of powder. This is a stabilized powder.

(*d*) "S. P. D. W." indicates a reworked powder. Instead of being destroyed, powders withdrawn from the service for stability or ballistic reasons, fag-end remnants of indexes, and target practice charges which have been dumped into distilled water are all shipped to Indianhead for reworking. This powder is stabilized.

(*e*) "S. P. D. B." indicates the combination of two indexes of powder known as a blend.

(*f*) "S. P. D. X." indicates a water-dried powder.

(2) Powders found in ammunition obtained from the Army or in small-arms ammunition obtained either from the Army or from commercial manufacturers are identified by lot numbers or by the type and manufacturer's designation.

(3) It is extremely important that these identification markings be maintained on all boxes, charges, samples, and ammunition components as long as they contain any of the powder. Great care should be exercised to see that the markings are not obliterated, mixed, or confused with other markings. All correspondence relating thereto should mention not only the index, lot number, or manufacturer's designation, but also should state the manufacturer's name, the caliber, and the type of powder.

Packing.

F-9. (1) All smokeless powder shall be packed in airtight metal boxes or in metal-lined wooden boxes when in bulk, and in airtight powder tanks or sealed cartridge cases or other airtight containers when in charges, samples, or other forms.

(2) Containers shall be carefully tested for airtightness before they are filled or loaded.

(3) An odor of ether-alcohol in a magazine is indicative of leaky containers, which must be sought out immediately and repaired or replaced.

(4) A leaky container is a source of danger which may cause rapid deterioration of its powder and possibly spontaneous combustion.

(5) Smokeless powder in leaky containers shall be transferred to air tight containers, and these marked "Transferred from leaky containers." If airtight containers are not available or if the container in use cannot be repaired properly, the powder shall be forwarded to an ammunition depot at the first opportunity, the container being marked "Leaky container." (See art. A-27.)

(6) Smokeless powder that has been wet from any cause whatever must be regarded as dangerous for storage on board ship. Such powder must be completely immersed in fresh water (in which condition it is entirely safe), and must be turned in to a naval ammunition depot immediately. Each container of immersed powder must be clearly marked to indicate the net weight and the condition of such powder. (See art. A-27.) Advise headquarters by dispatch of action taken.

Temperature and life.

F-10. Navy smokeless powder, being an ether-alcohol colloid of nitrocellulose, cannot be held to possess unlimited chemical stability, and the length of its life depends very largely on the conditions under which it is stored. At temperatures approaching 100° F. the period during which it will retain stability sufficient to warrant its retention in service is relatively short. Although chemical tests give an indication as to the probable life of powder, no satisfactory method has been devised of foretelling with certainty its length of life. The only safeguard is, therefore, to discover loss of stability by frequent tests, and such tests shall be made with unceasing care and vigilance.

Exposure to sunlight.

F-11. When smokeless powder is stored in or removed from magazines at naval ammunition depots or on board ships for transportation, gunnery exercises, or other purposes, it shall not be exposed to the direct rays of the sun or subjected to other abnormal conditions of temperature. This prohibition applies equally to powder in bulk, in tanks, cartridge cases, ammunition boxes, or other containers. Whenever it may be necessary to transport smokeless-powder ammunition in boats, or to take it on shore, as for boat-gun or field-gun target practice it must be effectively shaded from the rays of the sun.

Segregation.

F-12. Whenever, in particular cases, the terms of article F-11 have not been complied with, any ammunition which may have been exposed shall be segregated, and shall, for purposes of tests, inspections, and reports, be regarded as a separate index. Headquarters shall be notified immediately.

Decomposition.

F–13. All nitrocellulose smokeless powders are subject to progressive deterioration. The rate of decomposition is largely affected by—

(*a*) The purity of the materials.

(*b*) The method of, and the care exercised in manufacture.

(*c*) The composition, granulation, and presence of stabilizing agents, such as diphenylamine, etc.

(*d*) The storage conditions, particularly exposure to moisture or to high storage temperatures. (See art. A–38.)

Rigid specifications.

F–14. Inasmuch as the specifications for the manufacture of smokeless powder demand only the most suitable materials, which are carefully tested prior to acceptance, prescribe the exact composition, amount of stabilizer, and residual volatiles that experience has shown to be best; and owing to the fact that the manufacture, testing, and proof are carried on by experts under rigid inspection and supervision throughout all stages, there remains to the service at large only the control of the very important item of storage conditions which affect the decomposition of the powder. It is therefore mandatory that powder be stored in airtight containers, in magazines that are dry and cool (under 85° F. if possible and preferably under 75° F.). (See arts. A–37 and H–16.)

Effect of unsatisfactory storage.

F–15. When smokeless powder is exposed to high temperatures decomposition is accelerated and the stabilizing effect of diphenylamine is soon exhausted. Loss of this stabilizing effect results in the liberation of nitrous fumes. The appearance of these fumes in a container indicates the end of safe stowage. At this stage or just prior to it, decomposition may proceed so rapidly that the evolution of heat will cause spontaneous combustion, with possible disastrous results from surrounding explosives.

Safe storage.

F–16. Obviously, then, safe stowage depends upon—

(*a*) Rigid compliance with the instructions for examinations and tests, in order to detect leaky containers and those containing decomposing powder.

(*b*) Proper ventilation for the cooling of magazines so as to maintain the minimum rate of decomposition and to provide for the rapid radiation and conduction of any heat of decomposition. (See arts. H–15 and H–16.)

Signs of decomposition.

F–17. The stability of smokeless powder can be accurately determined only by means of repeated surveillance tests described in the succeeding articles, although visual examinations will frequently reveal such signs of decomposition as—

(*a*) Discoloration of grains, or grains differing markedly in color, especially grains with orange or yellow spots. (See Bureau of Ordnance Manual and Ordnance Pamphlet No. 4.)

(*b*) Grains showing fine cracks, particularly if of a dry appearance without the normal gloss.

(*c*) Friable or easily crumbled grains. This applies especially to the discolored spots on grains and to the off-colored grains.

(*d*) The unmistakable presence of nitrous fumes as determined by sight or smell immediately on first opening the container. Only in the very worst cases is there likely to be visible

the reddish-brown colored nitrous fumes. A skilled observer may sometimes detect the characteristic pungent odor of nitrous fumes from decomposing powder by the sense of smell. In examining containers, however, care should be taken not to mistake normal odors for those of nitrous fumes. This applies particularly to the regular ether-alcohol odor of smokeless powder, and also to the acetic-acid odor often present in old powders.

(*e*) If decomposition has progressed very far, the metal of the container may show signs of a green or white corrosion on the inside.

Standard condition of smokeless powder.

F–18. Navy smokeless powder is manufactured to contain, in the finished grain, a standard percentage of "residual volatiles," which is as low as practical considerations will permit. Under normal conditions of storage the volatiles will not become appreciably reduced. Furthermore, powder is packed at the factory, and charges are made up at the naval ammunition depots under normal atmospheric conditions as far as practicable to obtain a standard percentage of moisture. The charges for bag guns are issued in airtight tanks and charges for case guns are virtually sealed by cork composition devices or by the projectiles. The weights of charges are established by actually firing samples of the various indexes under standard condition of volatiles, temperatures, etc., and it is most important, for ballistic reasons, that the powder undergo no change in service thereafter. To insure this, those charged with its care shall see that the airtightness of the containers is rigidly maintained. Powder exposed to the atmosphere will lose a portion of its residual volatiles, and will gain or lose moisture. While the changes may be counteractive, it is unlikely that they will exactly offset each other. Therefore, the importance of keeping powder charges airtight is to be considered on a par with that, for instance, of keeping the sights in condition. (See art. F–21 (*b*).)

Effect of loss of stability.

F–19. The "proof" of powder, besides being held under normal conditions as regards volatiles and moisture, is conducted with the powder at that temperature which approximates that of ship's magazines. Variations in storage temperatures do not affect the ballistic qualities, provided the powder is brought to standard temperature before firing. Loss of stability, unless it has gone so far as to preclude retaining the powder on board ship, will not of itself affect ballistics if the other conditions are normal.

Section 4.—SURVEILLANCE OF SMOKELESS POWDER

General.

F–20. The instructions in this section pertain specifically to the surveillance of smokeless powder as distinguished from surveillance of other explosives, ammunition, and magazines in general. In order to detect deterioration, etc., certain tests are required to be made and reported. The Bureau of Ordnance records all tests reported from the various sources and keeps careful records of the disposition and condition of each index, in order that proper steps may be taken without delay to dis-

pose of any index which develops low stability. Care shall therefore be taken to submit correct and complete routine reports of powder on hand.

F-21. The following examinations and tests shall be made afloat and ashore: Examinations and tests.

(a) *Daily.*—(1) Visual examination of each magazine sample of powder. Daily.

(2) Visual examination of the strip of methyl violet paper inclosed in each magazine sample bottle.

(3) Test for local heating of containers.

(4) Recording of magazine temperatures. (See art. H-16.)

(5) The daily examination shall be made as a part of the daily magazine inspection required by these instructions. With ammunition received from naval magazines there will be supplied with each index a sample contained in a glass bottle with a tight glass stopper, known as the *"magazine sample."* The different samples shall be stored in the racks provided in the same magazine with the indexes which they represent and shall not be opened except for the purpose of conducting the violet-paper test hereinafter provided. The magazine samples shall be examined daily in a good light, without removing the stopper, to note whether the powder retains its normal appearance and for any change in the color of the violet paper. The presence at any time of reddish or orange colored fumes in the bottle will indicate decomposition of the powder. Any charges which are apparently showing signs of heat from decomposition should be opened and the condition of the powder checked immediately by the other prescribed tests in order to insure a correct report of conditions.

(6) So long as the bottled sample maintains a reasonably good violet-paper test this sample may be considered representative of the index. Powder in service is of various colors, ranging from buff to amber and black. Certain indexes have been dyed rosaniline color, which in time may fade out, but this fading of color is not a cause for alarm, although indicating some loss of stability. It indicates the necessity for careful testing. Reliance may be placed on the violet-paper test and surveillance test. Stabilized powders may become black with only very slight decomposition, so that any darkening of the grain is not a criterion of its stability, as such a grain may be dead black and still have present 80 percent of the stabilizer. Unstabilized powder becomes lighter in color as it decomposes. Visual examination.

(7) When a grain of powder has considerably decomposed there is always set free nitrous acid, which attacks the alcohol present in the grain, and the tough qualities are in a measure lost. Fine hair-line cracks develop on the edge of the grain where there is the greatest loss of volatiles. Here the grain becomes brittle, and the structure may be crumbled and broken off much like sugar, while the balance of the grain is still tough and hornlike. Finally the whole of the grain may be involved in this brittle condition. Grains which have developed even the first stages of such brittleness will show a very low Change in appearance.

violet-paper test and surveillance test and such tests should be made to confirm the first diagnosis.

Object of violet-paper test.

(8) The object of the violet-paper test for smokeless powder is to supplement the surveillance test and to give warning of powders requiring special vigilance. Samples of all powders on board shall be continuously subjected to the violet-paper test. Ships not equipped with surveillance ovens shall have at least three samples of any doubtful index undergoing the violet-paper test at the same time. Each of these samples should represent a different charge of the index.

Violet paper, care of.

(9) The strips of tenth normal (N/10) methyl violet paper issued are of standard size and contain a definite amount of coloring material. The supply of these violet-paper strips should be kept stored in a tightly stoppered glass bottle in a cool dry place. In renewing the violet paper in a sample bottle, care should be taken not to touch the strips of paper with the bare hand, nor to expose the strips to the atmosphere any longer than necessary, particularly where acid fumes may be present. The date of renewal of the paper should be marked on the strip with lead pencil.

(10) The methyl violet-paper test is completed when paper has been bleached to white. When making precompletion reports the time of the test is reported as the number of days it has been running with a particular strip of paper. When the paper has become white the completion of the test shall be reported, giving the number of days it took for the paper to bleach to white. Under favorable storage conditions good powder will not bleach the paper in less than 2 months' time. The violet paper shall not be changed in the magazine powder sample when a shipment of a powder sample for surveillance test is forwarded or the report therefrom received. The violet paper shall remain in the powder sample until evidence of decomposition of the powder appears. The same paper can remain in a sample bottle indefinitely, so long as it does not turn white. The number of days shall be continuous, in making the report on forms N. Ord. 67 and 67–A.

Violet-paper tests, how conducted.

(11) To test powder from rounds, charges, or bulk powder, a sample of 12 ounces of the powder shall be placed in a 16-ounce glass-stoppered bottle. Fruit jars or 8-ounce bottles partly full will permit carrying on a satisfactory test, as the quantity does not change the test, but it is better to have a standard procedure. One strip of dry violet paper, marked in lead pencil with the date of starting the test, is dropped into the bottle on the powder and the bottle is then closed tightly. It is preferable to stow the bottle in the warmest part of the magazine, but as a rule special racks are provided. The bottle should be carefully protected from bright sunlight. The oxides of nitrogen, if any are present, cause a gradual fading of the paper to a faint violet, then a change to blue, and finally total loss of color, leaving a white paper. The time of the test is the number of days required for the paper to become white, and the bottle should not be opened during this time. In submitting re-

ports of tests always show the total number of days that the strip has been in the bottle, omitting the plus (+) sign to show that the paper has not turned white.

(12) Greater reliance is to be placed on the indications of surveillance tests and violet-paper tests, if properly carried out, than on physical properties of the powder. Where containers are not tight, powder is more likely to decompose, and all such charges or rounds should be inspected and given special attention in tests. (See art. F-27 (*b*).)

(13) The test for local heating in magazines should include not only the examination of maximum and minimum thermometer temperatures but also the examination of magazine bulkheads for abnormal heating from outside the magazine and an examination of the containers themselves for evidence of local heating. While the sense of touch may distinguish differences of temperature between identical materials, it is not sufficiently reliable to detect containers having decomposing powder. An additional maximum and minimum thermometer that can be readily attached to any container provides a better means than the sense of touch for detecting the probable slight increases in temperature that it is desired to locate.

Fortnightly.

(*b*) *Fortnightly.*—(1) Visual examination of each replacement sample for signs of decomposition or change in appearance.

(2) There will be supplied with each index of powder a sample of the index in an airtight glass or metal container, for use in bringing up to weight a charge which has been drawn on for surveillance test, called the "*replacement sample*," which will be stowed in the same magazine with the index it represents. The replacement sample containers shall be opened and examined fortnightly for signs of decomposition or change in appearance. Care should be exercised to expose the replacement sample for as short a time as will permit a thorough examination and to restore the containers to an airtight condition. In the event no replacement sample is furnished, one charge shall be used for this purpose and plainly marked as such.

Monthly.

(*c*) *Monthly.*—(1) Visual examination of one or more charges of each index shall be made for signs of decomposition or change in appearance.

(2) Different charges shall be selected each month for this examination.

(3) Samples of powder when required for the 65.5° C. surveillance tests should be taken at the time of the monthly examination.

(4) Care shall be taken to expose the powder charges only for such short a time as will permit a thorough examination. Containers or cartridge cases shall then be restored to their former airtight condition.

(5) Containers of smokeless powder or cartridges which have been examined, or from which surveillance test samples have been taken, will be tagged, and the tags must show that replacement was made, the name of the person who made the examination or took the sample, and the date.

Breaking down charge.

(6) In examining the charge, the idea is to note a change from its original condition. In breaking down a charge, remove projectile. Do not tamper with the fuze of the projectile. (See art. G–92 and A–31.) After replacing the projectile in the case, remake the seal between the projectile and the cartridge case. The joint between the end of the cartridge case and the rotating band of the projectile shall be covered with several turns of friction or adhesive tape and given a coat of clear shellac. Cartridges that have been broken down for the purpose of making the monthly tests or for obtaining samples of powder for surveillance test shall be considered unserviceable until after the cases have been reformed or pressed at a naval ammunition depot.

(7) Ships not furnished with tools for withdrawing, replacing, and recrimping projectiles in crimped cartridge cases will turn such cartridges into a naval ammunition depot for break-down, examination and selection of test samples, and replacement at the earliest opportunity. Cartridges turned in for this purpose shall be tagged showing origin and purpose. In case 65.5° C. surveillance tests are to be conducted, the ship will forward to the depot the necessary powder test cards (Forms N. Ord. 67 or 67a) filled in as directed in part K hereof.

(8) In order to save transportation costs the Bureau of Ordnance has authorized Coast Guard vessels not in the vicinity of naval ammunition depots to conduct visual examination of indexes in 3-inch 23-caliber crimped cartridge cases quarterly instead of monthly provided the previous required semiannual surveillance test was 60+ days. Indexes which give a surveillance test of less than 60+ days should be examined monthly. Vessels operating in the vicinity of a naval ammunition depot should conduct visual examinations monthly. Monthly visual examination of indexes in uncrimped cases should be made as usual.

(9) Great care shall be exercised in the break-down and reassembly of cartridges to see that the cartridge cases are not deformed, that the projectiles are properly aligned, and that the seals between the cartridge cases and the projectiles are properly remade. Cartridges that have been broken down on board ship should be turned into a depot for gaging or overhaul if by any chance the cartridge case has been deformed in the slightest degree.

(10) Upon the accumulation of eleven 6-pounder, or twelve 3-inch, 50-caliber broken-down charges they shall be turned into a naval ammunition depot for reforming of cases. The containers or tanks of broken-down charges shall be conspicuously marked to indicate broken-down charges. However, the designation marks placed on the containers or tanks at the naval ammunition depot shall under no circumstances be defaced.

(11) In every case when a service charge is turned in to a naval ammunition depot for a test of any kind, commanding officers shall see that such charges are returned to the vessel; otherwise the Coast Guard will be required to reimburse the Navy for this shortage in service ammunition. (See art. G–18 (2) (*b*).)

65.5° C. surveillance test.

F-22. The 65.5° C. surveillance test shall be made on every index of smokeless powder as follows.

(a) *Monthly.*—On all indexes which give a 65.5° C. surveillance of less than 30 days, samples to be taken from *charges broken down for this purpose.*

(b) *Bimonthly.*—On all indexes which give a 65.5° C. surveillance test from 30 to 89 days, samples to be taken from *replacement samples.*

(c) *Quarterly.*—On all indexes which give a 65.5° C. surveillance test from 40 to 59 days, samples to be taken from *replacement samples.*

(d) *Semiannually.*—(1) 65.5° C. test on all indexes of smokeless powder on hand, samples to be taken from *charges broken down for this purpose,* except powder contained in crimped cartridge cases. Arrangements should be made for quarterly and semiannual tests to be made at the same time where 3-inch 23-caliber crimped cartridge cases are involved.

(2) Semiannual surveillance tests of powder afloat are usually started on or about January 1 and July 1. Commanding officers of units and others responsible for the shipment of samples of powder for surveillance test will communicate with the inspector of ordnance in charge of the naval ammunition depot at which these tests are made regarding these dates, and make shipments in accordance therewith.

(3) The number of samples to be subjected to the surveillance test applies to smokeless powders afloat and ashore. Forward one sample of each index carried.

(e) *Special.*—To be made at such times as the officer responsible for the same considers necessary or proper, due to abnormal or unusual conditions, such as undue heating of magazines, etc. Where an index indicates loss of stability in the daily or fortnightly examination or in the violet-paper test it shall be subjected to the surveillance test at once.

Tests, where conducted.

F-23. The daily, fortnightly, and monthly visual tests are made on board ship (except when crimped cases are involved), while the monthly bimonthly, quarterly, and semiannual surveillance tests of smokeless-powder samples, will be made by any naval ship having a surveillance oven on board or by any naval ammunition depot. In order that a uniform procedure shall obtain, it is directed that when a sample is forwarded from a Coast Guard unit it be accompanied by a written request and N. Ord. 67 if service ammunition and N. Ord. 67a if target practice ammunition, in quadruplicate, complete in all respects except that the column "Surveillance test" shall be left blank. The naval officer carrying out the test will fill in the appropriate column upon completion of the test, forward one copy to Coast Guard Headquarters, one to the Bureau of Ordnance, one to the commanding officer of the unit which forwarded the sample, and retain one fourth for his files. In most cases naval ammunition depots have a fixed date for the starting of surveillance ovens and it is desirable that samples be shipped in time to reach the ammunition depot a few days before this date. (See arts. F-22 (d-2) and K-22; also Ordnance Pamphlet No. 4, p. 71, art. 33.)

Target ammunition.

F-24. Target practice or experimental firing ammunition afloat need not be broken down for surveillance test within three months of its issue from a naval ammunition depot, but thereafter ammunition of this type shall be tested the same as service ammunition.

Small-arms powder.

F-25. Small arms powder in rounds afloat need not be tested.

Quantity for test.

F-26. In the surveillance test a fixed quantity of the powder to be tested is inclosed in a special tight glass-stoppered bottle and exposed to a constant temperature of 65.5° C. in an electrically heated constant temperature surveillance oven. The sample under test is examined once daily until red fumes appear, which mark the end of the test. The record to be made is the number of days it has taken to develop these fumes.

Method of selection of samples.

F-27. The method of selection of samples for surveillance test as specified below is intended primarily for floating units, but the same principles should govern shore stations:

(*a*) Samples of powder for test should be taken from several magazines, but especially from the magazines having the most unfavorable storage conditions of temperature, dampness, etc.

(*b*) Samples shall be taken from containers that are damaged or leaky or that have been exposed to unfavorable storage conditions as compared with the remaining containers. Such containers shall be searched out in order that tests can be made of the powder charges most likely to be in the worst condition.

(*c*) All of one test sample of powder shall be taken from one charge or tank. Both the test sample and the charge or container shall be carefully marked or tagged. (See art. F-21 (*c*-5) and (*c*-7).)

(*d*) In taking powder for samples the best method is to clean and dry the hands, put on white gloves, and remove handfuls of the powder from various parts of the container, or sections of the charge in the tank. Weigh and record carefully the amounts taken from each section. If gloves are not used, the hands must be thoroughly clean and dry.

(*e*) Spread out the powder on clean white cloth, mix or blend it thoroughly, and examine grains for signs of deterioration. If all the grains appear normal select at random sufficient grains for the test sample. (See art. F-30.)

(*f*) Test sample shall consist of 4 ounces of powder, except in the case of 1-pounder, when an entire charge shall be used.

(*g*) After sample has been selected for test, an amount of the same index equivalent to that removed shall be returned to each charge or section from which powder was taken, making up deficiencies from the proper *replacement* sample.

(*h*) (1). Attention is particularly invited to the fact that surveillance sample bottles are *not* interchangeable with magazine sample bottles. Surveillance sample bottles may readily be identified by the ground or etched space about 2 inches by 1 inch on the side of the bottle near the bottom.

(2) The distinction between the *magazine sample* of smokeless powder, furnished for the purpose of carrying out the daily inspection, and the *replacement sample*, furnished for the pur-

pose of replacing the powder removed from charges for surveillance tests, must be clearly understood. In all cases the Navy furnishes a sample of smokeless powder for daily examination which must remain in the magazine as long as any charges containing that index of powder remain on board, and this sample must not be used for surveillance tests. See art. F-21 (*a*) (5) and (*b*) (2).)

(3) All sample bottles must be kept tightly closed and marked to indicate contents, date, etc. Stoppers of magazine sample bottles shall be tied down; stoppers of surveillance test bottles must NOT be tied down.

Preparation of sample.

F-28. In preparing a sample of smokeless powder for shipment to a magazine for testing, the following shall be complied with:

(*a*) Test sample suitably marked shall be placed in a clean glass airtight bottle, sealed with paraffin or wax, and the stopper secured by cloth covering and twine seizing.

(*b*) The bottle shall be placed in a wooden box, properly cushioned and secured for shipping.

(*c*) The outside package must contain a label bearing the following notation:

EXPLOSIVE
SAMPLE FOR LABORATORY EXAMINATION
HANDLE CAREFULLY
KEEP FIRE AWAY
ADDRESS

(*d*) Shipment by mail is prohibited.

Cleaning of bottles.

F-29. Bottles for samples shall be carefully washed and dried. Distilled water should be used if practicable; and drying should be done preferably by the application of heat rather than by wiping with a cloth.

Sampling deteriorated powder.

F-30. Should the examination directed in article F-27 (*e*) reveal the presence of deteriorated grains, the stability of that lot of powder is questionable; and the following examination and tests shall follow immediately. The inspecting officer shall—

(*a*) Determine the number of visibly deteriorated grains per pound of powder under examination.

(*b*) Select a representative sample of not less than 1-quart fruit jar of the powder for transfer to a naval ammunition depot, or to the naval powder factory, Indianhead, Md., for test. The sample should be properly tagged or labeled to indicate result obtained in paragraph (*a*) of this article and any other pertinent information.

(*c*) Select one hand-picked sample of questionable grains, and one hand-picked sample of apparently normal grains, and place both these samples immediately under the 65.5° C. surveillance test if facilities are available; otherwise notify headquarters by dispatch.

Destruction.

F-31. (1) *Powder shall not be destroyed unless it shows unmistakable signs of advanced decomposition.*—In the event of such deterioration every charge of the index on board shall be examined and only such charges will be destroyed as contain the

decomposing powder. Decomposition in the sense here used is evidenced by—

(*a*) The grains being friable and easily crumbled.

(*b*) Unmistakable odor of nitrous fumes.

(*c*) Very low violet-paper test and surveillance test.

The conditions in (*a*) and (*b*) must be confirmed by (*c*).

Mushy smokeless powder.

(2) Powder found in a soft or mush condition shall be thrown overboard immediately.

Examination of decomposed powder.

(3) Whenever any powder is landed or destroyed because of its unstable or decomposed condition, samples of each index shall always be preserved and forwarded to the naval powder factory, Indianhead, Md., for examination, and headquarters notified at once of the shipment and the reason therefor. Such samples shall not be packed in water but shall be segregated to prevent damage to other materials in case of spontaneous combustion.

Section 5.—OTHER SMOKELESS POWDERS

Types.

F–32. Smokeless powders other than the standard nitrocellulose powder may be issued from time to time. Instructions for examination and test will be issued as required. In the absence of instructions to the contrary, such special powders should be given the same surveillance as regular powders.

E. C. powder.

F–33. E. C. powder, used in blank small-arms cartridges and as a bursting charge for grenades, consists of semicolloided nitrocellulose with inorganic nitrates.

Double base small arms powders.

F–34. (1) Certain double base powders will occasionally be found in .45-caliber pistol and revolver cartridges and in shotgun shells. These powders are usually identified by the manufacturer's trade names as "sporting ballistite," "ballistite," "infallible," and "bull's eye" powders.

(2) The storage of small-arms ammunition containing double base powders is the same as for small-arms ammunition containing straight nitrocellulose powders.

Section 6.—TNT

Composition.

F–35. TNT (trinitrotoluene) is obtained by the nitration of toluene in mixed sulphuric and nitric acid.

Properties.

F–36. TNT is a crystalline substance. When fairly pure it varies from white to pale yellow in color and is known as grade A, or refined TNT. When the proportion of impurities is much greater the color is darker, being often brown, and it is known as grade B, or crude TNT. It is toxic, comparatively stable, and relatively insensitive, although it may be ignited by impact, friction, spark, shock, or heat. It is readily melted and cast into bursting charges for projectiles, mines, etc. In a granular or crystalline form, and when unconfined, it burns freely and may burn away without detonation. In the cast form it will almost invariably detonate in a fire. Where small quantities of unconfined TNT have been ignited, sprinkling or flooding systems or steam drenching will be effective in checking the fire, since it does not explode immediately. Cast

rather difficult to detonate. It usually requires a booster charge of refined granular TNT or of tetryl. Thin-walled projectiles, mines, etc., containing TNT bursting charges are subject to sympathetic detonation or detonation in mass. This property makes it necessary to separate TNT storages from other explosive storages, especially fuzes and detonators and from fire hazards, which may initiate detonation. It does not appear to be affected by acids but is affected by alkalies, becoming pink, red, or brown, and more sensitive. Like most other explosives, but to a greater extent, it is adversely affected by sunlight. TNT is not so insensitive that it may be treated with impunity. There have been instances of detonation caused by scraping with a knife, and hammering a pipe plugged with TNT.

Uses.

F–37. (1) TNT has many uses, such as for main bursting charges of projectiles, mines, boosters, demolition blocks, etc. It is sometimes used as a component in other explosives.

(2) For boosters only a refined, granular, or crystalline TNT of high melting point is used.

(3) For large charges, such as mines, cast TNT of one of the lower grades and lower melting points is ordinarily used.

Exudation.

F–38. (1) A dark brown oily liquid frequently separates from cast TNT, and may exude from the containers after a period of storage. This exudate consists of isomers of TNT and lower nitrotoluenes. Isomers are substances having the same chemical composition but of different melting points, etc. Exudates are relatively insensitive, but when mixed with a cellulose absorbent will form a low explosive which is easily ignited, burns rapidly, and may even be detonated. An accumulation of exudate is considered both a fire hazard and an explosive hazard, which should be avoided by frequent inspection of cast TNT charges and frequent removal of exudate. Large cast TNT charges shall not be stowed on wood floors or decks nor on any material that is likely to absorb the exudates. (See art. A–49.)

(2) When an exuding charge is detonated the exudate is apparently detonated along with the charge.

(3) Aside from the additional hazard, the presence of exudate does not appear to affect the detonation of the TNT so long as the booster charge is not contaminated by it and there is intimate contact between the booster or booster container and the main charge.

Hazards and precautions.

F–39. (1) TNT in any form must be handled with great care and must be protected from drops or jolts. All containers must be protected from injury.

(2) TNT shall be protected from the direct rays of the sun, strong light, and from moisture.

(3) While not sensitive to ordinary summer temperatures, it should, nevertheless, not be exposed to a high storage temperature. High temperatures and direct sunlight increase the amount of exudation.

(4) Cast TNT crystallized from alcohol is more subject to exudation than when it is crystallized from other solvents. For this reason it is recommended that carbon tetrachloride only be

used for wiping off exudates from containers, for cleaning threads, fuze holes, etc.

(5) Persons exposed to TNT dust or fumes, especially in warm climates, are liable to be affected with TNT poisoning.

(6) To avoid sparks from nails or other metal, in opening boxes or handling TNT where the atmosphere or floors may be charged with TNT dust, all persons present should preferably wear safety shoes and safety clothing.

Surveillance. F-40. (1) Magazines and TNT charges shall be frequently cleaned of any accumulation of TNT exudate.

(2) TNT loaded containers shall be frequently inspected for deterioration, and any that are found to be defective aboard ship shall be turned in to a depot at the first opportunity.

(3) No other inspections or special tests of TNT on board ship are required.

Section 7.—TETRYL

Composition. F-41. Tetryl is made by several different processes, one of which is by the action of nitric and sulphuric acids on dimethylaniline which in turn can be made by heating aniline with alcohol under pressure in the presence of sulphuric acid.

Properties. F-42. Tetryl is a finely divided yellowish crystalline powder, toxic, hygroscopic, and somewhat more sensitive than TNT and explosive D. It burns more readily than TNT and is very likely to detonate if burned in large quantities, its tendency in this respect being quite erratic. It is an excellent initiator of detonations in other explosives.

Uses. F-43. The principal uses of tetryl are for booster charges for fuzes and as a constituent of detonators.

Part G.—AMMUNITION

Section 1.—GENERAL.

Definition.

G–1. The term "ammunition" as used herein means all the components forming a charge, complete round, or cartridge for cannon or small arms, or for any other weapon, mine, demolition charge, fuze, detonator, projectile, etc.; and all signalling and illuminating pyrotechnic materials; used for offensive, defensive, saluting, and training purposes.

Detailed information.

G–2. The general instructions herein shall be strictly observed. More detailed information may be obtained from ordnance pamphlets and sources listed in part A hereof. Interpretation of any instructions which are not fully understood should be requested from headquarters.

Types of ammunition.

G–3. Ammunition in the Coast Guard is of the following types:

(1) Separate loading.
(2) Fixed.
(3) Small arms.
(4) Pyrotechnic.
(5) Blank.
(6) Dummy, drill.
(7) Bomb.
(8) Impulse.

Service ammunition.

G–4. Service ammunition is supplied to ships for use in battle. It shall not be used for drill, for testing appliances, or for other similar purposes except upon the express authority of headquarters. It shall be regarded as a part of the vessel's outfit, shall be kept distinct from the ammunition used for gunnery exercises, and shall never be expended in gunnery exercises unless authorized in Orders for Gunnery Exercises or by special instructions from headquarters.

Special ammunition.

G–5. (1) Special ammunition is issued for gunnery exercises, except when a part of the ship's allowance of service ammunition is designated by headquarters for that purpose.

Target practice allowance.

(2) The target practice allowance for 1-pounder and larger guns is the maximum annual allowance and must be expended in accordance with regulations. Attention is invited to the allowance of 1-pounder target ammunition given certain vessels which is to be expended for training purposes without restriction except as to quantity. Annual target practice ammunition will be ordered by headquarters. (See arts. G–18, J–22, and K–4.)

Disposition of unexpended ammunition.

(3) The unexpended portion of such ammunition as may have been issued for a specific gunnery exercise or experimental firing shall be turned in as soon as practicable, after such firing, to an ammunition depot, unless additional firings are immediately authorized by headquarters. (See arts. K–10 and K–11.)

Unauthorized use.

G–6. (1) Ammunition, ammunition details, and explosives shall not be expended, except in action, signalling, saluting, line throwing, gunnery exercises, or training authorized by proper authority.

(2) Expenditures in excess of the authorized allowances for training purposes are prohibited.

(3) No ammunition nor components thereof shall be given away or diverted to private use.

Inspection before firing.

G–7. (1) Ammunition and containers shall be carefully inspected preparatory to firing, or when ammunition is laid out, for signs of defects, such as: its suitability for the purpose, dented containers, broken powder bags, loose or broken caps or windshields of projectiles, loose primers or fuzes, loose projectiles in cartridge cases, cracked cartridge cases, etc. Defects shall be reported to headquarters with full details. Defective ammunition shall not be fired if the defect is of such a nature as to be dangerous to personnel or to the gun or other weapon.

(2) Powder tank covers may be removed prior to firing for loosening in accordance with the safety precautions, but they shall again be set up hand taut and flame tight.

Search after firing.

G–8. (1) Immediately after firing, the officers in charge shall conduct thorough searches for unfired rounds, which shall be placed in a safe condition, carefully inspected, and returned to the properly marked containers.

(2) All containers having unfired rounds shall be examined, safety wires replaced, fuzes set on safety, fuze covers replaced, and taped, loose covers tightened, and shall be returned to the magazines as soon as practicable.

Return of empty containers, etc.

G–9. All empty cartridge cases, tanks, boxes, grommets, fuze covers, distance pieces, cork plugs, and all other ammunition components shall be collected immediately after firing, carefully cleaned, packed, and marked for return to a naval ammunition depot. Particular care shall be taken to remove all paint placed on projectiles for target practice. All such material shall be returned at the first opportunity to a naval ammunition depot, preferably the one from which issued. Only 1-pounder, 6-pounder, and 3-inch, 23-caliber cases should have the primer removed. These primers are not threaded. Such materials shall not be used for any other than the designated purpose. Officers will be held strictly accountable for the proper preservation of such articles and that every reasonable precaution is taken against loss. (See arts. K–10 and K–11.)

Instruction of officers and men.

G–10. All personnel shall be carefully and frequently instructed in the safety precautions, methods of handling, storage, and the uses of all kinds of ammunition with which the vessel or other unit may be supplied. All persons must distinctly understand that their safety as well as that of others depends on the intelligence and care exercised by themselves and by their fellow workers.

Competent personnel for ammunition work.

G–11. (1) No one shall be permitted to undertake the inspection, preparation, or adjustment of live ammunition until he thoroughly understands his duties and the hazards involved.

(2) New and inexperienced personnel must not be permitted to work alone, but shall be under the direct and continual supervision of skilled and experienced persons.

(3) Only careful, reliable, mentally sound, and physically fit persons shall be permitted to work with (as distinguished from

the mere occupation of handling in connection with transportation) or use explosives or ammunition.

(4) Personnel engaged in working with explosives or ammunition shall be limited to the absolute minimum number required.

(5) Visitors and spectators, unless accompanied by an officer or for training purposes, shall not be permitted in a magazine, nor in the immediate vicinity of handling or loading operations of explosives or ammunition.

Violations of safety precautions to be reported.

G–12. (1) Anyone knowing of defective ammunition or ammunition containers or handling devices or any rough or improper handling or of any wilful or accidental violation of the safety precautions, however slight, shall immediately report the fact to his immediate superior.

(2) Persons found guilty of wilful violations of the safety precautions or safety instructions relating to explosives or ammunition shall be punished; in the case of service personnel by appropriate disciplinary action and in the case of civil employees by immediate dismissal.

Cleanliness, etc.

G–13. Cleanliness of the person; scrupulously clean magazines and loading compartments; freedom from unnecessary furniture or tools; proper light; and explosives uncontaminated with foreign substances aid in furnishing excellent protection against accident.

Identification markings.

G–14. (1) All ammunition and ammunition containers have the contents properly marked thereon when issued from the depots.

(2) Empty containers shall be marked or tagged "EMPTY," "EMPTY CARTRIDGE CASE," etc., and show the name of the ship or station before transferring to another ship or station or turning into a depot.

(3) Care shall be taken that identification marks are not obliterated or that ammunition removed from its containers is not returned to incorrectly marked containers.

(4) Ammunition shall be marked or tagged to show why, where, when, and by whom overhauled, examined, etc., in pursuance of any regulation or instruction. These marks or tags will form part of the history and record of the ammunition.

Ammunition and containers not to be opened unnecessarily.

G–15. (1) Ammunition shall not be broken down, nor shall ammunition containers be opened except to make necessary examinations, tests, and overhauls, or when preparing ammunition for target practice or for action. This provision, however, must not be construed as relieving the service from making all required examinations and tests.

(2) Especial care should be exercised to see that hermetically sealed containers, such as primer boxes, detonator boxes, small-arms boxes, fuze covers, tanks, etc., are not opened beyond the quantity required for immediate use. Should partially filled containers remain on hand, they shall be so marked and shall be resealed as well as practicable to protect the contents against moisture. Friction tape well shellacked is suggested as furnishing a satisfactory temporary seal.

Old ammunition to be used first.

G–16. Unless instructions to the contrary are issued or special ammunition is supplied or designated, ammunition of the oldest date of manufacture or assembly on hand shall be used for gunnery exercises and training purposes.

Periodic examination and overhaul.

G–17. (1) Ammunition afloat is due for an overhaul 5 years after original assembly and thereafter every 3 years until replaced. Upon the occasion of a ship going to a navy yard for overhaul, the commanding officer will request the inspector of ordnance in charge at the naval ammunition depot to inspect the ammunition on board in order to determine the extent of examination or overhaul necessary. The request for the inspection shall be accompanied by a list of all ammunition, giving number of rounds, calibers, and indexes of powders; types and fillers of projectiles; types of fuzes; date and place of original assembly; date and place of last overhaul; any unusual storage condition or other pertinent information that will assist in the preparation of reports.

(2) The responsibility that the examinations and overhauls are made rests with the commanding officer.

(3) The Navy standard practice with regard to the inspection and overhaul of ammunition and explosives is as follows:

(*a*) *Powder charges (other than black powder and small-arms powder).*

Five years after assembly or reassembly.—All powder charges and all cartridges that have been on board ship for 5 years after assembly or reassembly shall be turned in to a naval ammunition depot for examination, test, and overhaul during the ship's next regular overhaul. In no case, however, shall powder charges be permitted to remain on board ship for more than 7 years after assembly or reassembly without having been overhauled at a depot.

Three years after an overhaul.—All powder charges and all cartridges that have been on board ship for 3 years after the overhaul mentioned in the preceding paragraph shall be turned in to a naval ammunition depot at the ship's next regular overhaul period for examination, test, and overhaul. Powder charges shall not remain on board ship for a longer period than 4 years without overhaul, except in the case of new or reassembled ammunition as provided for in the preceding paragraph.

Special overhauls.—Ammunition on vessels having long service in tropical waters, or on vessels having unfavorable storage conditions, will probably require special overhauls at more frequent intervals than the 5- and 3-year periods specified in the foregoing instructions. Commanding officers of such vessels should take the initiative in requesting examination and overhaul during the regular overhaul periods of the vessels.

(*b*) *Projectiles, separate ammunition.*—Projectiles (loaded with black powder, mixed filler, granular TNT and illuminating assemblies) need not be turned in to an ammunition depot for overhaul unless required as a result of the inspection mentioned below. Five percent of projectiles loaded with cast TNT, chemical warfare, or incendiary materials, or other special explosives or pyrotechnic materials, shall be turned in at every ammunition overhaul for such examination by the depot as may be necessary to establish the serviceability and safety for continued stowage

on board ship. The service allowance of projectiles shall be inspected by the inspector of ordnance in charge of the ammunition depot, or his representative, in company with the gunnery officer of the ship, if practicable, prior to or during the period of the powder overhaul in order to determine what overhaul is required; and, if considered necessary, shall be turned in to the depot.

(c) Advantage should be taken of the first opportunity for the periodical ammunition overhaul, so that a ship will not be forced through unexpected changes of schedules or duties to retain ammunition on board for periods longer than the maximum given above. In no case, however, shall any bag charges or cartridges remain afloat in ship's service allowances for a period longer than 10 years (regardless of the number of inspections or partial overhauls), without breakdown, complete overhaul, and reassembly at an ammunition depot. The dates of assembly or of reassembly as well as the dates of any subsequent overhauls will be printed by the depot on the "powder identification tags."

(d) The regular forms for reporting powder, and projectiles, should be submitted by ships even though the materials are undergoing overhaul at a depot. Where necessary the forms should be forwarded through the depot for filling in of test data.

(4) (a) Coast Guard vessels will follow Navy standard practice in the overhaul of ammunition. Where practicable, Navy inspectors of ordnance will inspect ammunition, explosives, and magazines on board Coast Guard vessels before ammunition is turned in for overhaul. Arrangements have been made with the Bureau of Ordnance, Navy Department, whereby the necessary inspections will be made on Coast Guard vessels by naval inspectors of ordnance at the various naval ammunition depots and elsewhere. These inspections are for the mutual benefit of the Navy and Coast Guard, and every effort shall be made to see that they are carried out readily and without undue inconvenience to either service. Attention is invited to the fact that the Navy Department, Bureau of Ordnance, furnishes to the Coast Guard without charge all service ammunition and practically all ordnance, for the specific purpose of having Coast Guard vessels ready for any emergency which might necessitate this service operating as a part of the Navy. It is, therefore, most important to the Navy as well as to the Coast Guard that ammunition inspections be uniform.

(b) The responsibility for seeing that the instructions covering inspection and overhaul are carried out rests upon the commanding officer. He shall communicate as may be necessary with the inspector of ordnance at a convenient naval ammunition depot or elsewhere and make arrangements agreeable to both parties for the inspection. Should the naval inspector of ordnance initiate the action, on account of being in the vicinity of a Coast Guard vessel or because he considers an inspection necessary at any particular time, the division commander or commanding officer with whom he communicates shall arrange to have the inspection made as soon as practicable, endeavoring not to interfere

with the normal duties of the vessel or unduly inconvenience the inspector, and shall see that all practicable assistance is given that officer in connection with the examination of ammunition and magazines.

(c) Upon the completion of this inspection, the inspector will make a report on the condition of the ammunition, explosives, and magazines, and will recommend the action, if any, which should be taken to comply with standard practice. A copy of the report will be furnished the commanding officer of the vessel, his immediate superior, and headquarters. Copies will also be furnished the Bureau of Ordnance, and such other officials as may be deemed necessary.

(d) Without further action, the commanding officer of the vessel will take immediate steps to comply with the recommendations made by the inspector, if he concurs and compliance will involve no expense. In case it is necessary to incur expense, authority shall be requested from headquarters immediately, the estimated cost of the work to be performed being clearly indicated. If the commanding officer does not concur with the recommendations of the inspector of ordnance, he shall make a full report to headquarters giving his reasons and making such recommendations as he may deem fit.

(5) In the event that it has been impracticable for a naval inspector of ordnance to go on board a Coast Guard vessel to make the necessary inspections, a commanding officer shall not permit a period of more than 3 years to elapse without making a report to headquarters and requesting instructions. If it is desired to have special overhaul of ammunition made in accordance with paragraph 3 (a) of this article, and it is impracticable for a naval inspector to make an examination, the fact shall be reported and instructions requested of headquarters.

Allowance during overhaul.

(6) If a vessel is stationed at such a distance from a naval ammunition depot that the vessel is likely to be left without service ammunition for a considerable time, while the periodic overhaul is being accomplished, the following instructions shall govern:

(a) The division commander shall arrange with another unit in his division or with the commander of an adjacent division for the temporary transfer of sufficient ammunition for service activities. The ammunition transferred shall not exceed one-half of the normal allowance of the vessel.

(b) The ammunition temporarily transferred shall be accompanied by a replacement sample and a magazine sample made up from the replacement sample of the issuing vessel.

(c) The violet-paper test of powder so transferred shall commence immediately upon the transfer.

(d) As soon as possible after the return of overhauled ammunition, loaned ammunition and samples shall be returned to the vessel which issued them.

(e) Upon the return of the ammunition, the loaned replacement and magazine samples shall be combined with the replacement sample of the vessel from which originally issued provided that no indications of powder deterioration are present.

(f) Headquarters shall be advised by the division commander of the arrangements made in each specific case. Appropriate forms shall be submitted promptly as required by paragraph 3 (e) above and article K-22.

G-18. (1) Allowances of 1-pounder and larger caliber ammunition shall be as follows: Allowance.

	Service					Target					Blank			
	5"/51	3"/50	3"/23	6-pounder	1-pounder	5"/51	3"/50	3"/23	6-pounder	1-pounder	3"/50	3"/23	6-pounder	1-pounder
	Per gun					Per ship								
Cruising cutters:														
Haida, Modoc, Mojave, and *Tampa*	50	100			55	(1)	(1)			[2]60			110	
Bibb class and *Cayuga* class	100				55	(1)	(1)			[2]60			110	
Tallapoosa		30			55		(1)		(1)				110	
With 3"/50 guns, only		30					(1)				78			
Redwing				60		60			(3)					120
Ossipee					55	60				(1)			110	
With 6-pounder guns, only					55					(1)			110	
165-foot patrol boats				60		60			(3)					120
Patrol boats with 3"/23 guns, only				60					(3)			60		
Vessels with 1-pounder guns, only					60					(3)				60

[1] In accordance with latest Orders for Gunnery Exercises, U. S. C. G., and art. J-11 hereof.
[2] Total allowance for subcaliber practice, to be expended at discretion of commanding officer.
[3] In accordance with art. J-22.

(2) (a) The quantities of service ammunition given above for 1-pounder and larger guns are the amounts which shall be carried on board at all times insofar as is practicable. Replacement of service ammunition will be made only in full boxes, and in no event shall request be made for less than one-tenth of the allowance. No transfers of service ammunition, particularly to naval ammunition depots, shall be made except in emergencies, without the authority of headquarters. (See art. K-1.) Allowance to be maintained.

(b) The original allowance of service ammunition is furnished the Coast Guard by the Navy without charge. It is expected that the Coast Guard will keep the amount of service ammunition on board its vessels up to allowance. All expenditures of service ammunition by the Coast Guard must be paid for by the Coast Guard. It is, therefore, important that an accurate record of all expenditures of service ammunition be kept. (See art. F-21 (c) (11).)

(3) In view of the limited supply of ammunition available, commanding officers of all units are enjoined to expend ammunition with care and judgment, eliminating all useless expenditures. Vessels having 3-inch or larger guns should not use these guns in expending service ammunition unless circumstances of the case render such use highly advisable. One-pounder or 6-pounder guns should be used normally in carrying out patrol duties. Care in use of ammunition.

Target practice ammunition is intended for gunnery exercises only, not for patrol duty.

Ships to always carry full service allowances.

G–19. (1) Unless specially exempted, ships shall always carry the full allowance of service ammunition on board. Shortages will normally be filled by headquarters upon receipt of routine reports. Should the shortage fall to 50 percent of the allowance of any particular type of ammunition, headquarters should be notified by letter unless ammunition orders covering replacement have been received.

(2) No training, signaling, or saluting ammunition allowances will be filled by ammunition depots without reference to headquarters.

Effect of temperature on charges.

G–20. It is important that all charges of a caliber for firing be kept as nearly as possible at the same temperature, and consideration should be given to this point in laying out ammunition preparatory to opening fire. Metal tanks and cartridge cases should be protected from the direct rays of the sun and from temporary exposure to temperatures differing greatly from the temperature of the storage magazine.

Section 2.—SEPARATE LOADING AMMUNITION

Definition.

G–21. Separate loading ammunition is ammunition in which the primer, propelling charge, and projectile are loaded into the gun in two or more operations. All 5-inch, 51-caliber guns use separate loading ammunition. Separate loading ammunition is of two types, viz: (*a*) For bag guns, and (*b*) for case guns. Separate loading ammunition for case guns is also known as semifixed ammunition.

Preparation.

G–22. (1) Propelling charges for separate loading, bag-gun ammunition are made up in bags of silk cloth and are packed in standard airtight metal powder tanks fitted with rubber gaskets and removable covers.

(2) The charges for a particular caliber on board ship are assembled as far as practicable from one index, lot, or blend of powder.

(3) The identity of all propelling charges must be carefully maintained. Each powder charge or each section of a charge has all necessary information stenciled on the bag, to which is also affixed a powder identification tag. The powder tank is likewise stenciled with information sufficient to identify the charge.

(4) Separate loading powder charges for bag guns are prepared in bags made of unbleached silk cartridge bag cloth with the black-powder ignition charge quilted in one end which is dyed red and which must be loaded toward the breech end of the gun. The amount of black powder being relatively small, the safety storage regulations pertaining to smokeless powder in assembled charges apply.

(5) Separate loading bag charges may be stacked or unstacked, depending on the caliber of the gun and the type of charge.

Alterations to charges forbidden.

G–23. (1) It is forbidden to add to the material of powder bags or to alter the charge in any way on board ship, except

to tighten the lacing or rebag the charge or section in one of the spare bags furnished; to make the necessary examinations; and to take the necessary surveillance samples, the powder for which must be exactly replaced from the replacement sample. Rebagging or relacing must not be done in a magazine containing smokeless powder or other explosives.

(2) Powder tanks must be kept tight and the covers should be occasionally gone over with the proper wrenches to see that all are set up taught and airtight.

Projectiles for separate loading ammunition.

G-24. Projectiles for separate loading ammunition are ready for firing when issued to ships except for the removal of grommets which protect the rotating bands. Every projectile is marked and stenciled to show the type of loading, fuze, tracer, etc., and it is essential that these markings be maintained in a legible condition.

Grommets not to be removed.

G-25. Grommets are not to be removed from any projectiles until they are prepared for firing. They shall be kept in place during handling of all separate projectiles and during storage of all these projectiles.

Condition of grommets.

G-26. Grommets shall be maintained in good condition and damaged grommets will be repaired or replaced by the ship. All separate projectiles turned in by ships shall be fitted with efficient grommets, even if new grommets have to be made on board.

Preservation of grommets.

G-27. Grommets left from projectiles fired at target practice shall be carefully collected and packed for return to a naval ammunition depot at the first opportunity. They should be invoiced at no price along with remnants of ammunition and other ammunition details.

Inspection, separate loading projectiles.

G-28. All separate loading projectiles shall be inspected and overhauled annually on board ship as follows:

(*a*) Inspect all projectiles for loose caps, windshields, fuzes, or fuze covers; damage of any kind, poor paint; illegible markings; rust, etc.

(*b*) Remove grit, dirt, exudate, and rust; remove old paint where necessary and repaint, using proper colors and being careful not to paint bourrelets and bands; and grease or oil for the prevention of rust all bright or exposed steel parts, such as bourrelets, rear of bands, and bases. Renew all paint markings where necessary. Care should be taken to protect bourrelets against rust or else frequent cleaning may reduce the diameter of this bearing surface too much for accurate flight.

(*c*) Overhaul, adjust, and tighten or renew all grommets as necessary. (See art. A-28.)

(*d*) Set aside, and tag to show a complete statement of facts, any projectiles found to be otherwise defective. Defective projectiles or any loaded and fuzed projectiles that have been dropped a distance exceeding 5 feet shall be turned in to a depot at the first opportunity. (See art. A-29.)

Loose caps or windshields.

G-29. Projectiles with loose caps or windshields, loose fuzes, or projectiles having cracks or badly damaged rotating bands, or covered with exudate shall not be fired.

Sweating.

G-30. Projectiles are subject to sweating when exposed to sudden large increase of temperature and care should be taken to dry them off immediately. Under no circumstances shall projectiles fitted with base fuzes or tracers be permitted to stand in pools of water. Control of ventilation, particularly the exclusion of moisture-laden air, will reduce sweating considerably.

Lock primers.

G-31. (1) Lock primers for separate loading ammunition are furnished in hermetically sealed boxes, 24 to a box.

(2) Lock primers are supplied for service, target practice, and training use in accordance with standard allowances for each battery and each ship. Whenever a ship is directed to use primers from the service allowance for any target practice or training purpose, only primers of the oldest lots on board will be used.

(3) Primers shall not be expended from the service allowance on board unless the expenditure is authorized by headquarters, except in case of an emergency, in which case the commanding officer shall make a report to headquarters stating the necessity for the expenditure and the number of primers expended.

(4) Service primers for use at target practice will be ordered in the same manner as other ammunition.

Storage of separate ammunition.

G-32. In the storage of separate loading ammunition, the various components are put in different magazines and are kept separated from other ammunition.

Hazards.

G-33. (1) Propelling charges, aside from the explosive hazard of smokeless powder, are especially dangerous to personnel in case of fire. Unconfined or in containers which rupture under slight pressure, such fires may be fought by drenching with water. Large quantities of burning smokeless powder develop intense heat, but burn without explosion if the gases of combustion can escape.

(2) The hazard from loaded projectiles is principally from the great destructive effect of the missiles of fragmentation caused by fuze action, fire, and sympathetic detonation. This hazard varies considerably with the type of projectile, sensitiveness of the fuze, and kind of explosive filler.

(3) Primers are principally a fire hazard.

Surveillance.

G-34. For surveillance of separate loading charges, see "Surveillance of smokeless powder."

Section 3.—FIXED AMMUNITION

Definition.

G-35. Fixed ammunition is ammunition for guns in which the projectile and primer are firmly secured in a cartridge case containing the propelling charge, so that the gun is loaded in one operation.

Preparation.

G-36. (1) In fixed ammunition the propellant charges and primers are prepared in cartridge cases, usually of brass. The propellant charges are generally held firmly in the cartridge cases by means of wads and distance pieces. As a rule, the cartridge cases are not designed to be entirely filled with the powder charge, since such a procedure would result in too high

a density of loading. With fixed ammunition, the wads and distance pieces are held firmly in place by the projectile, which also serves to form the airtight seal for the powder charge. Usually the circumference of the projectile in rear of the band is given a light coat of clear shellac or other approved quick-drying lacquer to insure perfect airtight seal.

(2) The powder charges are prepared with the same care as to weights and indexes of powder as is given to separate loading bag charges.

(3) In the case of fixed ammunition, the identification tag, placed inside the cartridge, contains information as to the primers, the type and loading of the projectile, types of fuzes, tracers, etc. The identity of each round must be carefully maintained and reports shall always give complete information as to all components.

(4) Each component, as well as each round of ammunition, is carefully gaged prior to assembly and issue from an ammunition depot so as to insure fit into any normal gun. Such ammunition, however, is particularly subject to misalignment of projectile and cartridge case or to other deformations which may cause jams in loading unless the greatest care is exercised to see that it is handled very carefully at all times. If consideration be given to the construction of fixed ammunition and to the relatively snug fit required in the gun for proper functioning, it will at once be apparent that rough handling is certain to result in frequent interruptions in the service of the gun and in other casualties.

Alterations and break-downs.

G-37. (1) Alterations and break-downs of fixed ammunition on board ship are forbidden except for the purpose of conducting the examinations and tests required and in the case of "Unloading guns," as covered in the safety precautions. (See art. F-21, par. (c) (6) et seq., also A-75.)

(2) Such ammunition shall never be broken down in a magazine containing other explosives nor in a compartment where an accidental explosion might be communicated to other explosives.

(3) The break-down and reassembly of fixed ammunition shall be done with the tools furnished for that purpose and great care shall be taken to protect the round against damage.

(4) When ships are not supplied with the proper tools for pulling and reseating projectiles in cartridge cases, especially crimped cases, the complete round shall be turned in to a naval ammunition depot for the monthly (quarterly if not in the vicinity of a naval ammunition depot) examination and for the selection of powder test samples. (See art. F-21 (c) (7) and art. F-23.)

(5) The preservation, safeguarding, and testing of ammunition afloat is primarily a duty of the ship itself and the ship shall take the necessary steps to see that the proper reports are made.

Shore stations.

G-38. While these instructions are intended primarily for the service afloat, they apply with equal force to shore stations having ammunition of any kind.

Packing. G–39. Fixed ammunition is supplied in wooden boxes or in airtight cartridge tanks. Special care should be taken to see that ammunition in wooden boxes is not exposed to moisture or damp storage. Cartridge tanks must be kept tight, and the covers should be occasionally gone over with the proper wrenches to see that all are set up taut and airtight.

Fitting cartridges in guns prior to firing. G–40. Fixed ammunition is carefully gaged prior to issue from an ammunition depot in a gage of closer tolerances than the gun chamber, therefore fitting cartridges in the gun is not recommended, unless the cartridge has some visible defect. The practice of trying the round in the gun is liable to do more harm than good, since it is likely that the rotating band will seat in the rifling and the projectile will remain seated when the cartridge case is withdrawn. (See art. A–83.)

Care of cartridge cases. G–41. Cartridge cases must be protected from salt water, moisture, oil, grease, dents, burrs, and scratches to insure proper functioning. During gunnery exercises adequate means shall be provided against damage to empty cases on being ejected from the gun and against possible loss overboard. Empty cases, especially when hot, should be placed on their heads rather than on their sides to prevent deformation.

Cleaning empty cases. G–42. Fired cartridge cases shall, before stowing below, be stood on their bases in the open air for 10 minutes, in order to avoid danger from inflammable gases. So far as practicable, fouling, particularly that from the black powder of the primer, shall be removed from the interior with a brush as soon as possible after the above 10-minute period. The cleaned cases shall then be returned to the cartridge boxes or tanks which must be properly marked as directed in article G–14. (See art. G–9.)

Storage of empty cases. G–43. Empty cartridge cases shall never be repacked in containers with unfired cartridges nor shall empty cartridge cases and containers be stored in a magazine containing live ammunition or explosives in any form. (See art. H–20.)

Hazards. G–44. Fixed ammunition combines the hazards of separate loading propelling charges, projectiles, and primers. Detonations of projectiles and explosions of propelling charges are not likely to occur *en masse*, although in case of fire both projectiles and charges will continue to explode for some time with great tossing about of adjacent rounds and containers.

Surveillance. G–45. For surveillance of fixed ammunition, see part F, section 4, "Surveillance of smokeless powder."

Section 4.—SMALL-ARMS AMMUNITION

General. G–46. All cartridges less than 1 inch in caliber are classified as small-arms ammunition. War Department practice with regard to the uses, specifications, classes, grades, and markings is followed by the Coast Guard. Detailed information regarding the construction, functioning, characteristics, identification, safety precautions, packing, and shipment will be found in the Technical Regulations published by the War Department, copies of which will be furnished upon request.

G-47. (1) Small-arms ammunition used in the Coast Guard includes the following types: Types.

(a) Caliber .30:
(1) Cartridge, ball, M1906 (as graded), for rifles, automatic rifles, and machine guns.
(2) Cartridge, ball, M1 (as graded), for rifles, automatic rifles and machine guns.
(3) Cartridge, armor piercing, M1922 (as graded), for Springfield rifles.
(4) Cartridge, tracer, M1 (as graded) (also M1917, M1923, and M1924), for Springfield rifles.
(5) Cartridge, blank, M1909, for Springfield rifles.
(6) Cartridge, rifle grenade, M1, for rifle grenade and Coast Guard shoulder line-throwing guns and for no other purpose.

(b) Caliber .50:
(1) Cartridge, ball, M1923 and M1 (as graded), for use in aircraft and antiaircraft machine guns.
(2) Cartridge, armour piercing, M1923 and M1 (as graded), for use in aircraft and antiaircraft machine guns.
(3) Cartridge, tracer, M1 (as graded), for use in aircraft and antiaircraft machine guns.

(c) Caliber .45:
(1) Cartridge, ball, M1911 (as graded), for automatic pistols (C. A. P.) and Thompson submachine gun.
(2) Cartridge, tracer, for Thompson submachine gun.

(d) Cartridge, subcaliber, caliber .30:
(1) Cartridge, ball and blank, M1898, for subcaliber use in Krag rifles.
(2) Cartridge, ball, M1925, for subcaliber use in Krag rifles.

(e) Caliber .22: Cartridge, ball, long rifle for Springfield gallery practice rifles and Ace pistols.

(f) Shotgun shells: Commercial types, 12-gage, for use in sporting and riot guns; not standard; issued only for special purposes.

(g) Caliber .32: Cartridge, blank, commercial type, for Lyle gun primer.

(h) Cartridge, for use with Models "L" and "M" Federal Coffman Aircraft Engine Starter.

(2) Other small-arms ammunition components used in the Coast Guard are as follows: Ammunition components.

(a) Belt links, caliber .30, ammunition component for feeding ammunition to automatic machine guns.
(b) Belt links, caliber .50, ammunition component for feeding ammunition to automatic machine guns.
(c) Cartridge belts, machine gun, caliber .30, ammunition component for feeding ammunition to automatic machine guns.

(*d*) Cartridge belts, machine gun, caliber .50, ammunition component for feeding ammunition to automatic machine guns.

(*e*) Safety disks for use with Model "M" Federal Coffman Aircraft Engine Starter cartridge.

Allowances.

G–48. (1) Allowances of small-arms ammunition for service use shall be as follows:

Service allowance, small arms ammunition

Unit	Machine gun	Rifle		Pistol and submachine gun
	.30 caliber ball	.30 caliber ball	.30 caliber blank	.45 caliber ball
Vessel with authorized complement of more than 100	2,400	6,000	2,000	10,000
Vessel with authorized complement of more than 60 and less than 101	2,400	6,000	2,000	8,000
Vessel with authorized complement of more than 38 and less than 61	1,200	1,200	1,000	6,000
Vessel with authorized complement of more than 15 and less than 39	1,200	1,200	500	2,000
Vessel with authorized complement of more than 5 and less than 16, except harbor craft	1,200	1,200	250	2,000
Harbor craft				2,000
Coast Guard station	[1] 1,200	1,200	250	2,000
Air station		1,200	250	6,000
Air detachment				2,000

[1] Station equipped with machine gun.

Basis of allowance.

(2) In general, service allowances are based on full case lots where storage space permits and expenditures justify. Allowances may be changed upon the recommendation of the commanding officer.

Target-practice ammunition.

(3) Allowances of small arms ammunition for target practice shall be determined by the number to fire and shall be estimated as follows:

.30 caliber, rifle:
90 rounds per man for entire firing complement.
180 rounds per man for those who will fire the sharpshooter and expert course.

.30 caliber, machine gun:
800 rounds per man for those who qualify to fire the machine-gun course.

.30 caliber, subcaliber:
2,400 rounds for each 3-inch gun, or gun of larger caliber.

.22 caliber, rifle and pistol:
500 rounds per man for entire firing complement.

.45 caliber, pistol:
300 rounds per man for entire firing complement.

.45 caliber, submachine gun—
400 rounds for each submachine gun. Two men shall fire 200 rounds apiece from each gun.

(4) As far as practicable, each unit will use its own SERVICE ammunition for small-arms target practice, replacing it with ammunition of a fresh lot. If there is not enough small-arms ammunition on hand, sufficient shall be requested to complete target practice requirements and to replenish the service allowance. In this way *the ammunition which has been at a unit for the longest time will be expended and new retained for service use.*

(5) All small-arms ammunition will be supplied as specified in article K–2 (c).

Issue of small-arms ammunition.

G–49. (1) The responsibility for sufficient ammunition being on hand at all times to meet emergencies rests with the commanding officer. Requisitions for small-arms ammunition to fill allowances shall be submitted to headquarters for authorization. (See arts. K–2 and K–5.)

(2) The annual allowances of small-arms ammunition for training and for target practice, computed from the number of men to fire as governed by the Small Arms Firing Regulations, shall not be exceeded without special permission from headquarters.

(3) For target use the oldest stock on hand shall be selected, having due regard to the class, grade, and condition of firing. Failure to comply with this rule will result in lack of proper turnover and very likely will force the firing of ammunition at a date long after it should have been expended.

Classification and uses of small-arms ammunition.

G–50. When small-arms ammunition is prepared for issue, information as to the method of packing and the purpose for which it is best adapted is placed on the packing box in symbolic form by the manufacturer in order to afford an easy means of identification. These symbols, therefore, indicate the *class* and *originally recommended use* of each lot of ammunition and should not be confused with the *grades* listed in the Army Field Service bulletins and headquarters letters which specify the serviceability found as a result of periodic surveillance and ballistic tests. Refer to TR–1350–A, Technical Regulations, War Department, Infantry and Aircraft Ammunition, for information regarding types, classes, and grades.

Grades.

G–51. (1) Periodically all lots of small-arms ammunition are subjected to ballistic and surveillance tests at Frankford Arsenal to establish the degree of serviceability of each lot. Depending on the results of these tests, the lots are assigned to different grades, the results being published in Ordnance Field Service Bulletin, Small-Arms Ammunition, No. 3–5, War Department.

(2) Care must be exercised to insure that an ammunition lot is issued for and fired in the weapons authorized by its grade as published in Ordnance Field Service Bulletin 3–5, *except* as specified in article G–53 (3) below.

Examination before firing.

G–52. The cartridge cases of caliber .30 ammunition of the World War manufacture are increasingly subject to split necks and season cracking as the ammunition becomes older. To insure the use of serviceable ammunition, commanding officers

should have this ammunition examined before firing and not fire cartridges showing defects detectable by visual examination.

Grading.

G-53. (1) Each major unit required to carry a supply of small-arms ammunition, is furnished with a copy of the current edition of Ordnance Field Service Bulletin 3–5, Small Arms Ammunition, War Department, which shows the results of surveillance tests on the several lots of small-arms ammunition issued by the War Department. Commanding officers are authorized to change the grades of ammunition on board from time to time as shown in this circular, but in every case headquarters shall be advised of the changes in markings.

Instructions for grading.

(2) Circular letters will be issued, as information is received, transferring lots of small-arms ammunition from one grade to another. Lots in grade 2, or regraded as grade 2, may be used for current target practice and the allowance refilled at the first opportunity with service ammunition.

(3) Ordnance Field Service Bulletin 3-5 carries certain TYPES of small arms ammunition (ball, tracer, armor piercing, etc.). Under each type the various LOTS which are considered serviceable for War Department use are listed by number and grade. *A lot may be serviceable for Coast Guard use although it is not listed in Ordnance Field Service Bulletin 3–5.* If a Coast Guard unit has small-arms ammunition of the TYPE carried in Ordnance Field Service Bulletin 3–5, but of a LOT number which does not appear, the following shall apply:

(*a*) If the quantity on hand is *more than 10,000 rounds,* authority shall be requested from headquarters to have a sample sent to a War Department arsenal for surveillance test.

(*b*) If the quantity on hand is *10,000 rounds or less,* it shall be inspected carefully and all defective rounds shall be thrown overboard in at least 20 fathoms of water. The serviceable balance of .30 caliber ball ammunition shall be designated "For ground machine gun use only"; the serviceable balance of .45 or .50 caliber ball ammunition shall be reported to headquarters whereupon instructions will be issued as to regrading or disposition. In any event, a report shall be submitted to headquarters covering all identification marks on the ammunition, the quantity destroyed, and the balance remaining on hand.

(4) In the absence of specific instructions, the TYPES of small-arms ammunition not carried in Ordnance Field Service Bulletin 3–5 shall be inspected visually at least once each year and always before firing to determine serviceability. Indications of unserviceability, whenever found, shall be reported to headquarters for instructions.

Packing and marking.

G-54. (1) Nearly all small-arms ammunition is packed in wooden boxes, practically all of which have hermetically sealed metal liners. Care shall be taken not to break open the air-tight metal liners unnecessarily and in excess of the immediate requirements.

(2) Special types of small-arms ammunition which are issued in small quantities, such as line-throwing and rifle-grenade cartridges, may be issued in sealed paper cartons and especial care should be taken to protect these cartons from moisture.

(3) All cartons and packing boxes are carefully marked with all necessary information for identifying the class, model, type, and use of the ammunition. Care must be taken to see that cartons and cartridges are not returned to wrong packing boxes.

(4) Ball cartridges for the standard service weapons are marked only on the cartridge heads with the initials of the manufacturer and numerals indicating the year of manufacture.

(5) Tracer cartridges have the same markings on the cartridge head as ball cartridges but are blackened their entire length.

(6) Armor-piercing cartridges have the same markings on the head of the cartridge case as ball cartridges, but are identified by blackened ogival points of the bullets.

(7) Blank cartridges are readily identified by the absence of metal bullets.

(8) Special-use cartridges are identified by the letters CRG (for smoke and lacrymatory rifle grenades) or PS (for pyrotechnic signal cartridges) marked on the head of the cartridge case in addition to the initials of the manufacturer and the numerals indicating the year of manufacture.

(9) In order to insure proper use of small-arms ammunition and to avoid mistakes the markings of small-arms ammunition shall be checked against the markings on newly opened packing boxes or cartons.

Surveillance and tests.

G-55. (1) The same surveillance afloat and ashore applies to small-arms ammunition as to other similar explosive materials except as regards tests.

(2) No surveillance tests of small-arms powders are required afloat or ashore except at ammunition depots and magazines.

Inspection before firing.

G-56. (1) Prior to firing any type of small-arms ammunition the cartridges or shells shall be given a searching visual examination and defective rounds culled out.

(2) When the ammunition is to be fired from machine guns or automatic rifles the alinement of the rounds in belts or clips should be carefully maintained in order to insure uninterrupted fire. It is desirable that web belts, belt links, or clips be freshly loaded after culling out defective rounds by visual examination. Belts should be loaded by belt-loading machines, although they can be loaded successfully by hand if care be taken to load rounds uniformly and to maintain proper alinement.

(3) Stowage of loaded belts in properly fitting boxes and careful handling are required to prevent misalinement of cartridges.

(4) Metallic belt links for proper performance must be protected against damage and from rust. Cleaning with kerosene is suggested as a suitable means for the removal of traces of rust. Metallic belt links when loaded should be flexible and should hang without kinks, otherwise interruptions in the fire are almost certain to occur.

(5) Web cartridge belts must be kept clean and dry. Occasional inspections, airing, and drying in the sun are desirable for preservation.

Defects.

G–57. (1) All personnel concerned with the inspection and preservation of small-arms ammunition shall thoroughly familiarize themselves with the manner of detecting the most common defects. The instructions which are clearly outlined in War Department pamphlet, Technical Regulations No. 1350–A, shall be followed.

Reports of defects, serviceability, etc.

G–58. (1) A perfectly serviceable lot and even new lots of small-arms ammunition may show a small percentage of visibly defective rounds, but when the defective rounds average 20 percent or more, or defects are of a serious nature, that lot of ammunition should not be fired until after its serviceability has been reestablished by special tests.

(2) Any serious malfunctioning of, or accidents involving small-arms ammunition shall be promptly reported to the immediate superior, who should conduct at once an examination of the ammunition and weapon in question, taking care to collect and preserve intact for further disposition all evidences such as the defective cartridge case, the weapon, and the unfired cartridges in order that the cause of the casualty may be determined. The particular lot of ammunition furnishing the cartridge causing the accident shall be set aside until instructions for its disposition have been received from headquarters. After the board of investigation all remaining parts of the firearm shall be sent to the Coast Guard Depot, Ordnance Supply and Repair Base, for further examination. (See TR–1350A, Technical Regulations, War Department, art. 15.)

(3) Reports of accidents and casualties should give all details such as the organization, type manufacture, model, caliber, and serial number of weapon, condition of weapon, number of rounds fired just prior to accident, all markings of ammunition and ammunition box, history of ammunition as well as can be determined, details of accident, and any other pertinent information.

Care and storage of small-arms ammunition.

G–59. (1) Small-arms ammunition should be carefully protected against dirt and against blows which might dent it. Dirt or moisture should be wiped off at once.

(2) Cartridges should not be polished although verdigris or corrosion should be wiped off.

(3) Cartridges should never be greased.

(4) Small-arms ammunition should be piled according to caliber, class, grade, and lot number and should always be stored under cover. It is adversely affected by moisture and by the direct rays of the sun.

(5) Tracer and shotgun ammunition are subject to quick deterioration if exposed to dampness.

(6) Permissible storages are given in part H.

Hazards.

G–60. Small-arms ammunition is principally a fire hazard. In case of fire it is advisable to keep everybody not engaged in fighting the fire well clear. Bullets and cases are not likely to fly over 200 yards.

General rules for use of small-arms ammunition.

G–61. The following general rules should be observed in the care and use of all small-arms ammunition:

(*a*) Do not open a case or break the metal liner until the ammunition is required for use in firing.

(*b*) Guard the ammunition carefully from mud, sand, dirt, and water, and wipe it off before using it if it does get muddy or dirty.

(*c*) Turn in all dented cartridges or cartridges with loose bullets.

(*d*) Use no grease or oil on the cartridges, and see that there is no grease or oil in the chamber or the bore of the rifle before firing.

(*e*) If a cartridge apparently misfires, be careful not to open the bolt of the gun for at least 10 seconds.

(*f*) Do not allow the ammunition to be exposed to the direct rays of the sun for any length of time.

(*g*) Blank ammunition packed in original packages or cartons should be used for automatic weapons. Furthermore, automatic weapons require a special attachment for the use of blank ammunition.

Handling of empty cartridge cases, etc.

G–62. After holding small-arms practice, the officer in charge of a rifle range (or, in case no officer has been specifically detailed in charge of the range, the officer in charge of the firing party) shall take steps to have all empty cartridge cases, clips, bandoleers, and packing boxes carefully collected. Empty cartridge packing boxes may be used for boxing the empty cartridge cases, clips, and bandoleers.

Precautions.

G–63. Empty small-arms cartridge cases and clips shall be packed loosely in ammunition boxes. Every precaution shall be taken to see that no live cartridges are boxed with the empty cartridge cases. To this end it is directed that each box containing empty cartridge cases have a tag securely attached to the inside of the cover of the container bearing the name of the officer under whom the packing was done. Mark on the outside of the box "scrap brass" if shipment is to be made by commercial carrier, to assure minimum shipping rate.

Disposition.

G–64. (1) Upon the accumulation of 300 pounds of empty cartridge cases and clips, they shall be turned in to the nearest army ordnance depot or to the Coast Guard depot if in that vicinity. This procedure is required as a discount is given on ammunition in anticipation of the return of empty cases, etc.

(2) Shipments to Army depots should be addressed as indicated below:

Commanding Officer, Augusta Ordnance Depot, Augusta, Ga.

Commanding Officer, Benicia Ordnance Depot, Benicia, Calif.

Commanding Officer Charleston Ordnance Depot, Charleston, S. C.

Commanding Officer, Hawaiian Ordnance Depot, Honolulu, T. H.

Commanding Officer, Raritan Ordnance Depot, Metuchen, N. J.

Commanding Officer, San Antonio Ordnance Depot, San Antonio, Tex.
Commanding Officer, Savanna Ordnance Depot, Savanna, Ill.
Ordnance supply Officer, Schenectady General Depot, Schenectady, N. Y.

Section 5.—PYROTECHNIC AMMUNITION

Ammunition.

G-65. Pyrotechnic ammunition consists of fireworks (pyrotechnic mixtures) adapted to military purposes and is divided into four classes: Signaling, illuminating, screening, and incendiary. It is further divided into pyrotechnics for ship or ground use and pyrotechnics for aircraft use.

Source of supply.

G-66. (1) Pyrotechnic ammunition for Coast Guard units is obtained from commercial manufacturers, from the Navy, or from the War Department.

(2) A wide variety of types exists and research and development work now underway will probably result in new and improved types being issued in the future.

Standard types.

G-67. The following types of pyrotechnic ammunition are standard for use in the Coast Guard: Tracers, Very-star cartridges, rockets (signaling, illuminating) with or without parachutes, hand lights, distress signals, aircraft parachute flares, float lights, and recognition signals.

Uses.

G-68. (1) The uses of the different types of pyrotechnic ammunition are prescribed in the various tactical instructions.

(2) The directions for firing will be found in Ordnance Pamphlet No. 4 and on labels on the packing boxes or on the articles themselves.

(3) Since pyrotechnic ammunition is especially subject to deterioration and by its construction liable to partial or total failure, it is advisable to have at hand additional rounds for immediate firings, in case of unsatisfactory performance of one or more rounds.

(4) Due to deterioration and in order to obtain turnover in this class of material, the oldest pyrotechnics on hand should be used before pyrotechnics of later assembly.

Surveillance.

G-69. (1) Pyrotechnics shall be inspected at least once a year. The inspection shall include an examination of packing boxes and containers and the opening of one or more containers for an examination of individual rounds, which, if satisfactory, shall be carefully repacked and sealed.

(2) If no service firings have occurred within 6 months, representative samples of each type or color should be selected for a firing test during the annual inspection. The test should be used for instruction, observation, and for collection of data on performance. A report of the test shall be rendered to headquarters, including the following information: Type, lot, or contract number, name of manufacturer, year of manufacture; duration of light, signal or smoke; height, color, visibility, etc. The following types should be included in the test: Very signal cartridges, rockets, distress signals, parachute

flares, Coston signals, both hand and percussion type, and all aircraft pyrotechnics.

(3) Pyrotechnic ammunition shall be protected from high temperatures, the direct rays of the sun, absorption of moisture, corrosion, rough handling, and from movement in storage on board ship.

(4) No special surveillance tests are required.

Hazards and safety precautions.

G-70. (1) Pyrotechnic ammunition is more subject to deterioration than some other types of ammunition, and some types are liable to spontaneous ignition if exposed to moisture, high temperatures, or rough handling. Certain types of rockets have a box of matches or a match igniter assembled along with the round; therefore, to prevent accidental ignition it is important that such articles be packed and stored so that they cannot rub against each other or against any other object.

(2) Pyrotechnic ammunition is in general a fire hazard and forms a very hot fire, difficult to extinguish. Most all types furnish their own oxygen upon combustion, but large volumes of water and copious sousing may serve to cool the materials, or at least adjacent materials below the ignition temperature.

(3) Certain types, such as aircraft flares and illuminating projectiles, may explode in fires.

(4) Due to the different types of pyrotechnic ammunition and the kinds of pyrotechnic effects required, numerous substances of varying stabilities and sensitivities enter into the compositions. Nitrate mixtures are fairly insensitive, while chlorate mixtures or mixtures containing red phosphorus are very sensitive. Mixtures containing chlorates and sulphur are liable to spontaneous ignition. Mixtures containing powdered aluminum and magnesium are likely to explode in a fire.

Safety precautions.

(5) The best protections against accident are: Cool dry storage, careful handling, protection against shocks and from continual movement due to the roll of the ship.

(6) When actually using pyrotechnic ammunition the minimum amount required should be opened, due regard being given to the exigencies of the situation. Occasional prematures or malfunctionings take place in firing pyrotechnic materials; therefore, other rounds should be kept covered, preferably in a firetight container, to prevent accidental ignition. Cases are on record of fatal accidents resulting from a failure to efficiently protect nearby rounds from accidental ignition. Personnel in the vicinity of the firing should be kept to a minimum and at a reasonably safe distance.

(7) Pyrotechnic ammunition found in a deteriorated, damp, or damaged condition shall be made the subject of a special board of survey.

(8) Very's pistol ammunition shall never be fired from a shotgun.

Allowance.

G-71. The allowance of aircraft pyrotechnics for an air station, air patrol detachment, or ship will depend upon the number of planes attached at a particular time and the types of the planes. The following table indicates the allowance for each type of plane. Responsibility for the storage and care of this

material rests with the unit to which planes are attached. It shall be issued to a plane, on custody receipt, as occasion requires. If a plane is transferred, its allowance of pyrotechnics shall be invoiced to the unit under which it is to operate.

Allowance basis, pyrotechnics for aircraft

Type of plane (present or new of similar type)	Landing flares, Mk. IV, Mod. 1	Float lights, Mk. IV	Special, Elgin flares	Parachute flares M-9	Signal flares M-10 (white star)	Signal flares M-11 (red star)
JF-2	2	4		6	6	6
J2K-1				6	6	6
J2K-2				6	6	6
J2W-1				6	6	6
N4Y-1				6	6	6
OO-1		4		6	6	6
PH-2	2	4		6	6	6
PJ-1		4		6	6	6
PJ-2		4		6	6	6
RD-1		4		6	6	6
RD-4	2	4		6	6	6
RT-1	2			6	6	6
R30-1			2	6	6	6
R30-1				6	6	6
SOC-4	2			6	6	6
Spares for air station	2	2		6		
Spares for air detachment				6		

Section 6.—BOMB-TYPE AMMUNITION

Bomb-type ammunition.

G–72. Wrecking mines are included in the classification "bomb-type ammunition."

Explosives.

G–73. The standard bursting charge for Navy wrecking mines is TNT.

Hazards.

G–74. (1) The hazards of bomb-type ammunition are those of the explosives involved, but are greater than those of the same explosives in bulk; in fact, this type of ammunition and bulk black powder are the most dangerous with which the Coast Guard has to deal.

(2) The hazards arise not so much from instability or deterioration of the explosives, but from the enormous destructive effect from the detonation of one round followed almost instantaneously by sympathetic or mass detonation of all rounds in close proximity.

(3) Fire is sure to produce detonations of bomb-type ammunition; therefore, safety demands not only prevention of fires but absolutely fireproof magazines, fireproof packing cases or crates and fireproof dunnage.

(4) In the event of a fire in the vicinity of bomb-type ammunition where there is danger of heating the cases or of firebrands falling among them, the threatened magazine should be flooded or thoroughly drenched with water.

(5) Only skilled personnel entirely familiar with the construction and methods shall be permitted to assemble, disassemble, prepare for firing, overhaul or perform any work on any type of bomb ammunition, fuze, or component thereof. (See art. H–21 (2).)

G–75. (1) The surveillance of this type ammunition consists in keeping cases perfectly clean and free from dirt, rust, corrosion, and exudate. Surveillance.

(2) Fuze threads, fuze, and booster cavities shall be kept clean.

(3) No steel instruments or tools which may cause sparks shall be used for cleaning fuze holes or threads, booster or fuze cavities, or for scraping off drops, or crusts of TNT or exudate.

(4) All bomb-type ammunition shall be inspected monthly for signs of deterioration, cases cleaned, exudate wiped up, etc.

(5) Any round of bomb-type ammunition showing evidence of excessive corrosion, defects, or damage will be turned in at the first opportunity and a report giving full details shall be made to headquarters.

(6) No special surveillance tests are required.

(7) No overhaul or repair work shall be done in a magazine nor where an accidental explosion could be communicated to other rounds or to other explosives. (See art. H–21.)

G–76. For information regarding procurement of mines see part K of this publication. Procurement.

G–77. (1) Navy wrecking mines now issued to the service are loaded with cast TNT and have a primer of granular TNT or tetryl. The detonator is the standard service electric detonator. The Navy wrecking mine is fully described in Ordnance Pamphlet No. 848. Mines in use.

(2) The Coast Guard wrecking outfit is fully described in the pamphlet Destruction of Derelicts and Menaces to Navigation, U. S. Coast Guard, September 12, 1935.

Section 7.—IMPULSE AMMUNITION

G–78. Impulse ammunition consists of specially prepared propellant charges, contained in cartridge cases fitted with primers and assembled as blank cartridges for purposes such as firing line-throwing projectiles. Definition.

G–79. The following types of line-throwing projectiles are issued to Coast Guard units: Types of projectiles.

.30 caliber, 13 ounce, nontumbling.
.30 caliber, 15 ounce, nontumbling.
6-pounder.
Lyle gun.

G–80. The .30 caliber, nontumbling projectile is used with the shoulder gun. Special blank cartridges (.30 caliber rifle grenade) with a load of approximately 50 grains of powder are furnished. No others should be used. The .30 caliber rifle grenade blank cartridges are supplied 20 rounds to a box and shall be requested on Coast Guard forms. A range of approximately 350 feet may be obtained with the 13-ounce projectile. A complete description of the Coast Guard .30 caliber shoulder line-throwing equipment is contained in the pamphlet United States Coast Guard .30 Caliber Shoulder Line-Throwing Equipment. .30 caliber.

G–81. The 6-pounder charge for use in the 6-pounder gun for line throwing is specially prepared for Coast Guard use with a lighter charge than regular Navy issue. Not more than 6 6-pounder.

ounces of black saluting powder shall be used in making up charges for the 6-pounder line-throwing projectile. The charge is made up in the same manner as a saluting charge. A 6-ounce charge will give a range of 300 yards or over. A heavier charge will not increase the range greatly and is likely to break the line. The gun should be elevated approximately 30°.

Lyle gun charges.

G-82. (1) The Lyle gun charge is prepared as specified in Instructions for United States Coast Guard Stations.

(2) The primer for the new Lyle gun firing attachment is a .32 caliber blank cartridge, which is furnished in waterproof boxes, 100 rounds to a box. These cartridges are supplied on Coast Guard requisitions. (See arts. K-2 and K-5.)

Section 8.—BLANK AMMUNITION.

Definition.

G-83. Blank ammunition consists of cartridge cases which have been loaded with primers and powder charges only, or with these and paper bullets. Blanks are used for the purpose of creating a noise, smoke puff, or both; and for signaling, saluting, and training purposes.

Preparation.

G-84. Blank ammunition for Coast Guard units (other than the black powder supplied to stations) is ordinarily furnished assembled and ready for use.

Precautions.

G-85. (1) The precautions for the use and handling of black powder apply in the preparation of blank ammunition.

(2) Blank ammunition shall not be prepared in a magazine containing explosives of any kind other than the small amounts of black powder which are being loaded into the cartridge cases. Care shall be taken in handling, and stowing saluting charges that the pluggings or wads of the cartridge cases do not get adrift and permit the powder to escape into the boxes or the magazine.

(3) Keep black-powder container and primer box tightly closed except for the minimum time required to remove the necessary amount of contents. A filled cartridge case must be closed and separated from the black-powder container as soon as possible. Place loaded cartridges in a closed receptacle immediately after completion of loading.

(4) Prior to firing, examine cartridges to see that cartridges are in good order, wads tightly sealed, etc.

(5) Keep boxes of blank ammunition removed from gun as far as practicable and keep them tightly closed except when necessary to pass up new rounds.

(6) Never put empty or fired cartridge cases in containers with live ammunition.

(7) Clean and dry cartridge cases immediately after firing. (See art. G-42.)

(8) After empty cartridge cases have cooled and prior to reloading they should be tried in the gun to see if they fit. Cartridge cases that do not fit shall be turned in to an ammunition depot for reforming along with other unserviceable cases.

Surveillance.

G-86. No special surveillance tests are required for blank ammunition containing black powder other than to see that the containers are tight and serviceable as provided under black

powder. Surveillance of small-arms blank cartridges or charges is the same as provided for other small-arms ammunition. (See aft. G-55.)

Section 9.—MISCELLANEOUS AMMUNITION COMPONENTS

Percussion or primer caps.

G-87. (1) Percussion or primer caps are found in small-arms cartridges, primers, fuzes, etc. A percussion cap consists of a cup into which is pressed a small amount of the priming mixture, a paper sealing disk, and an anvil. The cup and anvil are usually of brass or gilding metal. The anvil contains holes or vents to allow the flame from the priming mixture to reach the powder charge of the primer, fuze, etc.

(2) A percussion cap is fired by a blow from a firing pin which dents in the cup on the anvil, thus compressing the pellet of the priming mixture and causing it to ignite or explode.

(3) Percussion-cap misfires are often due to worn firing pins, too much grease on firing-pin springs causing cushioning of the firing-pin blow, or insufficient lubrication which increases the friction of the working parts. Among the other causes of cap misfires are: Eccentric firing pin, weak firing-pin spring, wet priming mixture, priming mixture jarred out from under anvil, defective cap due to manufacturing, etc.

G-88. Nearly all priming mixtures in use in the United States contain fulminate of mercury as the base of the mixture. Priming mixtures are exceedingly dangerous to handle and load because of the extreme sensitiveness of the material and the danger extends also to all ammunition containing it, although when assembled the danger is not so great because of somewhat better protection afforded against accidental firing.

Primers.

G-89. (1) Primers for the ignition of propelling charges are of the percussion, or electric, or of combination percussion-electric type.

(2) The main charge of black powder is ignited—

(*a*) By percussion firing of the primer cap.

(*b*) By electric firing in which a fine wire bridge in the primer is heated by an electric current and ignites a wisp of guncotton surrounding the bridge.

(3) Percussion primer failures may be due to any of the causes of percussion-cap failures, and electric-primer failures may be due to: Broken bridge wire, corroded primer parts, grease or oil on primer, poor electrical contact, etc. Many of the electric misfires or failures to fire of electric primers are due to open circuits or poor electrical contacts in one or more of the many electrical connections and switches in the firing circuits.

(4) To insure proper functioning, primers, whether separate or in loaded ammunition, should receive gentle handling and should never be exposed to drops, jolts, or unfavorable storage conditions. Primers in boxes or ammunition should be kept cool, dry, and in airtight containers.

(5) The practice of wiping off electric primers with alcohol prior to firing is not recommended, since the slightest excess may get into the primer. Wiping off with a dry rag and removing

any verdigris on exposed surfaces with very fine sandpaper is sufficient to give the best electrical connection possible.

(6) Whenever defective primers are found they should be tagged to show the name of the ship, type of practice, caliber and number of gun, salvo or round on which failure occurred; and should be turned in at the first opportunity to a naval ammunition depot for examination.

Protection of primers.

(7) Care shall be taken in handling assembled case ammunition out of their containers not to strike the percussion cap against anything sharp. In rapid loading care should be taken in handling cartridges so that the point of a projectile will not accidentally strike the cap of a primer of another case; consequently it is well to have the loader hold his hand over the base of the case.

Loading service primers.

(8) Service primers should not be previously loaded in the lock except as may be necessary to test the fit of the primer.

Exploding primers.

(9) When it becomes necessary to explode primers in cartridge cases the guns on board shall be used for the purpose and no other method shall be permitted.

Detonators.

G-90. (1) Detonators and their commercial equivalents, blasting caps, are designed for either electric or ignition firing. A typical detonator consists of a copper tube, about 2 inches long and about one-fourth inch in diameter, closed at one end, and partially filled with fulminate of mercury alone or sometimes with an addition of chlorate of potash (never found in standard Navy detonators) TNT, or tetryl.

(2) Electric detonators are fired by an electric current which heats a fine wire bridge and ignites a wisp of guncotton as in an electric primer, while the ignition type requires flame from a safety fuze or the flash from a percussion cap.

(3) The primer-detonator is so called because it has the fundamental parts of both primer and detonator. The primer fires by percussion or electric current which in turn explodes the detonator contained in the assembly. In some cases a pellet of explosive is inserted between the primer cap and the detonator to permit a delay in the detonation of the explosive charge.

Use of detonators.

G-91. (1) Detonators are designed to initiate high-order detonations of high explosives. With most military explosives it is necessary to interpose a specially prepared explosive called a booster (sometimes called a primer) between the detonator and the main charge. Boosters are usually small charges of high explosives (such as a high melting point, refined grade of TNT, tetryl, etc.).

(2) Detonators are sensitive to shock, dangerous to handle, and require special attention as to storage spaces. When shipped or stowed separately, they must be well removed from all high-explosive storages.

(3) Detonators are not suitable for, and should never be used for, ignition purposes such as firing powder charges.

Fuzes.

G-92. (1) *There are many types of fuzes* in service, but they may all be classed as ignition fuzes or detonating fuzes.

(*a*) Ignition fuzes are mechanical devices for igniting the bursting charge of a projectile, pyrotechnic material, etc. They furnish ignition only, and by themselves are insufficient to produce detonations of high explosives.

(*b*) Detonating fuzes are loaded similarly to ignition fuzes, but with the addition of a detonator and frequently also with a small high-explosive booster charge. They are always used in high-explosive bursting charges and are classified as nose, base, tracer, and instantaneous or delay detonating fuzes.

(2) Fuzes, if shipped or stowed separately, must be well removed from high-explosive storages.

(3) Fuzes are dangerous to handle, assemble, and disassemble, and such work shall never be undertaken by unskilled personnel.

(4) Most fuzes contain one or more safety features designed to prevent premature firing. Projectile fuzes often require setting of the fuze or rotation of the projectile to arm the fuze. Some types, however, are armed by setting of the time-train rings or by set-back when fired from the gun, and these types should be especially protected against possible dropping.

Boosters.

G–93. Boosters (or primer charges) are small high-explosive charges, usually of refined explosives, as granular or recrystallized TNT, or tetryl, designed to produce proper detonations of the main high-explosive bursting charges. Booster charges are more easily detonated than the main charges. In mining operations where very large charges are to be fired, booster charges are placed at several points in the charge to renew the explosion or detonation wave, which has a tendency to die out in very large charges. To insure practically instantaneous detonation of all booster charges at one time they are all connected by detonating fuze, Cordeau-detonant.

Tracers.

G–94. (1) In order that projectiles may be followed in flight, tracers are provided. In some cases they are an integral part of the fuze, but their action is entirely independent of the fuze action. Some tracers are ignited directly by the action of the powder gases; others depend on setback or pressure of propellant to fire a primer for igniting the tracer mixture. The later tracers are colored, so that the projectiles from different batteries may be distinguished.

(2) Tracers require no particular care except that they be kept free from dampness and rough handling.

Electric squibs.

G–95. Electric squibs are small shells containing an explosive compound (black powder) that is fired by means of an electric current brought in through wires. They are used for igniting black-powder charges or pyrotechnic material. The only general use in service is for the wing-tip flare on aircraft.

Safety fuze.

G–96. (1) A *safety fuze* or Bickford fuze is a time fuze which consists of a core of black powder inclosed in a tube of braided cotton, flax, tape, pitch, rubber, etc. The rate of burning varies with the kind and age, but is approximately 2 feet per minute.

(2) A safety fuze alone is used for ignition purposes, but requires a detonator or blasting cap for initiating detonations of dynamite or high explosives.

Quick match.

G-97. (1) *Quick match* is an easily ignited fast-burning fuze which is prepared by impregnating cotton wicking with black meal powder.

(2) Quick match is used for the ignition of certain types of pyrotechnic ammunition.

Section 10.—DUMMY DRILL AMMUNITION

Definition.

G-98. (1) Dummy drill ammunition includes any type of ammunition, or any component of any type, assembled without explosives or with inert materials, in imitation of regular ammunition.

(2) Dummy drill ammunition is used for training and testing purposes only; and it, as well as its containers, shall be carefully marked so that it cannot be confused with service ammunition.

Types.

G-99. (1) The following types are issued to the service in accordance with standard allowances: Separate loading, fixed, small arms.

(2) Separate loading target or drill projectiles and dummy powder charges with necessary tanks, are supplied. A supply of dummy primers should be maintained by collecting and saving fired service or drill primers.

(3) Dummy drill cartridges are supplied to fixed ammunition batteries in accordance with standard allowances. Some types of cartridges have drill projectiles fitted with removable steel nose plugs, which may be replaced with dummy time fuzes for conducting fuze-setting drills.

Sources of supply, repairs, replacements.

G-100. (1) The Coast Guard obtains dummy drill ammunition from the Navy Department.

(2) The allowance of drill ammunition will be retained on board as long as the ship is in commission.

(3) Recovering of drill powder charges and repairs to drill cartridges will be made by the ship's force. Such work will not be made the subject of a work request on a navy yard.

(4) Drill ammunition worn out or incapable of further repair by the ship's force will be surveyed and turned in to a naval ammunition depot for repair or salvage of serviceable parts.

(5) Replacements of drill ammunition will be authorized only to complete the allowance as determined by the actual number of unserviceable rounds surveyed.

Part H.—HANDLING AND STORING OF AMMUNITION AND EXPLOSIVES

Section 1.—HANDLING OF AMMUNITION AND EXPLOSIVES

General.

H–1. (1) The general instructions contained herein shall be strictly observed, where applicable, by all Coast Guard units afloat and ashore. It is difficult to cover every possible emergency which may arise and which, if improperly handled, may result seriously. An attempt should be made in carrying out these instructions, and the safety precautions (part A, sec. 4) to grasp the ideas on which they are based so that, under circumstances not known at the time of their promulgation, the proper action may instinctively be taken. More detailed information will be found in the various ordnance publications, or will be furnished by headquarters on request.

(2) The safety precautions are explicit and allow no recourse except positive compliance.

Utmost care to be observed.

H–2. All persons in the service whose duty it may be to supervise or perform work in connection with the inspection, care, preparation, or handling of explosives shall exercise the utmost care that all regulations and instructions are rigidly observed. No relaxation of vigilance with respect to these shall ever be permitted.

Supervision of work.

H–3. (1) Whenever ammunition or explosives are being received, transferred, stored, or prepared, the work should be supervised by an officer who is himself familiar with the rules for care and handling of explosives, and who sees that all persons engaged are properly impressed with the necessity for exercising the greatest care.

(2) Any repeated, familiar work, no matter how dangerous, is likely to become perfunctory and to lead to carelessness; therefore, safety in the handling and in the storage of explosives and ammunition demands constant vigilance and intelligent close supervision to prevent accident.

Embarking and discharging ammunition.

H–4. (1) The paramount consideration being safety and reliability, the receipt, discharge, preparation, and stowing of ammunition and explosives shall never be treated as a competitive evolution as regards speed and methods.

(2) Except in case of an emergency live ammunition and explosives should not be received or discharged from a ship or lighter at night.

(3) A red flag shall be hoisted at the fore on a ship when ammunition and explosives are being received or discharged. A red flag shall be flown in the bows of all boats, lighters, and other craft, and on vehicles while loaded with or transporting ammunition and explosives. (See art. 1662, Coast Guard Regulations.)

(4) Uncovered lights, matches, flame-producing devices, fires, and smoking shall not be permitted in the vicinity of exposed ammunition or explosives, nor in or near magazines containing explosives.

(5) Magazines, lighters, and cars containing ammunition or explosives shall be kept securely closed and locked or guarded, except when required to be open for ventilation, cooling, inspection, or handling of the contents, in which case a responsible person shall be in charge or the magazine or conveyance otherwise adequately guarded.

Shipment by common carrier

H-5. (1) *Ammunition or explosives for shipment by a common carrier,* by either water or rail, shall be marked and labeled in accordance with the Interstate Commerce Commission's Regulations for the Transportation of Explosives and Other Dangerous Articles by Freight and Express. (See Ordnance Pamphlet No. 4, ch. VI, par. 34.)

(2) As far as practicable, explosives and ammunition offered for shipment by a common carrier shall also be packed to comply with the Interstate Commerce Commission Regulations, although these regulations state that—

"Shipments of explosives offered by the War and Navy Departments of the United States Government may be packed, including limitations of weight, as required by their regulations."

(3) Copies of these regulations, with specifications for shipping containers, will be found at all naval stations, ammunition depots, and usually in all freight offices.

(4) The shipment of explosives in any form by MAIL is forbidden.

(5) A permanent record shall be kept of car numbers of common-carrier cars and names of vessels loaded with explosives or ammunition by Coast Guard activities.

Examination of shipments.

H-6. (1) Prior to taking aboard ammunition received in a lighter, boat, truck, or car, or before a conveyance which has been loaded leaves the shipper, an inspection shall be made of the condition and security and the contents checked against the invoiced quantities. Report of shortages, errors, defects, and discrepancies shall be made.

(2) Ships and shore stations receiving ammunition in leaky containers or ammunition showing evidences of rough or improper treatment shall at once fully investigate the circumstances and submit a complete report to headquarters. Powder stored for a considerable period in a leaky container is likely to deteriorate rapidly, with the attendant danger of spontaneous combustion.

Guarding and isolation of explosive shipments.

H-7. (1) Lighters, boats, trucks, and railroad cars containing ammunition or explosives shall not be allowed to remain loaded any longer than necessary. Such conveyances shall be guarded, and, as far as practicable, isolated from private property, in accordance with the station, port, municipal, Interstate Commerce Commission, or other applicable regulations.

(2) After unloading, every means of conveyance shall be swept clean of loose explosives and dangerous refuse destroyed or disposed of in safe and proper manner.

(3) If artificial light is needed for the examination or handling of ammunition or explosives, only carefully placed electric flood lights, approved magazine electric lanterns, or flashlights will be used.

(4) Every precaution shall be taken to prevent ammunition or explosives falling into unauthorized hands or being stolen. Attention is invited to the fact that many State laws make it a felony for an individual to possess ammunition or explosives without authority.

Handling of ammunition and explosives.

H-8. (1) Ammunition and explosive containers shall not be tumbled, dragged, thrown, or dropped on each other or on the floor or deck.

(2) Bale hooks shall never be used on the containers.

(3) When possible to do otherwise, projectiles should not be rolled but should be handled by trucks, tongs, and slings. When such methods are not possible, sufficient dunnage shall be laid down and projectiles shall be rolled by hand and not be allowed to bump each other so as to arm fuzes, damage or loosen windshields, caps, tracers, fuzes, bourrelets, rotating bands, and identification markings.

(4) Cargo nets alone should not be used for transferring empty or filled tanks or other ammunition containers likely to be damaged. In hoisting and lowering ammunition containers with cargo nets, a rigid wooden platform or base should be fitted in the net upon which the containers can be stood, stacked, or piled upon their stowage rings in such a manner as to prevent shifting and bumping into each other or exerting pressure upon their thin sides.

(5) Ammunition, explosive containers, and projectiles shall be hoisted and lowered slowly, and landed gently on a cushion of mats or old mattresses so as to prevent damage, leaks, loosening of wind shields and caps of projectiles, etc. Ample time shall be allowed for proper removal after the landing of a hoist.

(6) Slides may be used for comparatively small or light containers capable of being readily handled by hand, provided:

(*a*) That there is no drop at the end of the slide.

(*b*) That containers are handled slowly enough to permit steadying near the end of the slide and with sufficient care to allow removal without danger of striking other containers, and

(*c*) That thick cushions of mats or old mattresses are placed at the discharge end of the slide.

(7) Heavy containers may be discharged or loaded by means of slides; provided, restraining lines are used to ease them down, and the requirements as to the height of the discharge end and use of cushioning mats specified in the preceding paragraph are met.

(8) Barrels, drums or kegs containing explosives, and ammunition containers shall never be rolled, but shall be carried by hand or transported on trucks.

(9) Care shall be taken not to obliterate or deface markings, labels, and tags on containers of ammunition or explosives. Inspections shall be made to see that the markings are intact.

Proper facilities for handling.

H-9. (1) *Proper facilities* shall be employed for the handling of ammunition.

(2) Where proper and ample means are not available, ships and stations shall improvise or take the necessary steps to obtain all necessary equipment for the safe handling of explosives and ammunition.

(3) Blocks, lines, nets, shackles, slings, and projectile tongs or carriers, hooks, winches, hoists, conveyors, etc., shall be frequently examined and repaired or replaced as necessary to insure freedom from possible failure with the resulting danger of an accident. Brakes and controllers of hoisting motors shall be in efficient operating condition, and hoisting speeds shall be so regulated that there will be no danger of jams or parting of lines. Sufficient personnel shall be stationed for the safe operation of all hoists.

Ammunition damaged when received.

H-10. Any ammunition or explosive container received or found in a damaged condition or damaged or dropped in handling shall be returned to an ammunition depot.

Section 2.—MAGAZINES

General.

H-11. (1) The term "magazine" as here used means any compartment, space, or locker on board ship, or any building or other structure ashore, which is used or intended to be used for the storage of explosives or ammunition of any kind.

(2) The term "magazine area" includes the compartments, spaces, or passages on board ship containing magazine entrances or intended to be used for ammunition handling and passing; and the area on shore surrounding the magazine or group of magazines. The term is used to denote the areas contiguous to or surrounding explosive storages where liberty of action is restricted in the interests of safety.

(3) The provisions herein refer primarily to magazines afloat, but where applicable apply also to magazines ashore.

Magazines for particular purposes.

H-12. Magazines or ammunition stowage spaces afloat are designated with particular reference to the purpose for which used as follows: Powder magazines, fixed ammunition magazines, small-arms magazines, projectile magazines or shell rooms, fuze magazines, detonator lockers, pyrotechnic magazines or lockers, and ready service ammunition boxes, racks, or lockers.

Designed storages shown in plans.

H-13. (1) The specifications for the construction of the ship and the detailed plans which have had the approval of headquarters show the designated stowage of all types of explosives on the ship's allowance. All magazines are marked by appropriate label plates designating the compartments and the types of ammunition to be stowed therein. Changes in stowages should be referred to headquarters for approval. Unsatisfactory storage conditions should be reported to headquarters and instructions requested.

(2) Magazines are originally designed with special attention given to the facility of supply, best protection obtainable, most favorable storage conditions, and the separation of various types of explosives in order to obtain the highest degree of safety possible.

(8) Stowages vary considerably with the type of ship, the space available, and the kinds and the amounts of explosives involved. A stowage that is permissible on one type of ship might readily be prohibited on another type or even another ship of the same type, because of the different quantities of explosives or some other special condition.

Cork insulation

H-14. Cork insulation is provided on the bulkheads (except divisional bulkheads) and decks of magazines in which smokeless powder is stowed. Magazines stowing pyrotechnic ammunition are provided with cork insulation if they are located contiguous to sources of heat that range over 110° F. Such magazines not subject to temperatures of over 110° F. are not insulated.

Ventilation of magazines.

H-15. All magazines are provided with a mechanical supply and natural exhaust system of ventilation. The supply ventilation ducts in magazines and exhaust ventilation outlets are fitted with wire-mesh screens which shall be kept clean and in good condition. Both the supply and the exhaust ducts in the magazines are fitted with standard covers for maintaining watertightness and the ducts shall be closed with these covers during action unless there are imperative reasons for doing otherwise. (See arts. A-46 and F-16.)

Cooling magazines.

H-16. (1) A magazine wherein the temperature is habitually above 80° or ever reaches 100° F. shall not be used for the storage of smokeless powder. Artificial means shall be adopted for reduction of the temperature if it reaches 90° F. (See art. F-16.)

Pure air for magazines.

(2) If the air in a magazine be at all impure or if the odor of ether be noticeably strong in any magazine containing smokeless powder, such magazine shall be ventilated by portable fans or other artificial means.

(3) Normally, a good circulation of air will be maintained in all magazines except when it becomes necessary to stop it to prevent overheating or condensation of moisture.

(4) The following principles should govern in ventilating magazines:

(*a*) Unless the air blown in is cooler than the magazine itself the tendency will be to heat it up and to also increase the dampness if the humidity be high.

(*b*) The air should be dry in order to maintain the magazines dry. The outside air may be considered dry when the wet and dry thermometers differ by 5° or more.

(*c*) It frequently happens in hot climates that magazines can be maintained at a lower average temperature by closing off the supply of air during the heat of the day and running the blowers only at night when cool air can be forced in, thus allowing the magazines to heat up slowly by conduction during the day, rather than rapidly increasing the temperature by forcing in air that is already heated. The exact procedure best suited for a particular magazine or condition can be determined only by trial. Once determined, however, it should be made a matter of record for future guidance.

Stowing in magazines.

H-17. (1) *The stowing of ammunition in magazines* should be given considerable care so as to maintain an air space around

ammunition and explosive containers in order to supply ventilation in all parts of the pile.

(2) Where more than one magazine stowing the same type of ammunition is available, it is desirable that the quantities be divided between them as far as is practicable.

Stowing for supply to the guns.

H–18. (1) Consideration should be given to the stowing of the various types of ammunition so that all guns may be readily supplied.

(2) Where several indexes of powder are furnished for one caliber of gun they should be prorated to the guns and to the magazines and instructions should be posted concerning the order in which they are to be used.

Sprinkling and flooding systems.

H–19. (1) All magazines for powder, fixed ammunition, small-arms ammunition, pyrotechnics, bomb-type ammunition, and projectiles are fitted with both flooding and sprinkling systems if located half or completely below the water line, otherwise with sprinkling system only. Weatherdeck lockers for these materials do not require sprinkling systems.

(2) Suitable instruction plates and descriptions, together with diagrammatic arrangements of the sprinkling and flooding systems, are provided by the shipbuilder.

(3) Test plugs and caps are stowed in locked metal boxes, the keys for which are under the custody of the commanding officer along with the magazine keys.

(4) The greatest care is required in testing sprinkling and flooding systems or else damage to magazine contents is likely to occur from accidental flooding or sprinkling.

(5) Whenever the sprinkling and flooding systems have been overhauled or whenever, in the case of a ship in drydock, the dock is about to be flooded, a careful examination shall be made to see that all valves are tightly closed. Before water is turned on or reaches the systems men shall be stationed in the magazines or by the valves so that leakage can be stopped before any damage is done.

(6) The water admitted at the time of testing should be caught in a bucket or pan, and buckets or drip pans should be placed to catch small quantities of water draining out of the valves or pipes.

(7) An inspection of magazines should be made several hours after testing to see that there is no leakage from the valves.

(8) All officers of the gunnery department and others having duties in connection with magazines should be thoroughly familiar with the magazine sprinkling and flooding systems. The weekly tests of flooding and sprinkling systems furnish excellent opportunities for the instruction and training of personnel.

Magazine fittings.

H–20. (1) *Magazines will be fitted* with racks for magazine sample bottles, temperature boards, brackets for tank wrenches, hooks for thermometers and buckets, shelves, eyebolts, and pad eyes as required for the particular type of ammunition.

(2) Piping shall not be led through magazines except as required for the magazines themselves if any other lead is possible.

(3) Nothing shall be stored in magazines except explosives, their containers, and authorized magazine fittings and equipment. (See art. G–43.)

Work in magazines.

H-21. (1) Before performing any work which may cause either an abnormally high temperature or an intense local heat in or adjacent to a magazine or other compartment used primarily as a magazine, all explosives shall be removed to safe storage until normal conditions have been restored. (See art. A-42.) This provision includes such work as the use of oxyacetylene cutting or welding torch or similar appliance in or near the magazine; steaming out of oil tanks and compartments, etc.

(2) Detonators, boosters, primer detonators, or other firing mechanisms shall not be assembled in or removed from wrecking charges or other types of ammunition in or near magazines. Such operations shall be performed as near as practicable to the launching or dropping device.

Magazines to be kept locked.

H-22. (1) Magazine doors should not be opened unnecessarily.

(2) Unattended magazines shall be kept closed and locked.

(3) All magazines, explosive lockers, flooding and sprinkling system controls, and ready-service boxes, when not in use or required to be open for some other purpose, shall be kept closed and locked.

Ready-service boxes.

H-23. (1) The amount of ammunition stowed in ready-service boxes or racks should be kept to the minimum required by the conditions.

(2) Such ammunition is liable to deteriorate more rapidly than ammunition in the magazine, and for that reason should be specially examined and overhauled before being returned to the regular allowance in the magazine.

(3) Every possible precaution shall be taken to prevent exposure to the weather and to high temperature. When the temperature in a ready-service ammunition box reaches 100° F., the ammunition shall be removed, or steps taken to reduce the temperature below 90° F. as though the ammunition were in a regular magazine.

(4) Maximum and minimum thermometers shall be placed in ready-service boxes when ammunition is stowed in them and temperatures shall be recorded daily the same as for other magazines.

(5) Bright steel portions of projectiles should be kept lightly oiled to prevent rust.

(6) Ready-service boxes heat up rapidly in hot weather and special means should be taken to keep them cool. Tests have shown that by the following method air in boxes may be reduced about 2° below the outside air and about 13° below that which unprotected dry boxes would attain:

(*a*) Protect all boxes from the direct rays of the sun by awnings or screens.

(*b*) Cover boxes with blankets or some similar material which should be kept wet.

(*c*) Maintain a good circulation of air around the boxes and blankets to produce rapid evaporation of the water.

Section 3.—STORAGE OF EXPLOSIVES AND AMMUNITION AFLOAT

Storage according to plans.

H-24. Storages of explosives and ammunition afloat shall be in accordance with the ship plans, which shall comply as far as practicable with the requirements herein. Conditions which make compliance impracticable should be reported to headquarters for instructions. (See part A, sec. 4, Safety Precautions.)

Smokeless powder.

H-25. (1) Smokeless-powder charges for different calibers shall, if practicable, be stored in separate magazines containing a single caliber.

(2) Tanks for major-caliber powder charges shall be so stored that the covers are removable and the charges accessible without disturbing other tanks. The same principle shall govern storage of smaller-caliber charges as far as practicable. Where limited space available in a vessel's magazines renders it necessary, it is authorized to temporarily stow tanks containing powder charges issued for gunnery exercises in such a way as to require the moving of a minimum number of these tanks to remove the covers of, and gain access to, all tanks.

(3) Projectiles and powder charges, except those assembled in cartridges as fixed ammunition, shall not be stored in the same magazine.

(4) Bag-gun smokeless-powder charges shall not be stored in the same magazine with fixed ammunition.

Case ammunition.

H-26. (1) Fixed ammunition shall be stored by itself in magazines in which no other ammunition is stored.

(2) Fixed ammunition of different calibers shall, insofar as practicable, be stored separately and fixed ammunition of the same caliber should be stowed so that different types of projectiles will be separated.

Small-arms ammunition.

H-27. (1) Small-arms ammunition shall be stored in a separate magazine if facilities are available. Where this is impracticable and no other storage is specifically provided for the materials listed, it is permissible to store in the small-arms magazines the following materials:

(*a*) Lock primers, service, and drill.
(*b*) Saluting primers (unassembled).
(*c*) Shotgun shells.
(*d*) Special small-arms blank cartridges.
(*e*) Fixed ammunition.

Black powder.

H-28. (1) If practicable, black powder in bulk shall be stored in a magazine in which no other explosive or ammunition is stored. Where this is impracticable and no other stowage is specifically provided for the materials listed, it is permissible to store in the black-powder magazine with bulk black powder the following ammunition containing black powder:

(*a*) Black-powder blank charges for saluting, signaling, or training.

(*b*) Line-throwing black-powder impulse charges.

(*c*) Spare powder bags with attached black-powder ignition pads (must be stored in tight powder tanks).

(2) Projectiles of any kind, or cartridges in which projectiles are assembled in the cartridge case as fixed ammunition, shall not be stored in a black-powder magazine.

Separate loading projectiles.

H–29. (1) Separate loading projectiles shall be stored preferably in separate magazines in which no other ammunition is stored.

(2) Where no other magazines are specifically provided for the materials listed below it is permissible to stow in separate loading projectile magazines the following materials:

(*a*) Hand grenades and rifle grenades, loaded only with high explosives and plugged, and without firing mechanisms or detonators.

(*b*) All separate loading illuminating projectiles.

(3) All separate loading projectiles shall be stored with grommets in place on the projectiles. Separate loading projectiles shall be stored in the special metal bins, racks, or spaces provided in the magazines for the purpose of securing and protecting the projectiles, bands, fuzes, caps, windshields, etc.

(4) Separate loading projectiles of different types shall be stored in separate magazines as far as practicable.

Bomb-type ammunition.

H–30. (1) *Bomb-type ammunition* shall be stored in separate magazines in which no other ammunition is stored, or in specially designated racks or lockers. As far as practicable, several magazines will be provided for the storage of wrecking charges and other kinds of bomb-type ammunition.

(*a*) The different kinds of bomb-type ammunition should be stored separately.

(*b*) All bomb-type ammunition shall be stowed so as to be accessible for examination and cleaning.

(2) In compartments having nonwatertight decks, drip pans shall be provided where necessary under bomb-type ammunition containing cast TNT in order to prevent exudate from collecting in wells, drains, or bilges of magazine compartments. (See art. A–49 and F–89.)

(3) No fulminate of mercury or other substance used as an initiator of detonation, whether separate or loaded in a detonator, fuze, or firing mechanism, shall be stored in or near or taken into a magazine containing bomb-type ammunition.

(4) No ammunition classed as pyrotechnic ammunition or as chemical ammunition shall be stored in magazines containing bomb-type ammunition.

(5) No dummy, drill or practice bomb-type ammunition, which does not contain explosives, shall be stored in a magazine containing explosive loaded bomb-type ammunition.

Wrecking charges.

H–31. (1) Wrecking charges and TNT demolition blocks shall be stored in magazines provided for bomb-type ammunition, or in specially designated racks or rooms.

(2) Detonators and firing devices shall not be stored in magazines with wrecking charges.

(3) Wrecking mines assembled with detonators and carried in the ready condition shall be stowed and guarded in accordance with instructions prescribed for these materials. Before returning such materials to magazines, detonators must be removed

and all components put in a safe condition, and each component stowed in the proper magazine.

Detonators. H-32. (1) Detonators requiring stowage separate from ammunition in which it is to be assembled shall be stored only in standard type detonator lockers located in approved places, above the weather deck or in the mast in small surface craft. The location approved by headquarters will be shown on the ship's plans.

(2) Not more than 100 detonators shall be stored in one detonator locker and no two detonator lockers shall be less than 10 feet apart. Each individual detonator must be stored in its standard packing or stowage container or in its specially designed stowage block which provides a fixed wall thickness between detonators.

(3) Detonators shall never be stored in close proximity to TNT or other high explosive charges; and shall be kept away from fires, steam piping, electric apparatus, and locations liable to heavy shocks. Electric detonators shall not be located in the same compartment with or near radio apparatus or antenna leads.

Fuzes and boosters. H-33. (1) *Fuzes and boosters*, which are not permitted to be stored assembled in bomb-type ammunition, shall be stored in specially designated magazines which shall not be located adjacent to magazines containing bomb-type ammunition loaded with high explosives.

(2) Detonators which are not assembled and sealed within a fuze as an integral part of it—that is, detonators requiring separate stowage—shall not be stored in a fuze magazine that contains explosive-loaded fuzes, explosive boosters, or explosive of any kind other than detonators.

(3) Auxiliary boosters and boosters which do not have a detonator assembled with them, may be stored with the bomb-type ammunition to which they belong.

(4) Boosters which are an integral part of bomb-type ammunition and which are designed for storage with bomb-type ammunition need not be removed from that ammunition for separate stowage in fuze magazines.

Pyrotechnics. H-34. (1) *Pyrotechnics* and pyrotechnic ammunition (except illuminating projectiles) shall be stored in cool, dry magazines below decks, preferably above the water line; or in special pyrotechnic lockers located on the weather decks.

(2) If the quantity of any type of pyrotechnic ammunittion be large it shall be stored separately from other types of pyrotechnics.

(3) That part of signaling pyrotechnics for boats shall be packed in watertight boxes and may be stowed in boats as required by existing instructions.

(4) Certain materials classed as pyrotechnics, such as illuminating elements of illuminating projectiles and fuzes which are assembled integral with such ammunition, do not require separate storage as pyrotechnics, but are stored with the ammunition with which assembled.

AM. #1.

Art. H-39. Change to "H-39 (1)". In line 2, strike out "empty tanks". In line 3, after "containers" insert "except metal powder tanks". Add new paragraph, as follows: "(2) On the completion of a gunnery exercise, empty powder and cartridge tanks may be allowed to remain in the magazine(s) where they were stowed prior to the practice, until the first opportunity for transferring the tanks to a naval ammunition depot, provided that access to tanks containing powder, either service or target, as required for inspections, is not thereby impeded. Fired cartridge cases shall not be restowed in such tanks, nor shall tanks containing fired cases be restowed in magazines. The authorization contained herein is not to be construed as allowing empty

H–35. (1) *Lock primers,* saluting primers, and other primers for charges prepared on board ship shall be stored in primer magazine or in small-arms magazines. Lock primers.

(2) Care shall be taken in stowing primers to take all precautions against accidents and fires which may result in the loss of primers and thereby put a ship's ammunition out of commission.

H–36. (1) *Blank charges* (black powder) for use with line-throwing projectiles shall be stored in the black-powder magazine. Blank charges.

(2) Blank charges for caliber .30 line-throwing projectiles shall be stored in the small-arms magazine, except when the caliber .30 line-throwing box and equipment is prepared for ready service.

H–37. *Saluting charges* shall be stored in the black-powder magazine. Saluting charges.

H–38. (1) *Blank charges for 1-pounder* subcaliber guns shall be stored in the black-powder magazine. Blank charges for 1-pounder.

(2) Subcaliber blank cartridges or ball cartridges for subcaliber rifles shall be stored in small-arms magazines.

H–39. *Inert ammunition components* which do not contain explosives such as empty cartridge cases, ~~empty tanks~~, boxes, crates, and other empty ammunition containers; fired primers; wads, distance pieces, cork plugs; fuze-hole plugs; rifle grenade firing rods and dischargers; line-throwing projectiles, lines, and spindles; and inert firing devices (nonexplosive), shall not be stored in magazines with explosives. (See art. A–44.) Inert ammunition components.

H–40. *Dummy drill ammunition* shall not be stored in magazines. Dummy drill ammunition.

H–41. Experimental explosives or ammunition containing experimental explosives shall be stored separately from all other explosives. Experimental.

H–42. Privately owned ammunition afloat shall be stored in magazines. (See art. 1503, Coast Guard Regulations.) Privately owned ammunition.

Section 4.—STORAGE ASHORE

H–43. (1) Floating units shall not store ammunition ashore without specific authority from headquarters. General storage ashore.

(2) The same general principles of segregation and separation of different types of explosives and ammunition apply ashore as well as afloat.

(3) The safety requirements for explosive storages ashore, however, differ greatly from those afloat as regards proximity to private property, passenger-carrying railroads, public highways, etc.

(4) Coast Guard shore units shall follow applicable instructions contained in the Bureau of Ordnance Manual in regard to storage ashore.

H–44. (1) (*a*) Rifle and pistol ammunition will be stowed in the ordnance locker or a spare room and this space shall be kept locked at all times, with a yale lock. The door will be marked "EXPLOSIVES" in 4-inch, red letters, on a black background. Storage at stations.

If no spare room or locker is available, a locker will be built in the stock room.

(*b*) Small-arms ammunition will be kept in original containers, and piled according to caliber, class, grade, and lot number. It should be protected against blows which might dent it, against moisture, and against the direct rays of the sun. (Tracer and shot-gun ammunition are subject to quick deterioration if exposed to dampness.) Never grease cartridges or polish them, but wipe off any dirt, moisture, verdigris, or corrosion.

(2) (*a*) Pyrotechnics (Coston signals, flares, rockets, roman candles, etc.) may be kept in the station building on a suitable shelf or in a locker, used exclusively for pyrotechnic stowage. The shelf or locker shall be painted red and labeled "EXPLOSIVES" in 4-inch, black letters.

(*b*) As pyrotechnics are a fire risk, they must not be stowed in proximity to a stove, chimney, or where accidental ignition might be caused by a naked flame; they must also be protected from direct rays of the sun and kept dry. (See art. G–69 (2).)

(*c*) Black powder, in airtight metal containers, will be stored in the boathouse or other detached building, so placed in the building that it may be readily removed in case of fire or fire drill. Containers will be kept locked at all times. Charges for Lyle gun will be made up out of doors.

Part I.—LANDING FORCE—COMPLEMENT AND EQUIPMENT

Section 1.—ORGANIZATION

I–1. Coast Guard vessels shall have regularly organized landing forces as follows:

(1) Vessel with authorized total complement of 75 or more (commissioned officers, warrant officers, and enlisted men):

1 rifle platoon of 3 squads (plus platoon headquarters).
1 machine-gun platoon of 2 machine-gun squads (plus platoon headquarters).

(2) Vessel with authorized total complement of more than 60 and less than 75 (commissioned officers, warrant officers, and enlisted men):

1 rifle platoon of 3 squads (plus platoon headquarters).
1 machine-gun squad.

(3) Vessel with authorized total complement of more than 50 and less than 61 (commissioned officers, warrant officers, and enlisted men):

1 rifle platoon of 3 squads (plus platoon headquarters).

(4) Vessel with authorized total complement of more than 30 and less than 51 (commissioned officers, warrant officers, and enlisted men):

1 rifle platoon of 2 squads (plus platoon headquarters).

(5) Vessel with authorized total complement of more than 13 and less than 31 (commissioned officers, warrant officers, and enlisted men):

1 rifle squad.

I–2. Vessels operating as divisions, squadrons, etc., shall have the landing force further organized into platoons, companies, and battalions, by the commanders of the groups.

I–3. Division commanders shall organize the landing forces of their several units, as prescribed in article I–1 hereof, into companies or battalions as they deem appropriate.

I–4. The organization of the landing force shall be definite and specific; each officer and man shall at all times know whether he is a part of the landing force, and his duty in connection therewith, so that an order to land the force will be all that is necessary to determine its composition.

I–5. For parades and other functions vessels may land such number of officers and men as the circumstances render advisable, in such formations as are deemed appropriate. Machine-gun squads are not landed, ordinarily, under such circumstances.

I–6. Nothing in these instructions pertaining to the landing force shall be so construed as to countermand Coast Guard regulations pertaining to infantry drill.

I–7. The instructions contained in the latest edition of the Landing Force Manuual shall be followed in all matters pertaining to small-arms drill and landing force instructions, except insofar as they may be modified by these instructions.

Rifle squad.

I–8. (1) A rifle squad shall consist of—
1 petty officer.
7 enlisted men.

Rifle platoon.

(2) A rifle platoon shall consist of—
(*a*) Platoon headquarters, consisting of—
1 officer.
1 chief petty officer (armed with pistol).
2 petty officers (armed with pistols).
1 signalman (armed with pistol).
1 runner (armed with rifle).
(*b*) Two or more rifle squads.

Rifle company.

(3) A rifle company shall consist of—
(*a*) Company headquarters, consisting of—
1 company commander.
1 chief petty officer (armed with pistol).
1 signalman (armed with pistol).
2 runners (armed with rifles).
(*b*) Two or more rifle platoons.

Rifle battalion.

(4) A rifle battalion shall consist of—
(*a*) Battalion headquarters, consisting of—
1 battalion commander.
1 battalion adjutant.
2 color bearers (armed with pistols).
2 color guards (armed with rifles).
(*b*) Two or more rifle companies.

Machine-gun squad.

I–9. (1) A machine-gun squad shall consist of—
1 petty officer (armed with pistol).
7 enlisted men (armed with pistols).

Machine-gun platoon.

(2) A machine-gun platoon shall consist of—
(*a*) Platoon headquarters, consisting of—
1 platoon commander.
1 chief petty officer (armed with pistol).
2 petty officers (armed with pistols).
2 signalmen (armed with pistols).
1 runner (armed with pistol).
(*b*) Two or more machine-gun squads.

Section 2.—UNIFORM

I–10. The uniform for the landing force shall be designated by the senior officer present, in accordance with Regulations Governing the Uniforms for Commissioned and Warrant Officers and Enlisted Men of the United States Coast Guard.

Section 3.—EQUIPMENT

I–11. For designating equipment to be used in drills, parades, etc., the terms listed in the following table, if found suitable, shall be used:

Equipment A:
Officers: Undress belt and sword.
Men: Rifle, belt, bayonet, and scabbard for riflemen; pistol, belt, and holster for others.

Equipment B:
Officers: Same as A plus canteen and cup, and watch.
Men: Same as A plus canteen and cup.

Equipment C:
Officers: pistol, belt and holster.
Men: Same as A.

Equipment D:
Officers: Same as C plus canteen and cup, and watch.
Men: Same as B.

Equipment E:
Officers: Same as D plus binoculars, first-aid packet, first-aid pouch, haversack, pack carrier, meat can, mess gear, toilet articles, 1 pair socks, 1 suit underwear, raincoat (if ordered), 1 pair shoes, 1 blanket, rations (if ordered), flash light, and pistol-cleaning gear.
Men: Same as D plus haversack, pack carrier, first-aid packet, first-aid pouch, cartridge belt, raincoat (if ordered), toilet articles, 1 pair shoes, 1 pair socks, 1 undress jumper, 1 pair trousers, 1 suit underwear, 1 blanket, rifle or pistol cleaning gear, meat can, mess gear, and rations (if ordered).

Part J.—GUNNERY AND SMALL ARMS TRAINING

Section 1.—GENERAL INSTRUCTIONS FOR GUNNERY TRAINING

General.

J–1. The details of training officers and men for gunnery exercises are covered in publications furnished the units concerned. (See art. A–7.) Gun captains, pointers, trainers, sight setters, loaders, spotters, range-finder and range-keeper operators, and talkers should be carefully selected, tested, and trained. The gun crew, fire-control group, ship-control group, and other groups should then be carefully drilled, and finally the several groups drilled as a ship's team. Subcaliber practice with rifle and 1-pounder attachments should be held frequently, simulating full-charge practice.

Type of practice held.

J–2. (1) Vessels carrying guns with telescope sights shall hold the short-range practice prescribed in the current edition of Orders for Gunnery Exercises, United States Coast Guard, and such other practices as headquarters may designate.

(2) Vessels carrying guns not equipped with gun-sight telescopes shall hold target practice instruction described in section 2 of part J.

(3) Vessels carrying guns equipped with gun-sight telescopes and also guns not so equipped shall fire as prescribed in paragraph (1) of this article.

Time allotted.

J–3. The usual drills and preliminary training shall be carried out progressively and continuously throughout the gunnery year. During the 3 months preceding scheduled gunnery exercises (including both short-range practice and target practice instruction) each vessel which is required to fire shall complete a minimum of 20 days' intensive training. The division commanders and commanding officers are jointly responsible for proper preparation.

Plans.

J–4. (1) The division commander shall be the officer to schedule practices. In the case of joint exercises, the senior division commander shall be the scheduling officer unless he desires to delegate that authority to a junior division commander.

(2) Plans shall take into account overhaul and repair periods, normal duties, and other pertinent matters, so that only unforeseen conditions will interfere; they shall indicate the place where the practice will be held, arrangements for targets and towing vessel, and the time allotted each unit. Plans shall be *submitted to headquarters*, in quadruplicate, *6 months in advance* of the proposed firings. After approval by headquarters, copies of the plans shall be furnished to all units concerned by the scheduling officer. If a vessel cannot hold the practice at the time scheduled, every effort must be made to fire prior to the end of the gunnery year.

J–5. If necessary, each division commander shall have a target raft constructed, fully rigged, and available for use of vessels under his command. Target raft.

J–6. The gunnery year is from July 1 to June 30. Gunnery year.

J–7. Each vessel which is required to hold short-range practice shall have an observing party ready for officially observing practices of other ships, as specified in current Orders for Gunnery Exercises. Observing party.

J–8. Before commencing any practice, the report of readiness specified in current Orders for Gunnery Exercises shall be made. Report of readiness.

J–9. Rehearsal runs shall be made in accordance with instructions contained in current Orders for Gunnery Exercises. Rehearsal runs.

J–10. Reports of target-practice instruction shall be submitted as specified herein. Reports of other practices shall be submitted as specified in current Orders for Gunnery Exercises, on forms sent to the vessels concerned by headquarters. With the exception of sheet 22, the original only of each form shall be submitted. The original and one copy of sheet 22 shall be submitted to headquarters in order that one copy may be filed with the General Accounting Office. Reports.

J–11. (1) Ammunition for all units included in the plans will be ordered by headquarters. Ammunition.

(2) Allowances for target-practice instruction are specified in section 2 of part J. Allowances for other practices will be as specified in current Orders for Gunnery Exercises, plus 10 percent, or as specified in letters from headquarters.

(3) *Return remnants promptly.* (See arts. K–10 and K–11.)

J–12. (1) Additional compensation for gun captains, gun pointers, and range-finder operators is specified in section 4 of part J. Awards.

(2) Gunnery prizes are specified in section 5 of part J.

(3) The gunnery "E" and trophies are specified in section 7, part J.

Section 2.—TARGET PRACTICE INSTRUCTION

J–13. Target practice instruction shall be carried out under favorable weather conditions and may be held in protected waters. Weather; place.

J–14. The target screen shall be made of canvas 10 by 10 feet, painted war color, with a 2-foot square in the center, painted white. It shall be mounted on a raft, with the bottom of the screen about 1 foot above the surface of the water. The unit concerned shall provide the target. The regular 15- by 15-foot screen may be used by painting a square 10 by 10 feet on the screen and considering hits within this area. Target screen.

J–15. The target may be anchored or towed, but, in any case, the difference between the speed of the target and speed of the firing vessel shall be 5 knots. Target.

J–16. The vessel shall maneuver from her station so as to approach the target on a line parallel to the base of the target, which course, when continued, will bring her at a distance from the target when abeam as follows: Range.

(*a*) Vessels carrying 1-pounders, 450 yards.

(b) Vessels carrying 6-pounders or 3-inch .23 caliber guns, 750 yards.

Reference vessel.

J-17. Reference vessels may be used to assist in keeping vessels on this line. It is also permissible for vessels not equipped with range finders to mark the range by suitable buoys.

Speed.

J-18. Regulate the speed so that when the target bears 10° forward of the beam if firing with 3-inch .23 caliber or 6-pounder, 27½° if firing with 1-pounder, the firing vessel will be making a speed of 5 knots more than the towing vessel. This speed shall be maintained throughout the run.

Firing orders.

J-19. When the target bears 10° forward of the beam of the firing vessel if firing 3-inch .23 caliber or 6-pounder, 27½° if firing 1-pounder, being on a course parallel to that of the towing vessel or anchored target, hoist the explosive flag at the yardarm nearest the target, blow one blast on the whistle, and commence firing. The blast of the whistle shall be the preparatory signal, and the order "Commence firing" shall be given within 20 seconds thereafter. Should the order "Commence firing" not be given, the observer shall count time from the twentieth second. The gun shall not be loaded until the command "Commence firing" is given.

Time allowance.

J-20. One minute and thirty seconds is the authorized time for a string. Cease firing when the last round is fired, if within the time allowed, or 1 minute and 30 seconds after the order "Commence firing." In the former case the order "Cease firing" shall be given by the gun captain. In the latter case the order "Cease firing" shall be given by the chief observer.

Duties between runs.

J-21. When the firing has ceased at the end of the run, haul down the explosive flag, inspect and repair the target, count the hits, and then commence the next run.

Ammunition.

J-22. (1) The ammunition allowance for target-practice instruction is:

(a) 3-inch .23 caliber and 6-pounder:

8 rounds per gun, plus 4 rounds for each vessel for an officers' string. No allowance will be furnished to replace defective cartridges.

(b) 1-pounder:

16 rounds per gun. No officers' string or allowance to replace defective cartridges will be furnished. Due to the small crew and frequent changes in personnel, patrol boats less than 100-feet in length may hold two practices a year, but at least 3 months shall elapse between the two practices. For purposes of competition, the score made in the last practice shall govern.

(2) Four rounds shall constitute one string for a 3-inch .23 caliber or 6-pounder gun, eight rounds for a 1-pounder gun. Not more than one string shall be fired during a run.

Towing vessel.

J-23. The towing vessel, if used, shall—

(a) Fly the explosive flag at the yardarm nearest the firing vessel when the target is in all respects ready for firing.

(b) Half-mast the explosive flag at the yardarm nearest the firing vessel while the screens are being shifted or the target is being repaired and while target is not ready for firing.

(c) Sound several short blasts on the whistle and half-mast the explosive flag if for any reason it becomes necesasry to stop the firing during the run.

(d) Furnish repair party unless otherwise directed by proper authority.

(e) Tow the target at a speed or not more than 5 knots, with a distance of at least 200 yards between the bow of the raft and the towing vessel.

Observers.

J-24. If practicable, two observers from other vessels shall officially observe each practice. The senior shall be the chief observer. The observers shall—

(a) Verify all hits made. In order to record a hit, the screen must show evidence that the projectile passed through it or cut the edge. If the projectile touches the raft or any of the rigging, it will not be counted but should be reported under "Remarks."

(b) Collect and enter all data on the report and sign the report. Under "Remarks," enter the following information:

1. How navigational distance was measured.
2. Whether range was buoyed.
3. Average gun range used.
4. Whether all safety orders were carried out.
5. Casualties that occurred and the causes.
6. Any violation of rules prescribed for the practice.

(c) Submit one copy of the report to headquarters within 5 days after completion of the practice, through the commanding officer of the firing vessel.

Penalties.

J-25. Penalties for infractions of rules or for other causes will be imposed by headquarters. A gun firing after the order "Cease firing" shall be penalized one hit for each 10 seconds or fraction thereof over the authorized time allowance.

Scores.

J-26. Scores shall be computed as follows:

(a) The time for each set of gun pointers will be taken separately in accordance with article J-20.

(b) The hits per gun per minute for each set of pointers will be computed separately and shall be found by dividing the number of hits made by the official time of the string.

(c) The score for each set of pointers shall be found by multiplying the hits per gun per minute by the percentage of hits made by that set of pointers divided by 100.

(d) The score of the gun is the average of the scores of the pointers firing strings from that gun.

(e) The score of the vessel is the average of the scores of the guns of that vessel.

(f) If more than one practice is held within a gunnery year, the last one fired shall govern for purposes of competition.

Trophies.

J-27. Trophies for excellence in target-practice instruction will be awarded as specified in section 7 hereof.

Section 3.—SMALL-ARMS TARGET PRACTICE AND INSTRUCTION

Plans made in advance.

J-28. Plans for small-arms target practice shall be made 3 months in advance of firing and shall be submitted in quadrupli-

cate. Copies shall be furnished to all interested units. The plans shall include Coast Guard stations and shall show the dates when each unit will fire, the place where the practice is to be held, and all arrangements such as leasing ranges, ordering ammunition, etc. They shall be so drawn as to take into account overhaul and repair periods of units, normal duties, and other pertinent matters, so that only unforeseen conditions will interfere. (See art. 730, Coast Guard Regulations.)

Responsibility.

J-29. Division commanders are responsible for making the plans. They shall see that the preliminary instruction and practices are carried out and that reports are submitted. Commanding officers of units acting independently shall assume this responsibility.

Small-arms year.

J-30. The small-arms year is from July 1 to June 30.

Rules to be followed.

J-31. Small-arms target practice shall be held in compliance with Small Arms Firing Regulations and Instructions, United States Navy, with such modifications as are outlined in Ordnance Instructions and letters from headquarters. In case of conflict, Coast Guard instructions shall govern. The instructions and regulations shall be closely studied by all officers and shall be used as a text for the instruction of enlisted men. A thorough knowledge of the firing regulations is essential to the proper conduct of small-arms target practice. Since firing is on a competitive basis, any suspicion of unfairness would defeat the purpose for which the practice is designed.

Units required to fire.

J-32. All units in a fully operative status shall carry out the practices and instructions prescribed, unless excused by proper authority. Bases and districts shall include in their firing complements officers and men attached to patrol boats less than 100 feet in length and picket boats; 100-foot or larger patrol boats shall conduct their practices as separate units.

Personnel required to fire.

J-33. (1) All officers below the rank of commander, except officers of the Public Health Service assigned to duty with the Coast Guard, shall be given training in the pistol courses.

(2) All officers of the landing force below the rank of lieutenant commander shall be given training in the rifle and pistol courses.

(3) All enlisted men of the landing force (or 30 percent of the allowed complement if no landing force is prescribed) shall be given training in the rifle and pistol courses except that Hospital Corps men need not be so trained.

(4) All enlisted men of the landing force armed with automatic rifles, machine guns, or submachine guns shall be given training in rifle, pistol, machine gun, and submachine gun.

(5) All officers and men, such as those on picket boats and those attached to districts, who, by the nature of their duties may be called upon to use the rifle or pistol in law-enforcement work, shall be given training in these arms irrespective of whether they are members of a landing force or the number required to fire thereby exceeds 30 percent of the authorized complement of the unit.

(6) Officers and men not required to fire may elect to do so and shall be eligible for credits, insignia, and extra compensation.

Responsibility for training, etc.

J-34. The officer responsible for small-arms target practice shall have charge of the preliminary instruction, the practice, and the records connected therewith. He shall be assisted in these duties by other officers when the commanding officer so directs. The division officer shall always accompany his division when it is engaged in small-arms target practice.

Preliminary instruction.

J-35. Men shall not be permitted to fire on the range until they have been thoroughly drilled in all preliminary instructions, including sighting exercises, position exercises, rapid-fire exercises, sight-setting exercises, and safety precautions; where a gallery range is available they shall fire the gallery course before firing the full course.

Empty cases, etc.

J-36. After holding small-arms practice the officer in charge of a rifle range (or, in case no officer has been specifically detailed in charge of the range, the officer in charge of the firing party) shall take steps to have all empty cartridge cases, clips, bandoleers, and packing boxes carefully collected. Empty cartridge packing boxes may be used for boxing the empty cartridge cases, clips, and bandoleers. (See arts. G-63 and G-64.)

Publication of scores.

J-37. Each division commander shall publish to his division the relative standing of the units and the best individual scores made at each target practice for the units of his division, including Coast Guard stations. Information relative to the best general and individual scores made at each practice will be published by headquarters to the service, in circular letters. Copies of these letters will be filed with the records of the persons making the highest five individual scores.

Reports.

J-38. Every unit required to hold small-arms target practice shall prepare and submit an annual report. In the case of bases, the report shall include the base force and all boats attached which are less than 100 feet in length. In the case of districts, the reports shall include stations and all boats attached which are less than 100 feet in length, in one consolidated report prepared and submitted by the district commander. An air station or detachment shall submit a consolidated report for all men attached. The original only shall be submitted to headquarters not later than 10 days after completion of the practice. If no practice was held that fact must be reported not later than July 10. The attention of all responsible officers is particularly invited to United States Navy Small Arms Firing Regulations and Instructions for rules regarding the computation of merit and submission of reports.

Competition.

J-39. Commanding officers are urged to encourage competition in small-arms target practice of all kinds, both individual and team. (See sec. 6, part J.)

Medals, etc.

J-40. Medals and badges will be awarded for qualifications in Navy qualification courses as hereinafter described. (See sec. 7, part J.)

Extra compensation.

J-41. Enlisted men who qualify under these rules will be paid such additional compensation for qualification in rifle and pistol firing as may be authorized by law and regulations. (See sec. 4, part J.)

Small-arms trophies.

J–42. Trophies will be awarded for excellence in small-arms target practice as described in section 7, part J.

Section 4.—QUALIFICATION PAY

J–43. The following Executive order is quoted for the information of the Coast Guard:

EXECUTIVE ORDER

Pursuant to the authority contained in section 18 of the act of Congress to readjust the pay and allowances of the commissioned and enlisted personnel of the Army, Navy, Marine Corps, Coast Guard, Coast and Geodetic Survey, and Public Health Service, approved June 10, 1922, enlisted men of the Coast Guard, after having established their special qualifications in the use of the arm or arms which they may be required to use, according to standards of efficiency that may be prescribed from time to time by the Secretary of the Treasury, and who are so stationed by their commanding officers that they may be required to use such arms, shall receive additional compensation, first, second, third, fourth, or fifth class, for such periods of time as may be prescribed by the Secretary of the Treasury, as follows:

	Per month
First class	$5.00
Second class	4.00
Third class	3.00
Fourth class	2.00
Fifth class	1.00

WARREN G. HARDING.

THE WHITE HOUSE, *August 17, 1922.*

Class designations.

J–44. (1) Enlisted men of the Coast Guard, who have established their special qualifications in the use of the arm or arms which they may be required to use according to standards prescribed by the Secretary of the Treasury and who are so stationed by their commanding officers that they may be required to use such arm or arms, shall receive the following additional monthly compensation:

(*a*) First class	$5
Gun pointers, first class.	
Gun range-finder operators.	
Gun captains, first class.	
(*b*) Second class	4
Gun pointers, second class.	
(*c*) Third class	3
Gun captains, second class (nonrated men).	
Expert riflemen.	
Expert pistol shot, except that no man may draw extra compensation for both a rifle and a pistol qualification.	
(*d*) Fourth class	2
Gun captains, second class (rated men).	
(*d*) Fifth class	1
Rifle sharpshooters.	

(2) The articles immediately following outline the general qualifications required of enlisted men for this extra compensation, referring to current Orders for Gunnery Exercises, and Small-Arms Firing Regulations and Instructions, for certain details may vary from time to time.

(3) Should instructions be changed so as to alter the period of time during which any of these qualifications remain in effect, such a change will affect only men who qualified subsequent to the effective date thereof. Men retain their qualifications for the period prescribed and in effect at the time they established their qualifications, except as mentioned in paragraph (4).

(4) It may happen that an enlisted man who has qualified under one set of requirements is not eligible to reestablish his qualifications under later instructions from competent authority. In such cases the commanding officer shall, as of a certain date, relieve the man from his station at such arm or arms, whereupon his extra compensation shall cease.

(5) An enlisted man reenlisting in the Coast Guard is entitled to extra compensation for qualifications under the qualification he was holding at date of discharge.

Gun pointers.

J-45. (1) Enlisted men will be qualified as gun pointers first and second class, in accordance with current Orders for Gunnery Exercises.

(2) (*a*) Each enlisted man who qualifies as a gun pointer, first class or second class, shall hold his qualification for a period of 2 years from the first day of the month following completion of the practice, provided he is so stationed by his commanding officer that he may be required to operate a gun of the type at which qualified and no opportunity is afforded to again qualify during this period. All Coast Guard guns are considered to be of one type, viz, broadside.

(*b*) If, within the 2 years, he is again given an opportunity to qualify and fails to requalify, his qualification ceases as of the last day of the month in which he fails to requalify.

(*c*) If, however, while failing to requalify as a gun pointer, first class, he qualifies as a gun pointer, second class, his qualification as gun pointer, first class, ceases as of the last day of the month in which he fails to requalify as a gun pointer, first class, and he holds his qualification as gun pointer, second class, for 2 years from the first day of the month following completion of firing unless again given an opportunity to qualify and failing during that period.

(*d*) If, within 2 years, while holding the qualification of a gun pointer, second class, he is again given an opportunity to qualify and qualifies as a gun pointer, first class, instead of a gun pointer, second class, his qualification as gun pointer, second class, ceases as of the last day of the month in which he qualifies as a gun pointer, first class, and he holds his qualification as gun pointer, first class, for 2 years from the first day of the month following completion of firing unless again given an opportunity to qualify and failing during that period.

(*e*) If, within the 2 years, he is again given an opportunity to qualify and requalifies as either gun pointer, first class, or

gun pointer, second class; his qualification remains continuously in effect during the month in which he requalifies and for a period of 2 years from the first day of the following month unless again given an opportunity to qualify and failing during that period.

(3) Not more than two sets of pointers assigned to a gun shall be entitled to extra compensation as gun pointers.

Gun range-finder operators.

J-46. (1) An enlisted man will be qualified as a gun range-finder operator only after having been examined and recommended by a board of three officers appointed by his commanding officer to determine his fitness for the position. A candidate will be designated by headquarters upon recommendation of his commanding officer.

(2) In general, the qualifications will include—

(a) Familiarity with the general construction of range finders.
(b) Thorough knowledge of care and upkeep of range finders.
(c) Knowledge of the methods of keeping range finders in adjustment.
(d) Ability to calibrate.
(e) Ability to determine index correction.
(f) Ability to keep range-finder log.
(g) Passing an acuity test.
(h) Passing a practical examination and drill at the range finder in adjustments and rangekeeping.

(3) The board shall inspect the range finder at which the man is stationed and examine it as to adjustment, errors, care, and upkeep, and assign a mark thereon that is to be combined with the marks on other subjects of the examination. A report shall be submitted to headquarters showing whether the candidate was found qualified or unqualified.

(4) The qualification of a gun range-finder operator will be continued for a period of 1 year from the first day of the month following the date of examination, provided he is so stationed by his commanding officer that he may be required to operate a gun range finder of the type at which qualified. Not more than two operators for each 2½-meter range finder, or larger, that would be required for rangekeeping in battle may qualify for extra compensation.

Gun captain, examined by board.

J-47. An enlisted man is qualified as gun captain only after having been examined and recommended by a board of three officers appointed by his commanding officer to determine his fitness for the position. Details as acting gun captain may be made in order that desirable men may have actual experience prior to an examination, but this detail without examination does not entitle such men to extra compensation.

Gun captain, scope of examination.

J-48. Gun captains must have the following qualifications:

(*a*) Ability to station and drill the gun crew.

(*b*) Knowledge of the safety precautions to be observed in the service of the gun and the method of procedure in case of a failure to fire.

(c) Ability to bore sight the gun and adjust the telescope.

(d) Familiarity with the telescope sights of the gun, including their care, the precautions to be observed in their use, and their most probable derangements.

(e) Ability to shift and adjust the gas-check pad and breech mechanism.

(f) Practical understanding of the general terms used in ordnance and gunnery.

(g) Thorough familiarity with the mount and ability to adjust such parts as require adjusting from time to time.

(h) Knowledge of proper direction of changes to be made in the range and lateral compensation in order to make hits again after shots have begun to fall off the target.

(i) Knowledge of the firing circuit, with ability to detect and remedy local defects.

(j) Knowledge of method of receiving ranges and battle orders.

(k) Ability to rig subcaliber apparatus and superintend training.

(l) General knowledge of fire-control instruments at his gun, including care, operation, and alinement of instruments.

Report of qualification.

J-49. A report signed by all the members of the examining board shall be made to the commanding officer of the vessel to which the candidate is attached. This report will include individual marks for each subject and a certificate that the candidate is considered qualified for the duties of gun captain. Similar report should be made of those who are found not qualified. The report of the board shall be filed in the man's service record and a copy shall be forwarded to headquarters.

Form of report.

J-50. The required form for the report of examination of a man for gun captain follows. No other report is required.

REPORT OF EXAMINATION FOR GUN CAPTAIN

Candidate's name _____

Attached to U. S. Coast Guard _____

Date of examination _____

(Scale of marks: 4, excellent; 3.5, very good; 2.5, passing; 1.5, fair; 1, indifferent; 0, bad.)

Subject	Mark	Subject	Mark	Subject	Mark	Subject	Mark
(a)		(d)		(g)		(j)	
(b)		(e)		(h)		(k)	
(c)		(f)		(i)		(l)	

We certify that we deem the candidate { not to / to } be qualified for the duties of a gun captain, _____ class.

_____

_____

_____

(Signature and rank of each member of board)

Gun captains, second class.

J–51. Gun captains, second class, are those who are qualified in accordance with the foregoing paragraphs, and detailed as gun captain of an individual gun of a caliber of not less than 3-inch. Gun captains, second class, are entitled to different rates of extra compensation, depending on whether they are nonrated men or petty officers. (See art. J–44.)

Gun captains, first class.

J–52. Gun captains, first class, are those who are qualified in accordance with the foregoing paragraphs and whose guns attain a score at short-range practice equal to 80 percent of the standard score prescribed in current Orders for Gunnery Exercises.

Period of qualification, second class.

J–53. (1) The qualification of a gun captain, second class, is permanent, provided he is stationed by his commanding officer as gun captain of a gun of the type at which qualified. All Coast Guard guns are considered to be of one type, viz, broadside.

Period of qualification, first class.

(2) The qualification of a gun captain, first class, will be continued for a period of 2 years from the first day of the month following the practice at which qualified under the same conditions as are prescribed for gun pointers.

Effective dates.

J–54. The dates on which qualification pay of gun captains, first class, and gun captains, second class, becomes effective shall be the same as for gun pointers, first class, and gun pointers, second class.

Number who may qualify.

J–55. If the arrangement of a ship's battery is such as to render necessary the detail of one gun captain to a group of guns, a regular gun captain may be detailed as gun captain of the group, permitting an acting gun captain to relieve him at his own gun. In no case will the number of men on board, entitled to extra compensation as gun captain, exceed the number of guns of 3-inch caliber and above on that vessel.

Small-arms qualifications.

J–56. (1) Enlisted men shall be qualified as expert riflemen, rifle sharpshooters, and expert pistol shots in accordance with the instructions contained in current "Small Arms Firing Regulations and Instructions."

(2) (*a*) Each enlisted man who qualifies as a sharpshooter, expert rifleman, or pistol expert shall hold his qualification for 1 year from the first day of the month following completion of firing.

(*b*) If, within the year, he again fires for qualification and fails to requalify, his qualification ceases as of the last day of the month in which he fails to requalify.

(*c*) If, however, while failing to requalify as expert rifleman, he qualifies as a sharpshooter, his qualification as expert rifleman ceases as of the last day of the month in which he fails to requalify as expert rifleman and he holds his qualification as sharpshooter for 1 year from the first day of the month following completion of firing unless again firing for qualification and failing during that year.

(*d*) If, within the year, while holding the qualification of a sharpshooter, he again fires for qualification and qualifies as an expert rifleman instead of a sharpshooter, his qualification as sharpshooter ceases as of the last day of the month in which he qualifies as an expert rifleman and he holds his qualification as

expert rifleman for 1 year from the first day of the month following completion of firing unless again firing for qualification and failing during that year.

(e) If, within the year, he again fires for qualification and requalifies as either expert rifleman or sharpshooter, his qualification remains continuously in effect during the month in which he requalifies and for a period of 1 year from the first day of the following month unless again firing for qualification and failing during that year.

(3) An enlisted man of the Coast Guard is considered as being so stationed that he may be required to use small arms. Eligibility.

J-57. When an enlisted man qualifies in the use of two arms (a small arm and a broadside gun), he is considered as entitled to extra compensation for both, but his total compensation must not exceed $5. However, no man shall receive extra compensation for both a rifle and a pistol qualification. More than one qualification.

J-58. For the additional monthly compensation authorized by article J-44 credit will be made on the pay roll which shall show what qualification the man holds. Credit on pay roll.

Section 5.—GUNNERY PRIZES

J-59. (1) Short-range practice prizes will be awarded to gun crews which attain the scores specified in current Orders for Gunnery Exercises. These prizes should be paid on order of the commanding officer of a ship promptly after the receipt of the completed report of scores from the chief observer. Gunnery prizes.

(2) No prize shall be paid as the result of a modified practice unless and until specifically authorized by the commandant.

(3) Prizes may be awarded to ship-control and fire-control parties for particularly creditable performances on certain practices. Units to receive prizes are designated by the commandant after receipt of all reports of scores of a practice, except for short-range practice.

(4) No individual shall receive more than one gunnery prize during a gunnery year. This prize shall be the highest to which he is entitled. Prizes for enlisted men of the Coast Guard shall be charged to the appropriation "Pay and allowances, Coast Guard."

(5) The prizes, in cash, shall be paid in the following amounts:

First prize	$15
Second prize	10

J-60. Upon receipt of the report of scores from the chief observer, the commanding officer is authorized to pay prizes, provided the practice has been conducted strictly in accordance with current Orders for Gunnery Exercises. Otherwise prize money shall not be paid unless, and until, authorized by the commandant. Payment of prizes.

J-61. Enlisted members of prize broadside crews to a number not exceeding the standard number specified in current Orders for Gunnery Exercises, who actually served during the firing in a capacity that contributed to the score of the gun, and Persons eligible.

who are designated by the commanding officer, shall be entitled to prize money. In addition, one gunner's mate and one electrician's mate may be paid prize money if they actually served with the prize gun crew.

Names reported.

J-62. The names of men receiving prize money will be reported upon sheet No. 22, together with the additional data required on that sheet.

Section 6.—SMALL-ARMS COMPETITION

Object of competitions.

J-63. (1) The object of small-arms competitions is to furnish commanding officers a means of stimulating interest in rifle and pistol shooting. The primary requisite of all competitions is the element of fairness, and to this end it is essential that organizations of approximately equal strength compete. In arranging the competitions commanding officers should be guided by this principle of approximate strength of the organizations competing.

Rules for competition.

(2) Competition rules shall be as prescribed in the current edition of Small Arms Firing Regulations, United States Navy.

Authorized competitions.

J-64. The limitation of funds available for the payment of prizes has made it necessary to limit the number of competitions for which prizes are authorized. This should not, however, be considered as a limitation on the number, or kind, of competitions which may be held. On the contrary, opportunities to hold competitions should be sought as competition is of itself a great incentive for the men to become proficient in the use of the service small arms. Prize money will be paid only to those teams which make an average score per competitor equivalent to the qualifying score for the course fired. No prize money is paid to officers.

Eligibility.

J-65. Any unit having a total authorized complement of more than 40 men is eligible to compete as a "ship" under these rules. The complements of aircraft, patrol boats, picket boats, and other small craft shall be included in the complement of the shore establishment to which they are attached. The complements of stations shall be included with the district complement.

Intership competition.

J-66. (1) The members of any one team in these competitions must be from the same ship. There is no limit on the number of intership competitions which may be held. Each ship is, however, authorized to enter one team in only two intership rifle competitions, two intership pistol competitions, and two intership officers' pistol competitions for prizes and credits, in any one small-arms year. In the competitions for which prize money is paid, the number of firing members on each rifle team shall be eight and the number of firing members on each pistol team shall be four. The course for intership competitions in which prize money is paid shall be the sharpshooter's course. Not less than six of the firing members of each rifle team which competes for prizes or credits in an intership competition shall be enlisted men. All of the firing members of each pistol team which competes for prizes or credits in an intership competition shall be enlisted men. When less than four teams compete the value of the prize for each man on the team making the highest aggregate score is $5 in the rifle competitions and $3 in the pistol competitions. When the number of teams competing is from four to seven the value

of the prize to each man on the team making the highest aggregate score is $10 for the rifle competitions and $5 for the pistol competitions. When eight or more teams compete the prize to each man on the team making the highest aggregate score is $15 for the rifle competitions and $10 for the pistol competitions. When eight or more teams compete prizes will be awarded to the team making the second highest aggregate score as follows: (*a*) Rifle competitions, $10 per man; (*b*) pistol competitions, $5 per man. All of the firing members of each officers' pistol team shall be officers. No credits shall be awarded for the winning of an intership officers' pistol match unless the average score of the winning team is equal to or greater than the qualifying score for sharpshooter.

Extra service competition.

(2) Other competitions under the auspices of the different rifle associations of the country are open to teams and individuals from the Coast Guard under various conditions. The national matches held under the auspices of the National Board for the Promotion of Rifle Practice, the different matches held under the National Rifle Association and the National Revolver Association, the international matches held under the auspices of the International Shooting Union, the different competitions held by numerous State rifle associations are replete with interesting events. Information and circulars with regard to these will be furnished upon application to the secretary of the National Rifle Association of America, Washington, D. C. Information with regard to the different State matches may be had by application direct to the adjutant general of the State concerned by addressing him at the State capital. Officers and men are eligible for membership in the national associations and will find much of interest in the official publications of the associations. Teams and individuals represent the Coast Guard yearly in the national competitions. Commanding officers who have likely material for these teams are urged to communicate the circumstances to headquarters.

Prizes, how paid.

J-67. (1) Prizes to enlisted men for small arms competitions are paid from the appropriation "Pay and allowances, Coast Guard." These prizes should be paid without delay. A letter from the commanding officer to the disbursing officer directing the payment and listing the men's names, ratings, kind of prizes, and the value thereof is all that is required. A copy of this letter shall be forwarded to headquarters.

Report.

(2) Immediately upon completion of a competition in which prize money is awarded a report by mail shall be made to headquarters by the chief range officer, stating the number of teams entered, the units represented, the order of standing, the course or courses fired, the names of the men entitled to prize money, and the amount of each prize. The individual scores of all shooting members shall be reported on sheet No. 3.

Section 7.—TROPHIES, ETC.

Cutter trophy, gunnery.

J-68. The gunnery trophy for cutters will be awarded annually to the cutter attaining the highest merit in short-range practice for the year. The trophy will be held during the competition year following that for which it was awarded. A bronze plaque, suit-

ably inscribed to show the winning of the trophy, will also be given to the vessel for permanent mounting.

Trophies, target practice instruction.

J–69. Headquarters may award trophies to designated classes for excellence in target practice instruction, conducted in accordance with current rules. The award will be made annually to the vessel in each class attaining the highest merit, provided that the award may be withheld if, in the opinion of headquarters, the merit is not sufficiently high to justify the award. Trophies will be suitably engraved and will be held during the competition year following that for which awarded. A bronze plaque will be awarded annually to the vessel in each class attaining the highest merit, for permanent mounting.

Gunnery "E."

J–70. (1) The gunnery "E" is awarded to guns which attain merits indicated in current Orders for Gunnery Exercises. Each member of the gun crews or parties involved in the performances, to a number specified in current Orders for Gunnery Instructions for short-range practice, or by instructions from headquarters for other practices, is entitled to wear a small block letter "E" on the sleeve of his coat or jumper in the position prescribed by uniform regulations.

Dimensions.

(2) All gunnery "E's" awarded to any part of the armament will be white rectangular block letters. The dimensions and locations are specified in Instructions for Painting United States Coast Guard Vessels, Boats, and Stations, issued by headquarters.

Duration.

(3) The gunnery "E" awarded to the whole or any part of the armament of a ship as the result of a practice shall be displayed as provided above until the ship completes the same form of practice the folowing gunnery year or if the ship fails to hold the practice, for a period of 1 year from the date of award. The gunnery "E" awarded to members of the crew of any part of the armament or control party shall be worn during periods corresponding to the above. In cases of men transferred from the ship on which the award was made, the gunnery "E" shall be worn for a period of 1 year from the date of the award.

J–71. Headquarters may award trophies to designated classes for general excellence in small-arms target practice. Trophies will be awarded in each class to the unit attaining the highest final figure of merit provided that the award may be withheld if, in the opinion of headquarters, the final figure of merit is not sufficiently high to justify the award. Trophies will be suitably engraved and will be held during the competition year following that for which awarded. A bronze plaque will be awarded annually in each class for permanent mounting.

Loving cup, bases.

J–72. A silver loving cup, which Base 20 presented for competition, will be awarded annually to the base attaining the highest merit in small-arms target practice.

Insignia.

J–73. (1) Officers, cadets, and enlisted men who qualify for the first time as expert riflemen or except pistol shots will be awarded appropriate medals by the commandant. Requests for these medals acompanied by small-arms sheet No. 2 should be submitted by the commanding officer after each period of firing.

(2) Enlisted men drawing extra compensation as expert riflemen, rifle sharpshooters, and expert pistol shots will wear the

appropriate distinguishing mark in accordance with the provisions of Regulations Governing the Uniforms for Commissioned and Warrant Officers and Enlisted Men of the United States Coast Guard.

Insignia, distinguished marksman.

J-74. (1) A gold badge is awarded to such officers, cadets, or enlisted men of the Coast Guard as are designated as distinguished marksman by the commandant. The designation as distinguished marksman will be made upon receipt of an individual written application from those officers or men, in the active service of the Coast Guard, who have qualifications herein specified. The qualifications for a distinguished marksman are—

(*a*) The necessary credits must have been obtained while the applicant was on the active list of the Coast Guard and the applicant must have qualified as an expert rifleman during the small-arms year in which the application is submitted.

(*b*) The applicant must have won three medals in either or both of the national rifle matches, namely, the national rifle team match and the national individual rifle match.

(2) These rules shall not be interpreted so as to deprive any officer or man of a designation as distinguished marksman which he may have attained under previous rules.

Insignia, distinguished pistol shot.

J-75. (1) A gold badge is awarded to such officers, cadets, and enlisted men of the Coast Guard as are designated as distinguished pistol shots by the commandant. The designation as a distinguished pistol shot is made only upon the receipt of an individual written application from those officers or men in active service who have the qualification herein specified. The qualifications for a distinguished pistol shot are—

(*a*) The necessary credits must have been obtained while the applicant was on the active list of the Coast Guard and the applicant must have qualified as expert pistol shot during the small-arms year in which the application is submitted.

(*b*) The applicant must have won three medals in either or both of the national pistol matches, namely, the national pistol team match and the national individual pistol match.

(2) These rules shall not be interpreted so as to deprive any officer or man of a designation as expert pistol shot which he may have attained under previous rules.

Part K.—REQUISITIONS, REPORTS, RETURNS, ETC.

Section 1.—REQUISITIONS

Authority.

K–1. Ordnance material and equipment will be furnished and repairs or alterations to such material or equipment will be made only upon authority of headquarters. Telegraphic authority may be requested in emergency. The cost *will not be charged to the allotment of a field unit.*

Forms.

K–2. Requisitions shall be submitted to headquarters as follows:

(*a*) *On Navy forms* (S. and A. Forms 44 and 44a):

All material covered by the N. G. F. allowance list

EXCEPT: Firing and lighting battery replacements,
gun cover replacements,
drill charges and parts thereof.

(*b*) *By letter to headquarters:*

Ammunition for 1-pounder or larger guns, INCLUDING drill charges.

Black powder for Coast Guard stations.

Navy wrecking mines and chloride of silver batteries.

REPAIR OR OTHER ORDNANCE WORK TO BE PERFORMED AT NAVY YARDS. (See K–4 (4).)

(*c*) *On Coast Guard forms* (Form 2556, Treasury Department):

All other ordnance material or equipment.

Navy requisitions.

K–3. (1) Requisitions for Navy ordnance material are divided into two classes:

(*a*) *Requisitions for articles of original outfit*, consisting of articles being issued to a unit for the first time, many of which are issued without charge.

(*b*) *Requisitions for articles of replacement*, consisting of articles to replace those which have been lost, broken, etc., for which payment is made from Coast Guard appropriations.

Preparation.

(2) Prepare Navy requisitions as follows:

(*a*) Use S. and A. forms 44 and 44a.

(*b*) Prepare original and seven copies.

(*c*) *Do not* place articles of original outfit and articles of replacement on the same requisition.

(*d*) Number requisitions consecutively, starting a new series each fiscal year.

(*e*) *Do not* fill in bureau or appropriation.

(*f*) *Do not* exceed amount indicated in the allowance list without a letter of explanation.

(*g*) Enter caliber and mark of gun, together with nomenclature, drawing, and piece numbers of items listed, taken from the allowance list, blueprints, or photoprints.

(*h*) Type below the list of articles either the words "Articles of original outfit" or "For replacement of articles on board of survey (date) _____ No. _____."

(*i*) Forward original and six copies to headquarters.

Ammunition orders.

K–4. (1) When ammunition is to be overhauled in compliance with Navy requirements, authority for any expense involved shall be requested from headquarters. The estimated cost shall be stated in each case. (See art. G–17.)

Target ammunition.

(2) An annual order for target practice ammunition will be placed by headquarters for all vessels which are expected to fire any form of practice. It is desirable that this ammunition be carried on board as short a time as practicable. Therefore, it should be left at naval ammunition depots until shortly before the practice. (See arts. G–18 and J–22.)

Wrecking mines.

(3) Requests shall be submitted to headquarters for wrecking mines and other articles of the wrecking mine outfit which are required to replenish stock. If such articles are urgently needed for a particular project, the commanding officer may ask for telegraphic authority to obtain them from a naval ammunition depot or mine depot. The request to the inspector of ordnance in charge shall show the particular project for which the material is desired and shall indicate the appropriation to be charged, such as "Outfits, Coast Guard, 1939." A copy of each such request shall be forwarded to headquarters and a copy shall be sent direct to the Bureau of Ordnance, Navy Department, Washington, D. C. (See art. G–77.)

Navy yard repairs.

(4) Before requesting authority for repairs at a navy yard or navy station, the commanding officer shall obtain an estimate of the cost, so that it may be forwarded with the request for authority. When headquarters has granted authority, the commanding officer shall forward to the commandant of the yard or station, a written request stating specifically each item of repair. A copy of this letter shall be forwarded to headquarters. (See arts. B–2, C–14, and D–19.)

Coast Guard requisitions.

K–5. (1) Submit separate requisitions for the following:

(*a*) Firing and lighting battery replacements.

(*b*) Gun cover replacements.

(2) All other ordnance material or equipment may be placed on the same requisition.

Preparation.

(3) Prepare Coast Guard requisitions as follows:

(*a*) Use Treasury Department Form 2556. (See art. 1046 et seq., Pay and supply instructions.)

(*b*) Prepare original and seven copies.

(*c*) Number requisitions consecutively, starting a new series each fiscal year.

(*d*) If firing and lighting batteries are being requested, give full information regarding the battery required.

(*e*) Type below the list of articles either the words "Articles of original outfit" or "For replacement of articles on board of survey (date) _____ No. _____." Requisitions for units under construction will bear the notation "Original outfit; reimbursement expected from building appropriation."

(*f*) *Do not* exceed allowances without explanation.

(*g*) Forward original and six copies to headquarters.

Section 2.—INVOICES AND VOUCHERS

Depot issues.

K-6. (1) After approving a requisition from a field unit, headquarters will forward the original and five copies to the depot, retaining the sixth in a pending file.

(2) When the requisition is filled, the depot will—

(*a*) Inclose one copy of the invoice with the shipment as a packing list.

(*b*) Retain one copy in a pending file.

(*c*) Forward one copy to headquarters.

(*d*) Mail the original and two copies to the consignee, accompanied by bill of lading if one is used.

(3) Upon receipt of the material, the consignee will—

(*a*) Sign the original and two copies of the invoice.

(*b*) Retain one copy for file.

(*c*) Return the original and one copy to the depot.

(4) The depot will then—

(*a*) Retain the signed copy.

(*b*) Forward the original to headquarters, marked "For ordnance division."

Issues from other departments.

K-7. (1) The *original and six* copies of invoices covering ordnance issues from other departments are required to fulfill Coast Guard needs, as follows:

(*a*) One copy with the shipment as a packing list.

(*b*) One copy for the ordnance division, headquarters.

(*c*) Original and four copies to be sent to the consignee.

(2) Upon receipt of the material, the consignee should—

(*a*) Sign the original and four copies.

(*b*) Retain one copy for file.

(*c*) Forward one signed copy to the ordnance division, headquarters.

(*d*) Forward the original and two copies to the consignor.

(3) The consignor will—

(*a*) Retain a copy for file.

(*b*) Forward the original and one copy to the Coast Guard with the claim for reimbursement.

(4) The original will be forwarded to the General Accounting Office with the voucher, the copy kept in the finance division, headquarters.

Commercial purchases.

K-8. If a field unit is authorized to make a commercial purchase from headquarters ordnance funds, *one extra copy* of the voucher covering the purchase shall be prepared, marked "For Ordnance Division, Headquarters," and forwarded in a separate envelop, addressed: "Ordnance Division, Coast Guard Headquarters, Washington, D. C."

Transfers between units.

K-9. (1) Except in cases of emergency, ordnance material or equipment shall not be transferred without authority of headquarters. (See art. 1089, Pay and supply instructions.)

(2) When ordnance material is transferred from one unit of the service to another (except from the stores and other units regularly charged with issuing supplies), the consignor shall—

(*a*) Prepare the original and five copies of the invoice.

(*b*) Inclose one with the shipment as a packing list.

(*c*) Retain one copy in a pending file.

(*d*) Forward one copy to headquarters, ordnance division.

(*e*) Forward original and two copies to the consignee, accompanied by bill of lading if one is used.

(3) Upon receipt of the material, the consignee will—

(*a*) Sign the original and two copies of the invoice.

(*b*) Retain one for file.

(*c*) Return one copy to the consignor.

(*d*) Forward the original to ordnance division, headquarters.

Transfers to other departments.

K–10. (1) When ordnance material or equipment (ammunition, line-throwing equipment, etc.) is transferred to another department of the Government, the consignor will—

(*a*) Prepare the original and eight copies of the invoice.

(*b*) Inclose one copy as a packing list with the shipment.

(*c*) Retain one copy in a pending file.

(*d*) Forward one copy to ordnance division, headquarters.

(*e*) Forward the original and five copies to the consignee, accompanied by bill of lading, if one is used.

(2) Upon receipt of the material, the consignee will—

(*a*) Sign the original and five copies.

(*b*) Retain *two* copies.

(*c*) Return the original and three copies to the consignor.

(3) The consignor will then—

(*a*) Retain one signed copy for file.

(*b*) Forward the original and two copies to ordnance division, headquarters.

(4) Ordnance division, headquarters, will—

(*a*) Retain one signed copy for file.

(*b*) Forward the original and one copy with the claim for reimbursement.

Preparation of invoices.

K–11. In preparing invoices:

(*a*) Clearly identify each item. If the invoice covers large caliber ammunition, show the caliber, type, and index. If it covers small-arms ammunition, show caliber, model, type, manufacturer, lot number, and grade. (See form N. Ord. 41–B for what is meant by these terms.)

(*b*) If the invoice covers equipment bearing serial numbers, *list the numbers in consecutive order.*

(*c*) Price each item as shown on the invoice upon which the material was received, unless instructions to the contrary are received from competent authority.

(*d*) Plainly indicate whether reimbursement is required or transfer is made without exchange of funds, if the invoice covers a transfer of material to another department of the Government. Surveyed material returned to the Navy should be invoiced at "no cost."

(*e*) If target or saluting ammunition remnants are being returned to the Navy, enter on the face of the invoice:

> "This material was originally invoiced to the Coast Guard for _____, Invoice No. _____ date _____.
> (Type and name of vessel)
> The material is to be charged to the Navy Department and credited to the Coast Guard. Certified correct and just, payment not received."

Destruction of derelicts, etc.

K-12. Promptly upon removal or destruction of a wreck or other obstruction within navigable waters, the division commander shall prepare and transmit an adjustment voucher (on Standard Form 1080) to the district engineer, War Department, as specified in Pay and Supply Instructions, article 1453. An *extra copy* of the voucher shall be prepared, plainly marked "For Ordnance Division, Headquarters," and forwarded at once.

Section 3.—BILLS OF LADING

Bills of lading.

K-13. Instructions regarding shipment on Government bills of lading will be found on Standard Form 1058 and in Pay and Supply Instructions.

Section 4.—BOARDS OF SURVEY

Special boards of survey.

K-14. Special boards of survey shall be held on ordnance material or equipment, distinct from boards on any other material. Furthermore, material covered by the N. G. F. allowance list, INCLUDING drill charges and parts thereof but EXCLUDING firing and lighting batteries and gun covers, shall be placed on boards of survey on which no other material is included.

Preparation of boards.

K-15. (1) In preparing boards of survey—

(*a*) Use Treasury Form 2582.

(*b*) Prepare the original and three copies.

(*c*) Retain one copy in a pending file, to accompany invoice at disposition.

(*d*) Forward the *original and two copies* to headquarters. (Form 2582 requires submission in duplicate. However, an extra copy is desired for the files of the ordnance division at headquarters.)

(*e*) Number boards consecutively, starting a new series each fiscal year.

(*f*) If the board covers guns, spare parts, or accessories, enter caliber and mark of gun, together with nomenclature, drawing, and piece numbers of items listed, taken from the allowance list and from blue prints or photoprints. Carry these items at "No cost."

(*g*) If the board covers equipment bearing serial numbers, *list the numbers in consecutive order.*

Disposition of surveyed material.

K-16. Surveyed ordnance material shall be disposed of as follows:

(*a*) Ordnance material covered by the N. G. F. allowance list, INCLUDING drill charges and parts thereof but EXCLUDING firing and lighting batteries and gun covers, shall be turned in to the nearest navy yard, addressed to the SUPPLY OFFICER.

(*b*) Units on the west coast shall turn in firing and lighting batteries to the Coast Guard Battery Service Station, Base 11, Oakland, Calif. Units on the east coast shall turn the batteries in to the Coast Guard Battery Service Station, Fort Trumbull Training Station, New London, Conn., or the Coast Guard Battery Service Station, Base 6, Fort Lauderdale, Fla.

(*c*) Gun covers may be destroyed.

(*d*) Ammunition or ammunition components for 1-pounder or larger guns shall be turned in to the nearest naval ammunition depot.

(*e*) Small-arms ammunition, containers, etc., shall be turned in to the nearest army ordnance depot or to the Coast Guard depot, as specified in article G–64.

(*f*) All other surveyed ordnance material (including Lyle guns surveyed with beach apparatus carts) shall be turned in to the Coast Guard depot, unless disposition otherwise has been recommended and approved by headquarters.

Shipments to navy yards.

K–17. Surveyed ordnance material which is being returned to a navy yard must be addressed to the SUPPLY OFFICER and labeled to indicate shipper, so that no difficulty will be experienced in identifying material returned by the Coast Guard.

Section 5.—BOARDS OF INVESTIGATION

K–18. Boards of investigation shall be held at the earliest possible date after discovery of loss or theft of ordnance equipment. (See art. 1855 (*b*), Regulations.)

K–19. The number of boards of investigation in which responsibility for loss is not placed, indicates that greater care is needed in safeguarding small arms. It is directed that every possible precaution be taken to reduce this loss, not only because valuable public property is involved, but because arms are thus placed in the hands of persons not authorized to possess them by law. (See arts. 855, Regulations, and A–10 and A–11, hereof.)

Section 6.—REPORTS AND RETURNS

Promptness.

K–20. Submit reports promptly as they are essential for the keeping of accurate records.

Vessel with complement less than six.

K–21. (1) If a vessel has an authorized complement of less than six, the unit under which it is operated is responsible for all of its ordnance equipment and material and must render all reports required.

(2) There will be no need to submit N. Ord. 70, ordnance equipment card, and Treasury Form 2530, miscellaneous ordnance material and equipment card, since all equipment ordinarily reported on these forms will be held on custody receipts, and will be *reported by the responsible unit as a part of its equipment.*

(3) *Ammunition for 1-pounder and larger guns is issued to a vessel, not to a shore unit.* However, the responsible unit shall have custody and render all reports pertaining to it, indicating that the ammunition is held for the vessel. For example, Base 4 would submit ammunition reports for the CG–832, indicating "Ship or station" as "CG–832 (Base 4)."

(4) On gun cards and gun mount cards, "ship or station" would be indicated in the same manner as on the ammunition cards.

Accuracy.

K–22. To obviate needless work of returning reports for correction, prepare them carefully, *following instructions on forms with modifications as follows:*

N. Ord. 39. (*a*) *N. Ord. 39, gun card:*

1. Forward original and two copies to headquarters; if a transfer, send one additional copy with material.
2. On face of card enter date on which guns were last lifted.

N. Ord. 40. (*b*) *N. Ord. 40, gun mount card:*

1. Forward original and two copies to headquarters; if a transfer, send one additional copy with material.
2. Number reports in consecutive order, a new series beginning each *fiscal* year.

N. Ord. 41. (*c*) *N. Ord. 41, powder card, service ammunition:*

1. Forward original and two copies to headquarters; if a transfer, send one additional copy with material.
2. Number reports in consecutive order, a new series beginning each *fiscal* year.
3. *Do not* report small arms ammunition on this card.
4. Include on this card any black-powder ammunition issued as service ammunition.

N. Ord 41–A. (*d*) *N. Ord. 41–A, powder card, target practice ammunition:*

1. Forward original and two copies to headquarters; if a transfer, send one additional copy with material.
2. Number reports in consecutive order, a new series beginning each *fiscal* year.
3. *Do not* report small arms ammunition on this card.
4. Even though no ammunition has been on board, submit the periodic reports.

N. Ord. 41–B. (*e*) *N. Ord. 41–B, small arms ammunition card:*

1. Forward original to headquarters; if a transfer, send one additional copy with material.
2. Number reports in consecutive order, a new series beginning each *fiscal* year.
3. Leave columns 13 and 14 blank.

N. Ord. 42. (*f*) *N. Ord. 42, projectile card, service ammunition:*

1. Forward original and two copies to headquarters; if a transfer, send one additional copy with material.
2. Number reports in consecutive order, a new series beginning each *fiscal* year.
3. Include on this card any black-powder ammunition issued as service ammunition.

N. Ord. 42–A. (*g*) *N. Ord. 42–A, projectile card, target-practice ammunition:*

1. Forward original and two copies to headquarters; if a transfer, send one additional copy with material.
2. Number reports in consecutive order, a new series beginning each *fiscal* year.
3. Even though no ammunition has been on board, submit the periodic reports.

N. Ord. 50. (*h*) *N. Ord. 50, wrecking charge card:*

Am #1, 8-20-

1. Forward original and ~~two~~ copies to headquarters; if a transfer, send one additional copy with material.
2. Number reports in consecutive order, a new series beginning each *fiscal* year.
3. Submit annually on *July 1*, not December 31.
4. Include in this report Coast Guard (light type), as well as Navy.

(*i*) *N. Ord. 51–A, fire-control card:* N. Ord. 51–A.

1. Forward original and two copies to headquarters; if a transfer, send one additional copy with material.

(*j*) *N. Ord. 51–B, fire-control card (optical):* N. Ord. 51–B.

1. Forward original and two copies to headquarters; if a transfer, send one additional copy with material.
2. Number reports in consecutive order, a new series beginning each *fiscal* year.

(*k*) *N. Ord. 67, smokeless powder test card, service ammunition:* N. Ord. 67.

1. Submit only upon completion of surveillance test or a violet paper test.
2. If the report is to cover a surveillance test, submit in quadruplicate to *naval ammunition depot* along with sample, having filled in form completely except for column "Surveillance." Upon completion of test, depot will forward a copy to headquarters and a copy to unit submitting sample. (See art. F–23 hereof.)
3. If the report covers completion of a violet-paper test, forward original and two copies to headquarters.
4. Number reports in consecutive order, a new series beginning each *fiscal* year.

(*l*) *N. Ord. 67–A, smokeless powder test card, target practice ammunition:* N. Ord. 67–A.

1. If target practice or experimental firing ammunition is held more than 3 months from date of issue, have tests conducted and reports submitted as for service ammunition. (See art. F–23.)

(*m*) *N. Ord. 70, ordnance equipment card:* N. Ord. 70.

1. If report includes subcaliber attachments, rifles for subcaliber, or loading machines, submit original and two copies to headquarters; otherwise submit original only.
2. Number reports in consecutive order, a new series beginning each *fiscal* year.
3. Include all small arms *except* pyrotechnic pistols of the following types, which are reported on Form 2530: Driggs Faber and International Flare. List serial numbers on reverse of card under "Remarks" in consecutive order. In the case of Very's pistols, be *sure* to give number which appears on the *inside* of the *frame*. (If equipment is temporarily transferred or loaned on custody receipt, care must be exercised to see that it is properly returned, to avoid confusion in the records.
4. Omit all landing force equipment from this report; it is to be listed on Treasury Form 2530.
5. List serial numbers of loading machines, subcaliber attachments, etc.

(*n*) *Treasury Form 2530 miscellaneous ordnance material and equipment card:* Treasury Form 2530.

1. Forward original to headquarters; if a transfer, send one additional copy with material.
2. Number reports in consecutive order, a new series beginning each *fiscal* year.

(n) *Treasury Form 2530 miscellaneous ordnance material and equipment card.*—Continued.

3. All articles of ordnance equipment or material, unless herein excepted or carried on regular Navy ordnance forms, shall be carried on this card.
4. Nonexpendable items of range equipment, target rafts, etc., shall be listed in the blank spaces on the form.
5. All cartridge cases, whether empty or loaded (service, target, or saluting) shall be listed. This report in no way affects submission of N. Ord. 41, 41–A, 42, and 42–A.
6. Include all landing force equipment on this report, carrying none of it on N. Ord. 70.
7. If an article of infantry equipment differs from the standard, it should be so noted in the "Remarks" column.
8. *The following need not be reported:*
   Material expendable without a board of survey.
   Spare parts, tools, and accessories carried on allowance list.
   Empty small-arms cartridge cases, clips, etc.
9. *Do not* include Very's pistols on this form.
10. List all serial numbers in consecutive order. After each International flare pistol number listed, indicate whether it appears on the *outside* or *inside* of the arm. For example: 723 (outside) or L-21 (inside). *If a number appears on the outside, that is the correct one to report.* If no number is to be found on the outside, an inside number should be reported. (The two numbers appearing inside should be identical.)

N. Ord. 165.

K–23. *N. Ord. 165, Ford range keeper Mark II,* is a record card which is to be used on board ship in accordance with instructions contained thereon. It shall not be submitted to headquarters.

Annual reports, etc.

K–24. The following reports are due:

Annually, July 1.
When going into commission.
When going out of commission.
When changes occur. (See art. K–22.)

From all units:

(a) N. Ord. 41–B, small-arms ammunition card.
(b) N. Ord. 70, ordnance equipment card.
(c) Treasury Form 2530, miscellaneous ordnance material and equipment card.

From units normally carrying the equipment or material concerned, the following additional reports are due:

(a) N. Ord. 39, gun card.
(b) N. Ord. 40, gun-mount card.
(c) N. Ord. 41, powder card, service ammunition.
(d) N. Ord. 41–A, powder card, target-practice ammunition.
(e) N. Ord. 42, projectile card, service ammunition.

From units normally carrying the equipment or material concerned, the following additional reports are due.—Continued.

(*f*) N. Ord. 42–A, projectile card, target-practice ammunition.

(*g*) N. Ord. 50, wrecking-charge card.

(*h*) N. Ord. 51–A, fire-control card.

(*i*) N. Ord. 51–B, fire-control card (optical).

Reports of gunnery exercises.

K–25. (1) Reports of practices held in accordance with current Orders for Gunnery Exercises shall be submitted as specified therein. If no practice was held during a gunnery year, submit a letter to headquarters on July 1, stating the reason therefor.

Target practice instruction.

(2) Reports of target practice instruction are to be submitted as specified in section 2 of part J, on Form 2562, original only. If no practice was held during a gunnery year, submit a letter to headquarters on July 1, stating the reason therefor.

Small-arms target practice.

(3) Reports of small-arms target practice shall be submitted as follows:

(*a*) Submit original only of sheets 1 and 2.

(*b*) If no practice was held during a gunnery year, submit a letter to headquarters on July 1, stating the reason therefor.

(*c*) Bases shall submit one consolidated report for the base and all units attached.

(*d*) Districts shall submit one consolidated report for the district and all units attached.

(*e*) Each division commander shall submit a report stating the number of rounds of .30 caliber rifle and machine gun and .45 caliber pistol ammunition expended during the annual practice of his division. The report shall include all units in his division.

(4) Reports of small-arms competition shall be submitted on sheet 3 if competitions have been held.

Special reports.

K–26. The following *special reports* are required at headquarters as indicated:

(*a*) *N. Ord. 67 or 67–A*—When test is completed.

(*b*) *Ammunition, bomb type*—Report any found defective upon monthly inspection. (See art. G–75 (5).)

(*c*) *Ammunition, damaged*—Report any received in this condition. (See art. H–6 (2).)

(*d*) *Ammunition, small-arms*—Report defective or unidentified as specified in articles G–53 (3) and G–58.

(*e*) *Boards of investigation*—Submit promptly upon discovery of loss of material. (See art. K–18.)

(*f*) *Gas check pads*—Report survey of such material immediately. (See art. C–20.)

(*g*) *Gun, liner protrusion*—Report cutting off excess metal as required by article C–15.

(*h*) *Gun captain, qualification*—A report signed by all members of the examining board as specified in article J–49.

(*i*) *Gun, range-finder operators, qualification*—Submit the report specified in article J–46.

(*j*) *Line-throwing equipment*—Report semiannual test and use in assistance work as specified in articles C–47 and E–7.

(*k*) *Powder*—Report abnormal conditions as specified in articles A–37 and F–12.

(*l*) *Powder, aboard more than 3 years without overhaul*—Report as specified in article G–17 (5).

(*m*) *Powder, deteriorated, unstable, wet*—Report as specified in articles F–9 (6) and F–30 (c).

(*n*) *Pyrotechnics, test of*—Report as specified in article G–69.

(*o*) *Safety orders, additions or alterations*—Report as specified in articles A–15 to A–17.

(*p*) *Small arms and equipment*—Report excess on hand as specified in article E–18.

(*q*) *Storage conditions*—Report unsafe conditions as specified in article H–13 (1).

Record of public property.

K–27. The record of public property which is kept at each unit shall be complete. It shall show receipt and expenditure of all ordnance material, equipment, etc.

Serial numbers.

K–28. Serial numbers of all small arms shall be shown in the record of public property. They shall be shown on all invoices and form reports, *in consecutive order.*

Tools, etc.

K–29. Tools and material, unless especially designed for use of the ordnance department, shall not be carried as part of the ordnance outfit. Such articles shall be drawn from other departments, on custody receipt if necessary.

Inventory.

K–30. The N. Ord. cards and Form 2530, Treasury Department, submitted annually on July 1, constitute a complete return of *equipment* for the ordnance department. However, the provisions of article 1204, Pay and Supply Instructions, must be observed in so far as *supplies* are concerned.

INDEX

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ORD-463

5 August, 1933.

No. 2.

ADDENDA TO ORDNANCE INSTRUCTIONS

MACHINE GUN-ONE POUNDER COMBINATION

I. INTRODUCTION

1. Necessity for device.
2. Development of device.

II. Description

1. Method of manufacture or modification of component parts.
2. Assembly of component parts.

III. Adjustment

IV. Procedure in Use.

NOTE: NOTHING IN THIS ADDENDA SHALL BE CONSTRUED TO ALTER INSTRUCTIONS ALREADY PROMULGATED IN REGARD TO GUN FIRE.

I. INTRODUCTION

From time to time during the past few years a number of requests were received from various units for larger caliber machine guns, setting forth as the reason for such requests the ineffectiveness of the .30 caliber machine gun against high speed armored craft. After due consideration it was decided that larger caliber machine guns would not be authorized for use in law enforcement work because of their great range and consequent unsuitability for use in restricted waters.

In view of the inefficiency of .30 caliber and .45 caliber machine guns for this purpose, and of the policy regarding larger caliber machine guns, the Ordnance Section at Headquarters assumed the task of improving the effectiveness of the ordnance available.

The idea of a means of controlling 1-Pdr. fire naturally presented itself, since it had always been recognized that if hits could be registered with this gun a seizure could be effected in practically any case where armored high speed craft were concerned.

In considering the project as a whole, the following were apparent:

(1) The difficulty of registering hits with the 1-Pdr. from patrol craft in even a moderately choppy sea.

(2) The effectiveness of the 1-Pdr. against high speed armored craft provided hits could be made.

(3) The ineffectiveness of the available machine gun equipment against high speed armored craft.

(4) The comparative ease of getting on and holding on with machine gun using tracer ammunition.

These four facts naturally indicated that an extremely effective and safe weapon would result if the fire of the 1-Pdr. gun could be controlled by the fire of the machine gun. In other words, if the 1-Pdr. could be made to follow the machine gun, and the machine gun fired using tracer bullets, the 1-Pdr. could be made

hit with comparative ease.

It was apparent that to accomplish the above a mechanical combination of the two pieces was necessary. It followed that any such mechanical combination must incorporate the following features:

(1) The mounting of the machine gun securely on a non-recoiling part of the 1-Pdr. mount.

(2) The ability to move both 1-Pdr. and machine gun in unison in elevation and train.

(3) A method of easily and quickly adjusting the alignment of the machine gun with relation to the 1-Pdr. gun, so that at any chosen range the two pieces could be made to hit at the same point.

After considerable preliminary work, the "Experimental Lewis Machine Gun Mount" was designed. It was first demonstrated and given a practical trial at Base FOUR where it proved successful. Later a sample mount was demonstrated at Base NINE. Both these bases have adopted the mechanism, and have used it with success.

There is now being manufactured at the Depot a supply of these experimental Lewis machine gun mounts, and it is the intention of Headquarters to furnish each base with a sample mount. Should the mechanism be considered advantageous, additional mounts may be manufactured by the bases concerned.

II. Description of mount for use with Mk. IX-1 1-Pdr. mount.

The component parts are: modified swivel head with securing nut and washer, mounting bracket, modified shoulder bar, modified shoulder bar clamp with nut and washer, rear support strap, rear adjusting bolt and nuts, modified butt stock and butt stock bolt.

The swivel head is modified by securing a 1¼" stud bolt into the base of the swivel head proper which serves to secure the swivel head to the mounting bracket. There will be found in service two types of swivel heads, one having the base cored out leaving a recess 1¼" in diameter x 2½" deep, while the other type has a solid

base. In the cored out type the stud bolt is made by threading at one end for a distance of 1¼" a piece of steel stock 3⅝" long x 1½" diameter. To assemble, the upper part of the swivel head stud bolt is slightly dressed down until it fits into the cored recess in the base of the swivel head with a "drive fit". (Note: An excellent fit may be secured by expanding the swivel head base, by heating, in accomplishing this assembly). After assembly, a tapered hole is drilled through the base and stud bolt about 1-1/8" from the bottom of the base in order that a tapered pin may be driven through thus securing the assembly. This hole tapers from 1/4" to 5/32" in diameter. The pin should be cut off with about 1/16" extending on either end and then peened. The other type swivel head has a solid base. In this type the stud bolt is made from the same diameter stock, however it is only 2⅝" long and is threaded for its entire length. The swivel head base is drilled out to a depth of 1-3/8" and then threaded to receive the swivel head stud bolt. In assembly the swivel head stud bolt is screwed home into the swivel head base. It is not considered necessary to secure this assembly with a tapered pin. A spring washer and nut for the swivel head stud bolt complete the modification of the swivel head.

The mounting bracket is made from a 4" piece of angle iron 5" x 4" (inside) x 3/8" thick. A 5/8" hole is drilled through the center of the 4" or upright side of the angle iron for mounting the bracket onto the modified shoulder bar clamp. Through the 5" or flat side of the angle iron is cut an elongated slot running with the 5" dimension. This slot is 3" long by 1¼" wide, and is equidistant from the sides and ends of the angle iron. It receives the modified swivel head stud bolt, and permits adjustment of the swivel head in azimuth. The corners of the mounting bracket may be rounded using radii necessary to maintain symmetry.

The modification of the shoulder bar is accomplished as follows:

Remove name plate, shoulder bar handle and deflector. Drill a 3/8" hole through the shoulder bar in the center of the boss from which the deflector was removed.

The shoulder bar clamp is modified as follows:

Remove hand wheel. Thread the 3/4" shoulder as far down as possible using 5/8" die. A nut and lock washer complete the modification.

The rear support strap is made from an ordinary piece of strap iron or steel about 10" long x 1-5/16" wide x 3/16" thick. A 5/16" hole is drilled through the middle of the strap 7/16" from the upper end. An elongated slot 3/8" wide and 2" long is cut in the lower end of the support strap at such an angle as to allow adjustment in elevation by permitting the strap to move up or down on the rear adjusting bolt. The corners of the strap may be rounded.

The rear adjusting bolt is merely a 3/8" stock bolt 5" long threaded the full length. This bolt carries on it a locking nut and two adjusting nuts.

The butt stock assembly is modified by removing the butt stock from the butt tang and replacing with a short piece of wood which comes flush with the rear of the butt tang. Drill a 5/16" hole through the butt tang from side to side in about the center. An ordinary 5/16" stock bolt, with nut and washers, of sufficient length to pass through the butt tang and the rear support strap completes the modification of the butt tang.

The component parts are assembled as follows:

(1) With the 1-Pdr. gun on zero elevation, mount the modified shoulder bar parallel to the gun.

(2) Mount the mounting bracket on the modified shoulder bar clamp and level with a spirit level or other device to insure it being in the same plane as the 1-Pdr. gun. The nut which screws onto the modified shoulder bar clamp should be set up for a full due against a lock washer. The mounting bracket should be mounted with the flange down.

(3) Mount the modified swivel head onto the mounting bracket setting up the securing nut

hand tight.

(4) Mount the rear adjusting bolt to the modified shoulder bar running the outside adjusting nut off.

(5) Mount the rear support strap to the modified butt tang of the machine gun.

(6) Mount the machine gun in the modified swivel head allowing the elongated slot in the lower end of the rear support strap to pass over the rear adjusting bolt. The inside adjusting nut should be run about half way back on the bolt.

(7) Screw the outside adjusting nut onto the rear adjusting bolt so as to allow the rear support strap to be free to move in azimuth or elevation on the rear adjusting bolt.

III. Adjustment

To adjust the mechanism so as to make the machine gun and 1-Pdr. gun hit together at any given point, proceed as follows:

Boresight the 1-Pdr. gun for the range desired.

Align as nearly as possible by guess the machine gun barrel with the 1-Pdr. barrel in azimuth and elevation setting up on the saddle clamp screw, the modified swivel head securing nut and the rear adjusting bolt adjusting nuts sufficiently to hold the machine gun in place.

Test fire the machine gun at the range for which 1-Pdr. is boresighted using the 1-Pdr. sights properly set. Adjustment of the machine gun in elevation and azimuth must be made by test firing in this manner until the machine gun hits when the 1-Pdr. sights are on. When this is accomplished, set up hard on the saddle clamp screw the modified swivel head securing nut and the rear adjusting bolt adjusting nuts. Tighten the butt tang and rear support strap bolt.

IV. Procedure in use.

In using this assembly, the machine gun is used merely to get on the target. No attempt to use either the machine gun or 1-Pdr. sights should be made. The pointer stands at the shoulder bar in the usual manner, using the left hand to fire the machine gun and the right hand on the shoulder bar to assist in the pointing. The plugman should fire the 1-Pdr. The loading of the 1-Pdr. is accomplished in the usual manner. At commence firing the 1-Pdr. is loaded and the plugman takes the firing lanyard in his hand and watches the target. The pointer moves on the target and fires the machine gun, continuously watching the flight of the machine gun tracer bullets which will enable him to get on easily and quickly. As soon as the tracer bullets are seen to go into the target, the plugman fires the 1-Pdr. It will be readily seen that provided the mechanism is properly adjusted, the 1-Pdr. will hit at any time the tracer bullets are seen to be passing through the target.

H.G. HAMLET.

ADDENDA TO ORDNANCE INSTRUCTIONS

No. 1. Outline of 27 July, 1933.

Notes on Mine Wrecking Outfits and Derelict Destruction Operations.

FOREWORD

I EQUIPMENT

1. . Wrecking Outfit, Light Type, U. S. Coast Guard, Mark I.

(a) Reel and reel box
(b) Special mine cable
(c) Connecting cord
(d) Firing device
(e) Circuit Tester

2. NAVY WRECKING OUTFIT

3. MINES

(a) Navy standard
(b) T.N.T. blocks

4. TETRYL DETONATORS

II PROCEDURE

1. Test of detonators and cable before commencing operations.

2. PLACING THE MINES

(a) Number and location
(b) Securing and connecting up
(c) Safety precautions
(d) Final test of circuit
(e) Firing the charges

3. MISCELLANEOUS NOTES ON DERELICT DESTRUCTION AND MINING OPERATIONS.

III 4. MISCELLANEOUS NOTES ON SEARCHING OPERATIONS.

METHODS OF SEARCH FOR DERELICTS.

EQUIPMENT

Wrecking Outfit, Light Type, U. S. Coast Guard, Mark I.

1. This equipment has been lately developed at Headquarters, to provide a more compact and more easily handled outfit for wrecking operations. It consists of the following:

(a) Reel and reel box
(b) Special mine cable
(c) Connecting cord
(d) Firing device
(e) Circuit tester

DESCRIPTION AND USE OF EQUIPMENT

The reel and reel box: This equipment consists of a special rugged box provided with a hinged removable cover. The cover is removed and left on board ship during wrecking operations. The mine cable reel is completely housed in the box and is operated by a crank. The crank is operated from the outside of the box when rewinding the mine cable.

Secured to the outboard sides of each reel disc is a flat spring. These springs hold the ends of the mine cable when it is coiled on the reel. The bitter end of the mine cable remains fixed by one of these springs. This end of the wire is used for connecting to the firing device by means of the connecting cord. The reel will accomodate approximately 1500 feet of the special light mine cable.

To use the reel the crank is always disconnected and the cable allowed to unwind the desired length. Care must be taken to prevent the wire running out too rapidly, in order to avoid fouling. To rewind, remove the leads from the firing device, insert the crank in its hole in the right end of the box, engaging the journal on the reel crank end casting, and turn until all the wire is rewound. When the reel is not in use, keep the cover on.

The mine cable: This cable is very tough and much lighter than the Navy wrecking mine cable. It weighs about 62 pounds and has a total resistance of 8.8 ohms per 1000 feet. The cable should never be subjected to a strain of over 100 pounds. When not in use, it should be stored in a cool, dry place and kept on the reel.

The connecting cord: A four-foot connecting cord is provided for use with the firing device. The cord is fitted at one end with an unbreakable soft rubber standard plug; at the other end, with two clips with rubber covers, for attaching to the bare wires of the mine cable.

The firing device: This device designated "Battery Case, Type B, U. S. Coast Guard," consists of a 9¼" x 4½" x 2" brass case with a removable water-tight cover. It is fitted with a plug receptacle for the connecting cord and a push button for firing. It will accomodate nine standard 2-3/8" x 1-1/4" flashlight cells, connected in series, producing an E.M.F. of 13.5 volts. This device will effectively fire ten detonators in series with 1000 feet of the mine cable, provided the circuit is clear and the cells are not deteriorated. The terminal voltage of the device should be frequently determined by connecting it to a resistance of about twenty ohms. If its voltage under load is less than ten volts, the cells should be replaced.

When ready to fire the charge, connect the connecting cord to the bare ends of the cable by means of the clips attached to the connecting cord. Next, push the plug end of the connecting cord into its receptacle in the firing device. The charge may now be fired by pressing the push button.

Each firing device will have pasted on the inside of its cover a schematic diagram showing arrangement and order of cells, together with all connections. The purpose of this diagram is to insure the proper replacement of new cells.

The circuit tester: The circuit tester is a pocket-size device for determining the resistance of an electrical circuit and testing the circuit to see that it is clear. It consists essentially of an ohmmeter with a silver chloride cell in series, but is graduated to read in ohms. It is more convenient and safer to use than a magneto. The resistance of a circuit is found by simply connecting the terminals of a circuit tester to the leads of a circuit to be tested and reading the scale of the circuit tester which gives the resistance of the circuit in ohms.
CAUTION: The silver chloride cell in this instrument is

used because of its long life and safety. It can be replaced but no other type cell should be used. Do not place the circuit tester in a live circuit, i.e., one that has a battery in it or other source of electrical power. An open circuit is indicated by no deflection of the needle, when the instrument is connected across the leads of a circuit. The amount of resistance to be expected in a circuit can be easily calculated from the number of detonators in a circuit and the amount of wire in a circuit. Thus, if a circuit consists of five detonators and 1000 feet of wire, the total resistance should be approximately 17 ohms (8.8 ohms for the wire and 1.5 ohms per detonator). If the circuit tester shows much more than this, it indicates poor connections or a break in the circuit. If the resistance is much less, it indicates a total or partial short circuit. In either case, the whole circuit should be examined and repaired and the approximate proper resistance obtained before attempting to fire.

Detonators should be tested with this instrument before using. It is entirely safe to test a detonator with the circuit tester as it will deliver only .2 ampere, while .5 ampere is required to fire a detonator. It is advisable, however, to place the detonator at a safe distance when testing.

2. NAVY WRECKING OUTFIT

A description of this outfit with instructions for its use, is covered in Naval Ordnance Pamphlet No. 343.

3. MINES

Navy Standard: These mines are loaded with cast T.N.T. and are detonated by a booster charge of granular T.N.T. and the new issue tetryl electric detonator. A detailed description of this type mine with instructions for its use is covered in Naval Ordnance Pamphlet No. 343.

T.N.T. blocks: These blocks contain one-half pound of T.N.T. compressed to a density of about 1.48. They are shipped in boxes containing about fifty pounds (100 blocks). The blocks have a cylindrical detonator hole two inches in depth and 0.29 inches in diameter to receive the detonator. This hole is kept plugged with a cork as a precaution against moisture. The block is primed by placing a tetryl electric detonator in the hole and firing electrically in the same manner as the standard Navy wrecking mine. Any desired charge can be obtained by binding a number of blocks together. It is only necessary to detonate one block placed near the center of the charge. One detonator will normally be found

sufficient to explode a charge of 35 blocks. The blocks should be closely bound together. Wooden boxes, small arms ammunition containers, old oil cans, etc., filled to capacity make excellent built-up charges. It is not necessary that the containers be water-tight. The advantage of these blocks is in their ease of handling and the flexibility in the strength of charge possible to be obtained. They may be also used singly to cut rigging, etc. A single block will sever an eighty-pound rail.

It has also been found that these blocks will make excellent booster charges for the Navy wrecking mines. They will also detonate a mine by simply binding to the outside of the mine case. Built-up charges made from these blocks have been found more effective than the standard mine. In these notes, under "Procedure," reference to mines should be taken to refer to either the standard mine or the built-up T.N.T. block charges.

4. The Tetryl Detonator: The detonator issued for exploding mines or T.N.T. blocks is of the tetryl type and consists of a mixture of tetryl mercury fulminate and potassium chlorate sealed in a copper cylinder. They are supplied in cartons of fifty. They have a resistance of 1.5 ohms and require a current of .5 ampere to detonate.

Priming the T.N.T. block: To prime a T.N.T. block, remove the cork from the block and insert the electric detonator. Loop the detonator wire around the block in such a manner as to put the pull on the free end, thus leaving the wire from the loop to the detonator slack. The detonator does not fit perfectly in the block but it should be pushed in until the corrugated section of the detonator is flush with the top of the block. If necessary, the detonator may be held in the block by lightly wedging with a piece of match or a small wad of paper. A better method would be to slip a rubber band around the top of the detonator just above the corrugation. Then pass the band down and around the bottom of the block. Extreme caution should of course be exercised in handling detonators and in placing them in mines or T.N.T. blocks.

1. PROCEDURE

Test of detonators and cable before commencing operations.

Before leaving the ship the officer in charge of operations should carefully test all detonators to be used and should test the cable for short circuits, etc.

2. Placing the mines: In all cases the bight of the mine cable should be lashed to the charge to prevent any strain on the connections, but the cable must not be used to take the weight of the charge in lowering. When using the Navy wrecking charge, a line should be passed through the handles of the mine case and when the charge is placed in position and comes to rest, the line can be slipped. Should the mine case be badly damaged, it may be placed in a burlap bag. A slit should be made in the side of the bag near the top to allow the passage of the mine cable. The top of the bag is then seized together, after which a line is secured and the charge lowered. The above instructions are applicable to charges made up of the small T.N.T. blocks.

Number and location: The number of mines or the size of built-up charges used, and the manner of placing them, will depend upon circumstances, but it is not considered good practice to attempt to explode more than eight connected charges at one time on account of possible failure to detonate those most remote from the battery. Best results can be obtained if the charges are in actual contact with the object to be destroyed.

Securing and connecting up: Before connecting the detonator wires to the leading wires, scrape the ends of both sets; then join them with a long twist. Make the twist tight to keep the electrical resistance in the joints to a minimum, and tape so as to make the joints water-tight. When firing one or more charges simultaneously, make all connections in series. To do this, connect one wire from each detonator to the detonator wire in the next charge, and so on to the end until only two detonator wires are left free. These wires are then connected to the leading wire and made water-tight.

Safety precautions: When a misfire occurs, the action of the officer in charge of operations must be governed by conditions. In case of misfire, there is risk

in approaching the location of the mine. Wait a few minutes. There is also danger in attempting to remove the mine for repriming. It is a much better and safer practice not to attempt priming, but to cut the leading wire, connect and place a new charge in a position close to the first charge and explode it by induced detonation.

Final test of circuit: Before placing the detonators in the charge and after all connections have been made, make the final test of the circuit with the circuit tester.

Firing the charge: When the charges have been placed, the boat containing the demolition party pulls away from the wreck a safe distance, always keeping to windward. When in all respects ready to fire the charge, connect the connecting cord to the bare ends of the mine cable by means of the clips attached to the connecting cord. Next, push the plug end of the connecting cord into its receptacle in the firing device. The charge may now be fired by pressing the push button. After the charge has fired, disconnect the connecting cord from the mine cable and from the firing device. No firing connections should be made until the officer has assured himself that the circuit is complete and that no one is within the danger zone.

3. MISCELLANEOUS NOTES ON DERELICT DESTRUCTION AND MINING OPERATIONS.

To blow up a hull, particularly if it is water-logged, the best method is to place the charges inside so that the explosive effect will rend the parts assunder.

Next to exploding charges within a hull, it is best to place them under it, holding the charges in place by lines similar to hogging lines used in placing a collision mat. The major action of the explosive being in the direction of least resistance, will break up the hull by sudden lifting impulse. Similarly, for destroying floating wreckage, place the mine under the wreckage.

Where vessels are sunk in water deep enough so that the hull does not constitute a menace to shipping, it will, in most cases, be found sufficient to remove masts, spars, etc.

A floating spar projecting above the surface of the water and attached to a submerged wreck may be broken loose by sliding a charge down the mast as far as possible on a loop of old chain and then fired. If weights are required to submerge the charges, old grate bars or lengths of old chain will serve the purpose.

A steel hull, floating bottom up, is in most cases sustained by the buoyancy of air confined in tanks. A few well-directed shots from the ship's guns will usually be found effective to cause the section to sink. Where a floating hull is secured to the bottom by her anchors, the anchor cable can be cut by lashing one or two of the small T.N.T. blocks to the cable clear of the hull and firing.

The cutting of standing rigging may also be accomplished by the use of the small T.N.T. blocks.

4. MISCELLANEOUS NOTES ON SEARCHING OPERATIONS.

The success of searching for derelicts depends upon a number of elements, chiefly the accuracy of the original report, the time elapsed since the derelict was seen, currents, and weather.

Experience has demonstrated that in nearly all cases a vessel sailing light or in ballast will sink if water be allowed to run into her hull freely; consequently, only such wrecks as are laden with buoyant material will float for any considerable time.

Lumber and small stuff washed off a wreck will drift to leeward much more slowly than the wreck; consequently, upon running across such flotsam, the searchers may expect to find the derelict practically dead to leeward, provided the direction of the wind has been fairly constant.

A derelict bottom up will usually lie with one end out of water and the other end submerged. In this position, it may be expected that she will drift before the wind, highest end foremost. The rate of drift of such an obstruction depends more upon the force of the sea than upon the strength of the wind. As a sea overtakes the hulk, it breaks, and the comber gives the wreck an impetus that is almost incredible.

METHODS OF SEARCH FOR DERELICTS

There are four principal methods of search: zigzag, spiral, triangular, and rectangular.

The zigzag method: The zigzag method is carried on by sailing courses at approximately sixty degrees from each other, the vessel advancing somewhat as in beating to windward. This plan does very well where the obstruction is believed to be in an area of considerable length but small breadth, as along the shore. The vessel runs in until the shore is sighted, then stands off for a distance equal to twice the presumed visibility of the object, and then runs in again, parallel to the first course, thereby covering a belt whose breadth is about four times the distance the object should be visible. This method is not recommended for offshore work.

The spiral method: In the spiral method the vessel arrives at the probable position of the object without having found it. She then begins steering courses that approximate a spiral, the successive turns of which are twice as far apart as the distance the object should be visible. The chief advantage of this method is its comparative shortness. Its principal disadvantage is the frequent change of course.

The triangular method: In triangular searching, the vessel steams on three courses sixty degrees apart, describing an ever-increasing triangle. Its only advantage is its simplicity, as the vessel must cruise a greater distance to cover a given area than by either spiral or rectangular cruising.

The rectangular method: In rectangular cruising, the vessel steams along an ever-increasing rectangle, steering only four courses and making right-angled turns. It is simple, effective, and elastic. Its chief advantage is that by laying the original course 45° from the direction of the prevailing wind or sea, the vessel is never rolling in the trough of the sea nor bucking a head wind. In laying out a day's work, courses may be so arranged as to have a fair wind for considerably more than half the time. This method is recommended for practically all offshore work. The rectangles may be practically squares or very much elongated, according to circumstances.

H. G. HAMLET.