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WAR DEPARTMENT

U.S. Dept. of Army

TECHNICAL MANUAL

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PRESERVATION AND CARE OF SEACOAST DEFENSE MATÉRIEL

June 30, 1941

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TECHNICAL MANUAL
No. 4–245

WAR DEPARTMENT,
WASHINGTON, *June 30, 1941.*

PRESERVATION AND CARE OF SEACOAST DEFENSE MATÉRIEL

Prepared under direction of
Chief of Coast Artillery

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This manual supersedes TR 1160–20, July 1, 1933, including C 1, January 2, 1935, and Chapter 5, Part Two, Coast Artillery Field Manual, Volume I, February 1, 1933.

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SECTION I

GENERAL

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1. Scope.—*a.* This manual contains general instructions for the proper care and preservation of ordnance, engineer, signal, and coast artillery matériel employed in seacoast defenses. FM 4–20 and 4–120, including the references to other publications contained therein, describe the care of matériel in the hands of troops and in active use. This manual deals primarily with matériel in the hands of troops and maintenance detachments but not in regular use.

b. Detailed instructions, which apply particularly to certain items of equipment, are published in the manuals or handbooks relating to those items. These publications should be consulted in addition to the general instructions contained herein.

c. Instructions contained herein are published as a guide and are not intended to preclude such additional action as may be necessary on the part of responsible officers to prevent the deterioration, damage, or loss of Government property.

2. General.—*a.* Corps area and department commanders will insure that the duties herein prescribed for personnel, both commissioned and enlisted, assigned to maintenance detachments take precedence over all other duties, except in case of emergency.

b. Periodic exercise of matériel and extent of overhaul prescribed herein are based on normal conditions in temperate climates. Under other conditions, and particularly in tropical climates, the frequency of exercise and the extent of overhaul must be increased as determined by rapidity of deterioration and local experience. Officers conducting technical inspections (see par. 17) should note any special requirements of this nature and see that appropriate instructions are issued. In addition, local ordnance officers, by means of the work chart furnished to the organization (par. 23*b*), should provide for the overhaul of items requiring attention more frequently than herein prescribed.

c. Corps area and department ordnance officers are responsible that ordnance technical publications or portions thereof applying to the operations of organizations and units of the arms in the care and preservation of matériel are made available (par. 9, OFSB No. 3–1).

d. The employment of labor saving devices such as paint spraying equipment, blowtorches, and scaling hammers for cleaning metal and similar equipment is recommended.

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3. References.—*a.* The references listed in the appendix, together with manuals, handbooks, and similar publications covering particular items of matériel, should be consulted. *TM 9-850, describing cleaning and preserving materials issued by the Ordnance Department and the proper uses of these materials, will be found especially valuable in maintenance planning and execution.

b. A file of Ordnance Field Service Bulletins, which contains many details in connection with the care and preservation of ammunition and armament, is maintained by each ordnance agency. Instructions contained in those bulletins form the basis for routine maintenance work (par. 23*b*). The bulletins having particular application to operations prescribed in this manual are listed in the appendix.

SECTION II

CLASSES OF MATÉRIEL

Paragraph

General 4
Class A 5
Class B 6
Class C 7

4. General.—*a.* Classification of seacoast batteries and the matériel pertaining thereto is as follows:

(1) *Class A.*—Matériel assigned to an organization in a primary capacity for purposes of regular and frequent training, together with all installations required to make that matériel effective, is considered as in class A.

(2) *Class B.*—Matériel which is not assigned to an organization for regular and frequent training but which is important to the performance of the mission of a harbor defense is considered as in class B.

(3) *Class C.*—Matériel which is not assigned to an organization for regular and frequent training, and which is not considered vital to the performance of the mission of a harbor defense, but which is capable of furnishing some fire support, is regarded as in class C.

b. As a minimum, there will be designated as class A one complete battery, or one complete unit of submarine mine matériel, together with accessories such as stations, searchlights, and power plants necessary to render it effective as a combat unit, for each lettered battery organization in each active harbor defense. The initial classification of seacoast batteries in the continental United States is prescribed by the War Department in harbor defense projects.

c. The defense commander concerned is authorized to raise the classification of a battery from B or C to A by assigning the matériel to an organization primarily for the purpose of training or mobiliza-

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tion. Likewise, the same authorities may return batteries to a classification not lower than that prescribed by the War Department.

d. In oversea departments, the classification of matériel in A, B, or C will be made by the department commanders.

e. A class B or C battery designated as class A for training or mobilization under *c* above, will be considered as in class A for local maintenance and preservation, but alterations and the supply of equipment and ammunition will be based on its project status as a class B or C battery.

5. Class A.—*a.* Instructions for the care and preservation of matériel and equipment in class A are contained in the following publications:

Seacoast Artillery—chapter 6, FM 4-20.
Antiaircraft Artillery—chapter 5, FM 4-120.

b. If a battery is in class A, all of its stations and equipment, together with normally assigned searchlights and plants which provide necessary power, will be considered as being similarly in class A. This matériel will be maintained at all times in such condition as to permit of its being prepared for service by a full strength manning party in not to exceed 24 hours.

6. Class B.—*a. Maintenance year.*—(1) The maintenance year is divided into two periods which will be known as the "active" and "inactive" seasons. The "active" season will extend for a period of approximately 6 months, to be designated by the defense or department commanders; while the "inactive" period will extend throughout the remainder of the year. Annually in January, defense commanders should inform interested corps area commanders of the periods designated as active seasons in order that the latter may coordinate their technical inspections (par. 15).

(2) During the active season, all matériel will be placed in operating condition, fully assembled except as noted elsewhere in this manual, and will be maintained in such condition as to permit of its being prepared for service by a full strength manning party in not to exceed 24 hours. During the inactive season, matériel will be maintained as hereinafter prescribed and in such manner as to permit of its being prepared for service by a full strength manning party in not to exceed 72 hours.

(3) An inspection period, as defined in paragraph 15, will be designated during which all elements, including fire-control instruments, communication equipment, and other accessories, will be kept in their battery positions. All heavy grease and other similar preservative coatings will be removed from the bores and other bright metal parts,

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and, in general, armament, power equipment, and ammunition-handling systems will be maintained in readiness for action.

b. Paints, preservatives, and lubricants.—(1) During the inactive season, bores and bright metal parts, after being thoroughly cleaned and dried, will be coated with appropriate rust-preventive compounds. These compounds should be applied during warm weather. It is most important that all surfaces be thoroughly cleaned and dried prior to application and that the work be thoroughly and carefully done to insure that no surfaces remain exposed. *TM 9-850 should be consulted in connection with the application of proper preservatives.

(2) All surfaces of ferrous metal which require painting for proper preservation will first be thoroughly cleaned to remove all old paint, rust, and scale and then painted with one coat of red lead. Ordnance matériel such as guns, carriages, shop trucks, and subcaliber equipment will be given a final finish of two coats of enamel, synthetic, olive drab, lusterless. Emplacement accessories, such as doors, handrails, ceiling beams, trolley rails, power and light cables and ammunition-handling devices (shot hoists, trolleys, and blocks), will be given a final finish of two coats of good quality black bituminous paint. The use of paint on concrete surfaces is considered unnecessary for purposes of preservation. The application of approved preparations (such as asphalt emulsion) for the prevention of seepage and for concealment is authorized.

(3) All means of lubrication, including grease cups, handy oilers, oil cups, oil holes, and passages will be thoroughly cleaned and kept filled with prescribed lubricants, which should be forced into all bearings. To secure best results, mechanisms should be operated while lubricants are being applied. Missing grease cups, oilers, or plugs will be replaced promptly. When necessary, temporary means will be devised to keep water and dirt out of the oil or grease passages.

(4) Oil cups, grease cups, and oil-hole plugs will be painted red. Handy oilers and oil holes not provided with oil plugs will have a red ring painted around them. In cases where this is prevented by inaccessibility, red arrows pointing to such handy oilers or oil holes will be painted upon the nearest convenient surface. When matériel has been painted, responsible officers will personally verify that all such oil cups, grease cups, and oil holes have been indicated in the prescribed manner.

(5) Other parts of nonferrous metal will be kept in their natural state of the finished surface.

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(6) Suitable paints, preservatives, and lubricants are prescribed by the appropriate supply services. These will be employed for the purposes for which provided.

c. Covers and housings.—(1) Muzzle and breech covers and canvas covers for generators and searchlights will be maintained in a state of good repair. Muzzle and breech covers will be used to the exclusion of wooden tompions or breech plugs. During the inactive season, three or four layers of burlap saturated with rust preventive may be tied over the muzzles and breeches of cannon, provided the prescribed covers are not available.

(2) There is no objection to the use of penthouses or other improvised shelter where warranted by prevailing weather conditions.

d. Equipment and accessories.—(1) During the inactive season, equipment such as subcaliber guns and firing mechanisms pertaining to seacoast armament, after being suitably prepared, will be stored in their respective boxes or chests in a dry place. Tools may be kept on display boards provided that such action does not cause deterioration.

(2) All accessories, such as ammunition trucks, loading equipment, and maneuvering equipment will be kept clean, properly painted where appropriate, adequately tagged and, when not in use, neatly stored in suitable storehouses. Ammunition trucks will be inverted or blocked up so that all weight is removed from tires and so that wheels may be spun freely. (See AR 850–18 of storage of motor vehicle equipment.)

(3) During the active season, equipment and accessories will be kept cleaned, oiled, and ready for use.

e. Breech mechanisms.—(1) During the active season, all breech mechanisms will be kept cleaned and oiled and will be completely assembled and mounted on their respective cannon, ready for use. Exception may be made in the Tropics, provided such action does not contravene the provisions of *a*(2) above.

(2) (*a*) At the beginning of the inactive season, obturator spindles with mushroom heads, split rings, and filling-in disks, pertaining to cannon which use separate loading ammunition, will be removed, thoroughly cleaned, dried, slushed, and suitably stored. Vent holes will be thoroughly cleaned and filled with preservative. Gas-check pads will be removed and cleaned with a wet sponge and wooden scraper, and after being thoroughly dried, will be coated with graphite grease. Gas-check pads will be stored in the containers which are provided for them. The obturator spindle holes will be filled with waste or burlap soaked in rust-preventive compound.

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(*b*) Cannon using fixed ammunition will have their breech mechanism removed, disassembled, thoroughly cleaned, properly slushed and stored, or reassembled.

(3) All parts, when removed from the cannon to which they pertain, should be carefully marked with tags securely attached bearing the name of the battery from which removed, together with the gun model and serial number. Temporary record of place of storage will be made in each case and filed in the emplacement book pertaining to the battery concerned (see par. 19).

f. Disappearing carriages.—(1) During the active season, disappearing carriages will be tripped and retracted at least once a month.

(2) During the inactive season, frequency of tripping will be based upon climatic conditions and will be as prescribed by harbor defense commanders. In preparing these units for the inactive season, all moving components will be maneuvered to insure that lubricants reach all bearing surfaces. While "in battery," these carriages will have the top portion of the crosshead guides and rear portion of the recoil roller paths covered with a coating of rust preventive. The gun will then be retracted until the gun levers are within about 2 inches of the recoil buffer. The lower portion of the crosshead guides, exposed portion of the piston rods, recoil rollers, and paths, and other exposed machined surfaces, except traversing rollers and paths, will be covered with a coating of rust preventive. Followers on cylinder heads should be set up as tightly as can be done by two men working with the wrench provided. Condition of packing should be checked before this is done. Tripping levers will be removed or securely fastened down, and retracting cables will be removed from hooks.

g. Barbette carriages.—(1) Three-inch, 6-inch, 12-inch gun carriages, M1892, and 12-inch mortar carriages, M1908, should be retracted once during the active season. In preparation for the inactive season, these units will be placed in "from battery" position, and the sliding portion, together with the interior of the cradle, will be thoroughly cleaned and lubricated with the prescribed lubricant, after which they will be placed in the "in battery" position.

(2) Eight-inch, 12-inch, M1917, 16-inch gun, 16-inch howitzer, and 12-inch mortar carriages, M1918, will all be left in the "in battery" position. All grease cups will be kept filled and run down sufficiently to insure thorough lubrication for the sliding portions of the guns and the interiors of the cradles.

h. Recoil and recuperator systems.—(1) All recoil and recuperator systems, except hydropneumatic systems, will be kept as full as

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possible of the prescribed liquid at all times. Hydropneumatic recoil mechanisms will be filled according to special instructions contained in manuals pertaining to the matériel involved. At least once every two years all recoil and recuperator systems permitted to be disassembled in the field will be completely disassembled and carefully inspected for rust or corrosion. A record of this inspection will be entered in the battery emplacement book (par. 19*b*(5)(*c*)). Hydropneumatic recoil mechanisms that are permitted to be disassembled in the field will be disassembled only under the supervision of the local ordnance officer. Systems will be thoroughly cleaned, dried, and placed in first-class condition throughout before being reassembled. Under no circumstances will emery cloth or other abrasives be used for removing discolorations. Kerosene or leaded gasoline will not be used for cleaning. The proper cleaning fluid issued by the Ordnance Department (*TM 9–850) will be used for this purpose.

(2) While it is realized that the present system of leaving recoil cylinders with a certain amount of void in them will result in some rust accumulating on the top element of the cylinders and pistons, experience during the past 30 years indicates that this accumulation of rust in no way affects the serviceability of the carriages; and as it will be necessary, in any case, completely to empty and clean recoil cylinders every 2 years, no extensive injury is expected.

i. Fire-control and sighting equipment.—(1) At the end of the active season, telescopes pertaining to fire-control and sighting equipment will be thoroughly cleaned and will then either be placed in their cases and stored in a suitable place, or be remounted on their bases in their proper stations. The method of storage will be determined by harbor defense commanders; such determination being based upon considerations of preservation and protection against theft and vandalism. Care will be taken to prevent grease getting on optical parts. Dunnage should be placed on floor to insure air circulation. Heavy pedestals for instruments will not be removed from their fastenings but will be prepared in position in such manner as to prevent deterioration. Pedestals for coincidence range finders which are exposed to the weather should have temporary sheds constructed over them. Except during inspection periods and subject to the provisions of *a*(2) above, harbor defense commanders are authorized to direct the removal and local storage of fire-control equipment for purposes of more effective preservation or to prevent theft or vandalism.

(2) Dry papers form an efficient packing material. Up to a certain point of saturation, such paper prevents the access of moisture

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to the instrument. Every 3 months, cases selected at random should be opened and telescopes should be examined for signs of deterioration. The frequency with which paper should be renewed is dependent upon climatic conditions and must be determined locally in each case. Instruments stored on bases should be examined once each month.

(3) Plotting room equipment may be stored or left in place in the discretion of harbor defense commanders. Due regard will be given to the possibilities of deterioration, theft, or vandalism.

(4) All fire-control and sighting equipment in storage will be carefully tagged with the name of the station and battery to which it pertains, and the place from which removed will be tagged to show place of storage. Temporary record will be made in emplacement books to show place of storage. In no case will such equipment be removed from its proper harbor defense assignment without War Department authority.

(5) Leather instrument cases will be kept in repair and the leather will be kept properly oiled.

j. Miscellaneous parts.—All traversing rollers and paths will be cleaned, dried, and thoroughly coated with cup grease at the beginning of the inactive season. All other exposed machined surfaces will be cleaned, dried, and thoroughly coated with rust preventive at the beginning of the inactive season and at such intervals during the inactive season as circumstances may require. During the active season, these surfaces will be kept cleaned and oiled with appropriate lubricants. All carriages will be traversed, elevated, and depressed within their limits at least twice a month during the active season and, unless otherwise authorized by corps area and department commanders, traversed at least once a month during the inactive season.

7. Class C.—*a.* Class C matériel will embrace only such fixed armament as is so designated (par. 4*b*). Maintenance of this class will ordinarily be such that more than 72 hours will be required to restore the armament fully to an active condition. Such restoration, however, normally should be accomplished by a full strength manning party in less than 15 days.

b. This matériel will be stripped of such parts as are easily removable. Such parts, together with equipment, tools, and accessories, will be permanently stored after having been first thoroughly cleaned and treated with suitable rust preventive. All machined surfaces of ferrous metal will be cleaned and treated with white lead or similar protective application (see *TM 9-850). All ferrous and nonferrous metal parts not treated with preservative will be painted the regu-

*See Appendix.

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lation color. At least once a year inspection should be made of this matériel to assure that preservative measures are effective in furnishing necessary protection. At least once every 3 years this matériel will be placed in operating condition and thoroughly inspected; a record of this inspection will be entered in the emplacement book.

c. To prevent settling of base rings in important sectors, carriages will be traversed so that guns point toward some part of the field of fire where action would be unlikely, and no further effort will be made toward maintenance while in inactive status except as prescribed below.

d. Inspecting officers will require small areas of machined surfaces, selected at random, to be cleaned, and should deterioration be observed, they will give such instructions as appear necessary to proper preservation.

e. Emplacement books of batteries placed in class C will show the authority for such classification as well as the place of storage of equipment, parts, and accessories which have been removed.

SECTION III

AUXILIARY EQUIPMENT AND AMMUNITION

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Power plants	8
Searchlights	9
Communications	10
Ammunition	11

8. Power plants.—*a.* All power plants will be operated under normal load at least ½ hour per week. Generating sets will be kept clean, properly painted, and in such condition as to permit operation with minimum delay. Approved antifreeze solutions will be used in radiators when freezing weather may be encountered. For detailed instructions on the preservation and care of local power plants, see books of instruction which accompany the sets. The cautions and directions contained in these books will be carefully observed. An instruction book will be kept with each set in a readily accessible place. Generating sets should be thoroughly overhauled every 3 years.

b. During winter months in localities where freezing weather is common, when so authorized by harbor defense commanders, the following procedure may be carried out in lieu of the weekly operation:

(1) At the beginning of the cold season change cylinder oil and run plant for 15 minutes. If the unit has not been used during preceding month, it will not be necessary to change the cylinder oil.

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(2) (*a*) *Gasoline generating sets.*—Remove flanges closing cylinder water jackets, and clean jackets thoroughly. Flush out radiator and cooling system with a sal soda solution (1 pound soda to 3 gallons water) for 15 minutes. If soda ash is used the mixture should contain ½ pound soda ash to 3 gallons water. Drain solution. Refill with clear water and run for 30 minutes to clean system of soda. Drain water; leave cock open. Crank engine 10 revolutions in reverse manner to clear pump of water.

(*b*) *Diesel generating sets.*—Remove flanges closing cylinder water jackets and clean jackets thoroughly. Drain water; leave cock open. Crank engine 10 revolutions in reverse manner to clear pump of water.

(3) Remove cylinder heads. Scrape out carbon from piston heads and valve seats. Coat interior of cylinder, valve seats, and valves with light cylinder oil. Cover the piston heads with ⅛ inch of light cylinder oil. In the case of 25 kw. sets, GM–12, remove the three plugs from the ports in the top of each cylinder. Through the center port pour ½ pint of light cylinder oil over each piston head. Pour a small quantity of similar oil over each intake and exhaust valve head and valve seat, and turn motor over by hand at least six times to insure that valve heads, valve seats, and cylinder walls are well lubricated.

(4) Remove handhole covers, and coat all possible mechanisms with oil.

(5) Replace cylinder heads or port plugs so that in any emergency power plant may be run even with excess oil present.

(6) Turn over plant by hand once a week at least 10 revolutions, thus insuring reoiling of cylinder walls by excess oil on top of piston heads. The fact that these plants have been turned over will be made of record.

(7) At end of cold season, remove cylinder heads, wipe off oil, examine parts for rust, and replace cylinder head. In the case of 25 kw. sets, GM–12, remove cylinders, scrape out all carbon, remove all rust, wipe clean, and replace cylinders. Oil crankshaft bearings by hand through handhole covers. Fill cooling system, clean all ignition connections and plugs, and operate for about 15 minutes.

9. Searchlights.—Searchlights will be kept clean, properly painted, and in operating condition at all times. Lights will be operated during the time power plants are running for a sufficient period to insure that they are in satisfactory operating condition. For detailed information, see instruction pamphlets which accompany each light.

10. Communications.—Radio sets, fire-control telephones, fire-control switchboards, time interval systems, cable lines, electrical

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data-transmission systems, and other fire-control communication matériel will be maintained in operating condition at all times. Except during inspection periods, and subject to the provisions of paragraph 6*a*(2), harbor defense commanders are authorized to direct the removal and local storage of communication equipment for purposes of more effective preservation or to prevent theft or vandalism. In such cases, such of this equipment as pertains to class B elements will be fully restored to its active location and tested prior to the beginning of each annual inspection period. That pertaining to class C elements may be kept in storage and there inspected. If desirable, potheads may be removed from cable pertaining to class C elements and either replaced by sealed terminal chambers or the ends of the cable may be sealed with lead. Dry batteries will be removed from all equipment which is to be stored for a longer period than 24 hours in the Tropics, or 1 week in other climates. Communication plants are to be maintained in such condition as to satisfy the requirements of the regular Signal Corps inspections.

11. Ammunition.—Ammunition will be stored and cared for in accordance with existing regulations. (See list of references in appendix.)

Section IV

SUBMARINE MINE INSTALLATIONS

	Paragraph
General	12
Cable	13
Generating sets	14

12. General.—Detailed instructions for the maintenance of shore installations pertaining to submarine mines will be found in *TM 4–220. The instructions contained in this manual will be carefully observed and followed in all matters affecting the care and preservation of submarine mine matériel.

13. Cable.—See instructions contained in *TM 4–215. Cable tanks habitually will be kept filled. They may be drained for short periods in severe weather only when no other means can be employed to prevent structural damage from freezing.

14. Generating sets.—These sets should be operated at least 15 minutes three times per week, and in no case will they be run less than ½ hour per week. Sufficient antifreeze solution will be used in cooling systems to make winter draining unnecessary. Seasonal changes in lubricants will be made as provided in instructions contained in manufacturers' handbooks furnished with each set. Whenever generating sets are operated, the entire casemate installation also will be put into operation.

*See Appendix.

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SECTION V

INSPECTIONS

Paragraph
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By higher commanders 16
Technical 17

15. Periods.—In the case of class B matériel, corps area and department commanders will designate for each harbor defense annual periods of not less than 1 month as "inspection periods." The inspection period should be during the active season and, when the strength of the garrison is adequate, it will extend over the entire active season (par. 6*a*(1)). All detailed tactical inspections of matériel, including ordnance armament inspections and inspections of Signal Corps installations, will be confined to these periods. Corps area and department commanders will advise the War Department annually, in January, as to the inspection periods designated so that full cooperation may be given in confining detailed inspections to the periods designated. The foregoing is not intended to preclude inspections at any time by responsible commanders to determine whether the provisions set forth herein are being carried out. However, such inspections should not require extensive advance preparation.

16. By higher commanders.—*a.* (1) Defense or department commanders will cause coast artillery district and harbor defense commanders to make such personal inspections as may be necessary to insure that the provisions of these instructions are being observed and to satisfy themselves that one of the primary missions of the Coast Artillery Corps, given below, is being effectively accomplished:

The War Department considers that, under present conditions, one of the primary missions of the troops of the Coast Artillery Corps assigned to harbor defenses in the continental United States is the maintenance of the armament of those harbor defenses in a condition to permit its effective employment in the early phases of any major emergency.

(2) In addition to the foregoing, maintenance expenditures in harbor defenses should be examined periodically. (See par. 22.)

b. These inspections may be supplemented by inspections to be made by representatives of the Chief of Coast Artillery at various times.

c. Emplacement and fort record books will be examined by inspecting officers with sufficient frequency to insure that they are kept up-to-date and contain all pertinent data.

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17. Technical.—*a.* Corps area and department ordnance and engineer officers are responsible under corps area and department commanders for making sufficiently frequent and detailed technical inspections to insure that matériel in the hands of troops is kept in the condition contemplated by these regulations and that the prescribed records of matériel are kept up-to-date.

b. The condition of Signal Corps matériel and equipment in the hands of these detachments will be checked by Signal Corps inspectors in person during the annual inspection of communication plants in place. Local commanders will make such additional tests as may seem necessary.

c. During technical inspections, any requirements for more frequent exercise or more extensive overhaul of matériel than herein prescribed should be noted and arrangements made by inspectors for the issue of appropriate instructions (par. 2*b*).

Section VI

REPORTS, RECORDS, AND FORMS

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18. Gun and motor books.—Gun and motor books will be kept up-to-date in accordance with the instructions contained therein. The Artillery Gun Book (O. O. Form 5825) is required for each mobile gun; the Ordnance Motor Book (O. O. Form 5956) for each ordnance motor vehicle; and the Motor Vehicle Service Record Book (Q. M. C. Form No. 248) for all other vehicles, including trailers.

19. Battery emplacement book.—*a. General.*—(1) A battery emplacement book will be kept for each fixed and mobile gun, howitzer, and mortar battery assigned to a seacoast fortification.

(2) The battery emplacement book will constitute a permanent record of important information concerning the battery. This book will be corrected to date and kept in the manner prescribed below. All entries made therein will be dated and initialed by the officer making the entry.

(3) The sources of all important measurements, dimensions, and similar data should be indicated clearly in a manner to facilitate

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later check or verification. Rectangular coordinates should be referred to the same grid system used in the harbor defense project.

(4) This book will contain in legible form the data called for below, and in the order set forth in the headings and subheadings. An index will be kept. Where the information called for under any heading cannot be obtained or does not apply, notation will be made to that effect. Bulky documents, such as copies of firing records, firing tables, and sketches, drawings, or blueprints which cannot be furnished in convenient size, may be filed separately; in each case, the title of the document and the location of the separate file will be entered in the book under the appropriate heading or subheading.

(5) The battery emplacement book will be classed as *confidential.*

(6) When a battery has been eliminated from the harbor defense project, and after the guns have been removed and the carriages have been dismantled, data of value to other elements will be transferred to other emplacement books or to the fort record book, as may seem appropriate; other data will be destroyed and the binder, if serviceable, together with blank sheets, will be turned in to harbor defense headquarters for replacement purposes.

b. Seacoast artillery.—The emplacement books for seacoast artillery batteries will contain all pertinent data listed below.

(1) *Name.*—The name of the battery, citation of authority therefor, and a brief reference to the person for whom named.

(2) *Position-finding system.*—(*a*) Whether standard or provisional; date of installation.

(*b*) List of stations, including battery commander's station; observing stations; emergency stations; plotting room. Dates of construction; limiting azimuths of fields of view; azimuths and ranges to established datum points and principal points of the harbor; heights above mean low water of tops of concrete pier mounts for the range finding instruments; heights above mean low water of axes of range finding instruments; lists of articles of equipment of the stations, giving models and serial numbers of instruments, except communication instruments.

(*c*) Azimuths and lengths of baselines.

(*d*) Rectangular coordinates for directing point of battery, all stations, established datum points, and principal points of the harbor.

(*e*) Distances and azimuths from BC station to observing stations; distance and azimuth from BC station to group commander's station.

(*f*) A complete description of any improvised system of position finding to be used in an emergency (par. 18, FM 4-15).

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(3) A sketch showing the azimuths and lengths of all baselines pertaining to the battery; the azimuths and ranges of datum points and principal points of the harbor from battery commander's station, observing stations, and directing point of the battery.

(4) *Communications.*—Date and character of installation (standard or provisional); date of important modifications.

(5) *Emplacements.*—Show separately in numerical or alphabetical order—

(*a*) *Date of construction.*

(*b*) *Gun* (*howitzer or mortar*).—Caliber; model; serial number; place and date of fabrication, with name of manufacturer; date of mounting; under whose supervision mounted; limits of elevation of gun (howitzer or mortar) as mounted and emplaced; total serial number of shots fired.

(*c*) *Carriage.*—Model; serial number; place and date of fabrication, with name of manufacturer; date of mounting; under whose supervision mounted; dates of dismounting; under whose supervision dismounted and remounted; dates and results of all accurate tests for level, giving names of officers under whose supervision tests were made; amount of counterweight on hand; data of throttling valve setting, including date, setting, temperature, and recoil; a tabular statement showing dates of painting gun (howitzer or mortar) carriage, cleaning recoil cylinders (par. 6*h*(1)), and conical rollers and paths.

(*d*) *Sights* (*or quadrants*).—Models; serial numbers.

(*e*) *Azimuths and distances.*—Height above mean low water of axis of gun (howitzer or mortar) trunnions in firing position; limits of traversing; azimuths and distances to the other guns of the battery and to the directing point; azimuths and ranges to established datum points and principal points in the harbor for use in orientation; an accurate description of the location of the points used in orientation of mortars.

(*f*) *Ammunition supply.*—Capacities, in rounds, of projectile rooms and service magazines; number of powder charges for which storage room is provided in the main or storage magazine; quantities, types, and storage locations of ammunition components of the battle allowance; kinds of hoists.

(*g*) *Material alterations* in gun and carriage; defects that have proved incapable of remedy or which it has been officially decided not to remedy, authority for decision being given; any peculiarity of equipment requiring special care or unusual mode of operation.

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(*h*) *Record of inspections* made under authority higher than that of the harbor defense commander; entry will be made of each defect, deficiency, or irregularity noted and of the remedial action taken.

(6) *Gun differences.*—Data for obtaining gun differences.

(7) *Elevation tables.*—Copies of elevation tables corresponding to the range drums provided for the battery. Care should be exercised that the elevation tables filed are the same as those which were actually used in graduating the range drums, since they provide the simplest and most direct data for checking the settings of the drums.

(8) *Firing tables.*—Copies of all firing tables and range scales required for use in connection with the battery including a Range-Range Relation Table embodying a tabulation of the range relationship for all projectiles which the battery may be required to fire.

(9) *Correspondence.*—Copies of all *important* letters sent and received concerning the material of the battery and of which the contents are not required by this manual to be entered elsewhere under a specific head.

(10) *Records of firings.*—Retained copies of reports of all firings, including calibration firings. Report of calibration firing filed with emplacement book will contain record of any change in adjustment of indices of elevation scales as a result of such firing.

(11) *Battery commanders.*—Lists of battery commanders and organizations that have served at the battery, giving dates of service, if obtainable from the records of the post.

(12) *Blue prints*, showing the following:

(*a*) Emplacements of the battery.

(*b*) Drainage system of the battery.

(*c*) Electric circuits of the battery.

c. Antiaircraft artillery.—The emplacement books for antiaircraft gun batteries will contain all pertinent data listed below.

(1) *Designation.*—The designation of the battery, with a citation of the authority therefor, its general location, and dates of construction.

(2) *Mission.*—(*a*) Statements of the primary mission of the battery and its relation to other installations in the seacoast fortification.

(*b*) A general layout showing fields of fire of the battery, installations it is required to protect, including priorities designated in the mission, and locations of other elements of the fortification influencing the actions of the battery; azimuths and ranges to datum points should be given.

(3) *Safety.*—A description or layout to show any special features or local safety requirements which influence the employment of the battery.

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(4) *Fire-control system.*—Sketches of the battery to show such of the following as are applicable:

(*a*) Locations of gun, searchlight, director, and height-finder positions.

(*b*) Locations of altimeter, spotting, and observing stations.

(*c*) Layout of data transmission system.

(*d*) Wiring diagram of the communication system to include connections into the harbor-defense communication system.

(*e*) Rectangular coordinates of gun directing point; director and height-finder positions; altimeter and spotting stations; datum points.

(*f*) Azimuths and lengths of altimeter baselines; spotting baselines; line from directing point to director offset position.

(*g*) Parallax settings for each offset position of the director.

(5) *Equipment.*—A list of the principal items of equipment of the battery with model designations, serial numbers, dates of receipt or installation, and storage locations. Components of principal items, to include guns, mounts, data indicators, tracking telescopes, power plants, and handbooks, will be included in this listing. Any articles of fire-control equipment substituted for or used in place of standard articles of equipment should be described and the reasons for their use stated.

(6) *Ammunition.*—(*a*) List of firing tables for all standard types of ammunition applicable to the battery, with filing location of those on hand indicated.

(*b*) Quantities, types, and storage locations of all ammunition assigned to the battery for war use.

(7) *Functioning records.*—(*a*) Trial Shot and Calibration Report (Form AA–3) and Matériel and Powder Report (Form AA–7) for all firings conducted by the battery.

(*b*) Records of all alterations and modifications to matériel, dates accomplished, and authority; defects that have proved incapable of remedy, authority for the decision being given; any peculiarity of equipment requiring special care or unusual mode of operation.

(*c*) Record of inspections made under authority higher than that of the harbor defense commander; entry will be made of each defect, deficiency, or irregularity noted by the inspector for action and of the remedial action taken.

(8) *Correspondence.*—Copies of all important letters sent and received concerning the matériel of the battery and of which the contents are not required by these instructions to be entered elsewhere under a specific head.

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(9) *Personnel.*—List of battery commanders and organizations that have served at the battery, giving dates of service.

20. Mine group record book.—*a.* A mine group record book will be kept for each mine group, which will constitute a permanent record of the important information concerning the mine group. This book will be corrected to date and kept in the manner prescribed. It is a *confidential* record.

b. All entries made therein will be dated and initialed by the officer making the same.

c. This book will contain in legible form the data called for below, and in the order set forth in the headings and subheadings. An index will be kept. Where the information called for under any heading cannot be obtained or does not apply, notation will be made to that effect. Bulky documents, such as copies of firing records, firing tables, and sketches, drawings, or blueprints which cannot be furnished in convenient size, may be filed separately; in each case, the title of the document and the location of the separate file will be entered in the book under the appropriate heading or subheading.

(1) *Number of mine group.*

(2) *Fire-control system.*—(*a*) *Stations and equipment.*—List of stations, including mine group commander's station, observing stations, emergency stations, and plotting rooms; their dates of construction, limiting azimuths of field of view, azimuths and ranges to established datum points and principal points of the harbor; heights above mean low water of tops of pedestals for instruments; heights of axes of telescopes above tops of pedestals; heights above mean low water of axes of instruments; lists of articles of equipment of stations, giving models and serial numbers of instruments, except communication instruments.

(*b*) *Base lines.*—Azimuths and lengths of horizontal baselines. Data for checking plotting boards.

(3) A *sketch* showing the azimuths and lengths of all mine group baselines pertaining to the mine group, and the azimuths and ranges of datum points and principal points of the harbor from the mine group commander's station and observing stations. Sketch will bear the date it was drawn and the date of approval of mine project for which it was prepared.

(4) *Names of the batteries* assigned to the mine group, stating caliber and model of guns; kind and model of carriages.

(5) *Communications.*—Date and character of installation, standard or provisional. Date of important modifications.

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(6) *Mining casemate.*—(*a*) *General.*—Dimensions of all rooms, date of construction, and when received by the Coast Artillery Corps.

(*b*) *Operating room.*—A list of all submarine mine equipment installed, which is classified as "supervised" in Table of Allowances for Submarine Mine Projects. Code numbers and nomenclature will be those used in the above tables. Important modifications or repairs to equipment.

(*c*) *Engine room.*—Name, type, serial number, rating, and date of installation of all generating apparatus therein, including starting batteries. Important modifications or repairs to equipment.

(7) *Mine matériel.*—(*a*) Number of groups of mines in project.

(*b*) Amount, kind, classification, and date of last annual test of cable.

(*c*) Under each group of mines—

Type and size of anchor, mine case, and mooring rope to be used.

Depth of water.

Length and kind of mooring rope.

Length and kind of cable.

Kind of case.

Kind of bottom.

(8) (*a*) *Mine boats.*—Type, serial number, or name of those on hand; kind and names of commercial boats available as auxiliary planters, with names and addresses of owners; a statement showing where emergency equipment is stored.

(*b*) *Distribution box boats.*—Type, serial number, length, beam, draft, date of manufacture, and date of receipt at station, with kind, serial number, and name of manufacturer of gas motor. Any peculiarity of engine operation should be entered.

(*c*) *Motor yawls.*—Type, serial number, length, beam, draft, date of manufacture, and date of receipt at station, with kind, serial number, and name of manufacturer of gas motor. Any peculiarity of engine operation should be entered.

(9) *Buildings and wharves.*—(*a*) *Loading room.*—Date of construction, dimensions, facilities for handling material, and when received by Coast Artillery Corps.

(*b*) *Storeroom.*—Date of construction, dimensions, facilities for handling material, capacity of crane if installed, and when received by Coast Artillery Corps.

(*c*) *Cable tank.*—Date of construction, dimensions and capacity in reels, water supply including whether salt or fresh, facilities for handling reels, and maximum weight and size of reels that can be handled,

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capacity of crane if installed, and when received by Coast Artillery Corps.

(*d*) *Explosive room.*—Date of construction, dimensions, and when received by Coast Artillery Corps.

(*e*) *Terminal huts.*—Dates of construction, locations, dimensions, and when received by Coast Artillery Corps. Also distances and routes to nearest points to which boats can approach for landing shore cables.

(*f*) *Mine wharves.*—Dates of construction, dimension, facilities for handling material, and depth of water at wharf head at mean low water, and when received by Coast Artillery Corps.

(10) *Explosives.*—(*a*) *Trotol.*—When received, where stored, amount on hand, amount required for project.

(*b*) *Any other explosive.*—When received, where stored, amount on hand, amount required for project.

(11) *Charts and maps.*—Hydrographic maps of mine fields and contiguous waters with direction and velocity of currents (tidal and otherwise) and character of bottom. Soundings along lines of mines and routes of shore cables.

(12) *Blueprints showing.*—(*a*) Casemate wiring. (One to be kept in the mine group record book, one to be framed and hung in the mine casemate.)

(*b*) Wiring of mine group commander's station, observing stations and terminal strips, with legend. (One to be kept in the mine group record book, one to be framed and hung in the corresponding station.)

(*c*) Cable ways, from casemate to terminal huts, showing number and kinds of ducts, manholes, cables laid, and shore ends. (One to be kept in the mine group record book and one in the mining casemate.)

(13) *Correspondence files.*—Copies of all important letters sent or received concerning the matériel of the mine group and of which the contents are not required by these regulations to be entered elsewhere under a specific head.

(14) *Records of firings.*—Retained copies of reports of all mine firings.

(15) *Mine group commanders.*—Lists of mine group commanders and organizations that have served in the mine group, giving dates of service, if obtainable from records of the post.

(16) *Inspections.*—Record of inspections by higher authority, together with defects noted and remedial action taken.

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(17) *Incidents.*—Any unusual items developed during mine planting which would be of service to mine group commanders in connection with planting in this particular harbor. (It is especially desired that accumulation of ordinary incidents which are not peculiar to the harbor be omitted under this head.)

21. Fort record book.—Instructions for keeping the fort record book are contained in paragraph 7, AR 90-50.

22. Expenditures.—Harbor defense commanders should be familiar with expenditures for maintenance purposes within their harbor defenses for the upkeep of engineer, ordnance, or signal matériel. No special accounting system will be maintained for this purpose. Data will be obtained from the normal routine reports, copies of which will be furnished to harbor defense commanders by appropriate staff officers.

23. Daily records.—The following system of daily records has been found to present certain advantages and the use of some such system is recommended:

a. The man in charge of each battery, or other matériel, is given a "log book" made up of about 100 sheets of legal cap paper. He is required to keep therein a daily log of the work done by him and his helpers. This log is kept in the first half of the book. The last half is an inspection record or space reserved for inspectors to note at the time of inspection such deficiencies as may be observed. Sheets are ruled and headed as follows:

Date	Inspector	Deficiency	Action taken	Date corrected	Initials
3-6-33	HD 00	Rust on piston rod	Rust removed and rod redoped	3-7-33	J. H. L.

During each visit to the battery, the inspector consults this log and determines whether or not the deficiencies noted at the last inspection have been corrected; then he inspects the parts concerned to see if this corrective action is adequate.

b. In addition to the log book, the man in charge of each battery is furnished by the local ordnance officer with a "work chart" which lays out routine work to be accomplished over a period of 3 or 4 months' time. (See pars. 2*b* and 3*b*.) He consults this chart daily, performs the work indicated thereon, and initials the chart when a particular job is completed. Inspectors scan these charts to see that they are being properly kept and that the work laid out is actually accomplished. Samples of work sheets follow.

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BATTERY _____ TYPE OF CARRIAGE_____
(Guns)

WORK SHEET_____ to _____
(Date) (Date)

DUTY	DATE						
Check and refill recoil cylinders.							
Check and refill stuffing box with packing if necessary.							
Test float of trunnion bearing (0.005-inch clearance); elevate electrically.							
Oil holes cleaned and oiled.							
Oil elevating and traversing mechanisms.							
Oil teeth of all gears.							
Fill compression grease cups to bottom of bevel at the top of cup, and screw down.							
Traverse between stops. Oil pintle surfaces.							
Remove inspection plates on roller paths, and redope if necessary.							
Examine entire carriage and see that all assembling bolts are screwed up to their proper fittings.							
Sweep out magazines.							
Oil chains and blocks.							
Oil shot trucks.							
Oil shot tongs.							
Check and refill recoil cylinders on 75-mm gun.							
Clean all bearing surfaces on 75-mm gun.							

NOTES.—The schedule as indicated on this work sheet will be followed. Initials will be entered in the appropriate date column opposite the particular work indicated upon completion of the job.

This work sheet will be kept up-to-date at all times and will be presented to the inspecting officer upon his arrival at the battery.

Under no circumstances will anyone but the ordnance machinist be allowed to refill or work on the Waterbury hydraulic speed gear. This gear will be inspected by the ordnance machinist once each month.

All recoil cylinders must be filled to overflowing.

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BATTERY_____
(12-in. mortars)

WORK SHEET_____ to _____
(Date) (Date)

DUTY	DATE						
Check and refill recoil cylinders.							
Oil elevating racks and gears.							
Oil traversing mechanism, including pintle surfaces.							
Oil teeth and gears.							
Examine rollers; see that dust guards are in place.							
Fill compression grease cups to bottom of bevel at the top of cups; screw down.							
Traverse carriages through 360° and leave at different azimuth after each test; elevate and depress the mortar between stops.							
Oil shot trucks.							
Oil shot tongs.							
Oil chains and blocks.							
Sweep out magazines.							

NOTES.—Oil holes to be closed at all times except while oiling.

In oiling the pintle bearing surfaces, the carriage must be traversed in order to distribute the oil throughout the whole circumference.

If any leakages occur from the hydraulic recoil system, report same to resident machinist.

The schedule as indicated on this work sheet will be followed. The work sheet will be presented to executive officer or ordnance officer upon arrival at battery for inspection. Initials will be entered in the squares by dates as provided above after completion of the work.

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APPENDIX

LIST OF REFERENCES

Ammunition:	
Antiaircraft	TM 9–1920 (now published as TR 1360–3A).
Coast artillery	FM 4–205.
General	TM 9–1900 (now published as TR 1370–A).
Harbor defense and railway artillery	TM 9–905.
Cleaning and preserving materials.	TM 9–850 (now published as TR 1395–A).
Coast artillery weapons and matériel.	TM 4–210.
Formations, inspections, service, and care of matériel:	
Antiaircraft artillery	FM 4–120.
Seacoast artillery	FM 4–20.
Handbook of antiaircraft artillery.	TM 9–2410.
Handbook of coast artillery matériel.	TM 9–2400 (now published as O. D. Doc. 2042—1923).
Railway artillery, characteristics, scope, and utility.	TM 9–2405 (now published as O. D. Doc. 2034—1921).
Repair and test of submarine mine cable.	TM 4–215 (now published as TR 1160–15). TM 4–220 (now published as TR 2160–20).
Submarine mining.	AR 850–18.
Storage of Motor Vehicles.	
Ordnance Field Service Bulletins:	
No. 3–1 —Ammunition—General.	
No. 3–2 —Seacoast and Railway Artillery Ammunition, Antiaircraft Ammunition, and Field Artillery Ammunition for Large Calibers, including 155-mm Gun and above.	

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Ordnance Field Service Bulletins—Continued.

No. 4–3 —Preservation of Ordnance Matériel not in Regular use.

No. 4–7 —General Instructions—Groups C, D, and E Matériel.

No. 4–8 —Special Instructions—Group F Matériel.

No. 4–9 —Special Instructions—Group G Matériel.

No. 4–10—Preservation of Seacoast, Railway, and Antiaircraft Matériel out of Service.

No. 4–13—Special Instructions—Group E Matériel.

[A. G. 062.11 (3–7–41).]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:

E. S. ADAMS,
Major General,
The Adjutant General.

DISTRIBUTION:

C and H 4, 9 (1); IC and H 4, 9 (5).

(For explanation of symbols, see FM 21–6.)

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