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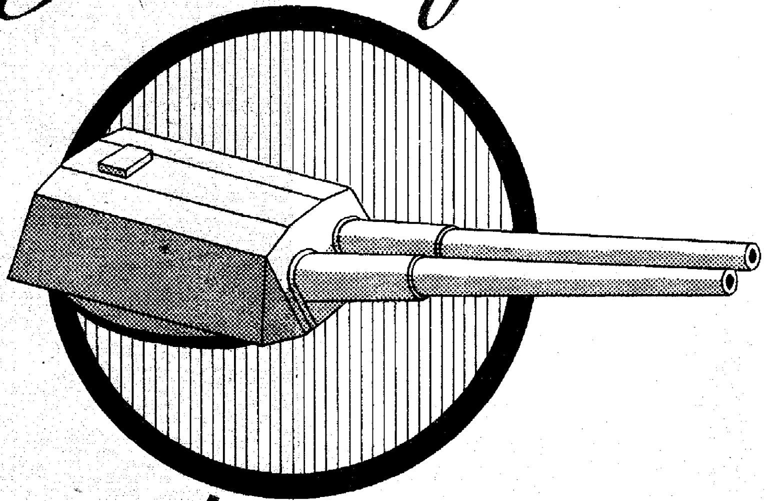
SURVEY OF Japanese Seacoast Artillery



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by ~~GHQ USAFPAC~~
SEACOAST ARTILLERY
RESEARCH BOARD

1 FEBRUARY, 1946

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GENERAL HEADQUARTERS
UNITED STATES ARMY FORCES, PACIFIC
APO 500

REPORT OF BOARD OF OFFICERS
CONVENED
TO STUDY THE JAPANESE
ANTIAIRCRAFT AND SEACOAST ARTILLERY

1. Proceedings of a Board of Officers which convened at Advance Echelon, General Headquarters, United States Army Forces, Pacific, pursuant to General Orders No. 292, of the above-mentioned headquarters, dated 27 October 1945, a copy of which is attached and marked Exhibit 1.

2. Pursuant to the aforementioned orders, the following officers were detailed as members of the Board:

Brig. General Rupert E. Starr,	011309	USA
Colonel Reinold Melberg,	03812	CAC
Colonel Dean Luce,	012389	CAC
Colonel John H. Kochevar,	016867	CAC
Lt. Colonel Richard T. Cassidy,	023213	CAC
Lt. Colonel Kimball C. Smith,	0268901	CAC
Lt. Colonel Henry Von Kolnitz,	0317542	CAC
Lt. Colonel Conrad O. Mannes, Jr.,	0368132	CAC
Major Salvatore J. Mancuso,	022006	CAC
Major Brilsford R. Flint, Jr.,	0394361	CAC
Captain Ernest B. Blake,	0213540	Sig
Captain Walter A. Haine,	0339411	CAC
Captain Jack Warner,	0432904	CAC
Captain Harold L. Peimer,	01040455	CAC
Captain Kenneth Z. Dorland,	02039681	CAC
1st. Lieutenant James C. Crittenden,	01556405	Ord

The Board met on 7 November 1945 and after organization, examined documents and material pertinent to the study, heard witnesses, and visited various Japanese antiaircraft and seacoast artillery installations and organizations.

3. The purpose of the Board, as outlined in detail in supplementary instructions, was to study and report upon matters connected with organization, training, materiel, technique, tactics, supply, administration, and operations of the Japanese Antiaircraft and Seacoast Artillery.

4. a. Based upon its study, the Board submits its findings in two separate reports, one covering Seacoast Artillery and the other covering

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Antiaircraft Artillery.

b. In addition, a condensed consolidated report covering the salient points of the two basic reports has been prepared under separat cover.

c. The basic Seacoast Artillery Report, herewith, is presente in three parts, as follows:

(1) Army Seacoast Artillery - Part One.

(2) Naval Seacoast Artillery - Part Two.

(3) Controlled Submarine Mines - Part Three.

d. The basic Antiaircraft Artillery Report is presented as a separate report, in two parts, as follows:

(1) Army Antiaircraft Artillery - Part One.

(2) Naval (Shore-Based) Antiaircraft Artillery - Part Two.

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GENERAL HEADQUARTERS
UNITED STATES ARMY FORCES, PACIFIC

GENERAL ORDERS)
:
NO.........292)

APO 500
27 October 1945

THE JAPANESE ANTIAIRCRAFT AND SEACOAST

ARTILLERY RESEARCH BOARD

1. Establishment. The Japanese Antiaircraft and Seacoast Artillery Research Board is established under the direct control of this headquarters.

2. Objective. The objective of this Board is to obtain for War Department and for Theater records complete and accurate analytical information on equipment and materiel of the Japanese Military Forces used in antiaircraft, seacoast and submarine mine defenses.

3. Duties. The duties of the Board will be:

a. To prepare detailed reports delineating the results of research and investigation made in Japanese defense fields specifically indicated by directives from the War Department and from this headquarters.

b. To carry out the directives of the War Department and of this headquarters in accomplishing its objective.

4. Composition. The Board will consist of a President and such other personnel as may be assigned or attached to it.

5. Location. The initial station of the Board will be at Advance Echelon, General Headquarters, United States Army Forces, Pacific, in Tokyo.

By command of General MacARTHUR:

R. K. SUTHERLAND,
Lieutenant General, United States Army,
Chief of Staff.

OFFICIAL:

/s/ B. M. Fitch,
/t/ B. M. FITCH
Brigadier General, U. S. Army,
Adjutant General

C-O-P-Y

Exhibit #1

F O R E W O R D

In presenting this report the Board desires to express its appreciation to the following-named officers who, although not detailed as members, worked untiringly with the Board in various phases of research, study and actual preparation of the reports.

Colonel Roger W. Moore,	018370	CAC
Lt. Colonel Everett D. Light,	023033	CAC
Captain William C. Linton,	026140	CAC
Captain Robert W. Hook,	01041362	CAC
1st. Lt. Frank L. Doleshy,	01058984	CAC

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Part Three - Controlled Submarine Mines

LIST OF ILLUSTRATIONS

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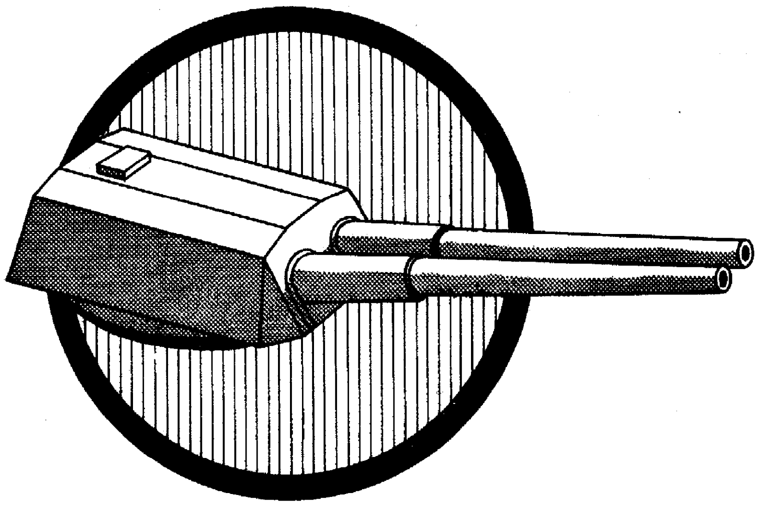
PART ONE

ARMY SEACOAST ARTILLERY



Part One - Army Seacoast Artillery

CHAPTER 1

GENERAL

1. History of Japanese Coast Artillery. a. Period Including World War I.

(1) During the period which ended with the Russo-Japanese War, Coast Artillery was considered one of the most important branches of the Japanese Army. It was during this period that fortress artillery had its greatest development. The emplacements which were constructed during this period were comparable to those in our own Harbor Defenses at the time.

(2) During this period the 24-cm gun and the 28-cm howitzer were the principal weapons. They were of Italian design but were manufactured in Japan.

(3) Coast Artillery originally consisted of seacoast artillery only, but shortly prior to the Russo-Japanese War it was decided to mount some of the 28-cm howitzers on carriages which could be disassembled and transported with the field armies. They were first used at the siege of Port Arthur during the Russo-Japanese War and later modified for field use. This marked the beginning of the heavy field artillery role of coast artillery troops in the Japanese army. This component of the Coast Artillery continued to increase in strength until it became twice as large as the seacoast artillery component.

b. Period From World War I to Beginning of World War II.

(1) After World War I it was decided to modernize the coast defenses by supplementing the older type guns with 20-cm guns and 42-cm howitzers. However, while the project was still in the planning stage, certain naval guns became available as a result of the Disarmament Conference of 1922. The plans were revised accordingly, and the naval guns (3 turrets of 41-cm, 6 of 30-cm, 2 of 25-cm, and 2 of 20-cm) were emplaced for seacoast defense. Each of these turrets contained two guns.

(2) The latter part of this period was characterized by the changed psychology of the Japanese, with its

emphasis on offensive weapons, and the subordination of defensive weapons. As a result, seacoast artillery made little or no progress during these latter years.

c. World War II Period. (1) It was only during the latter years of World War II, when the tide of battle had turned for the Japanese, that they again became interested in the seacoast defense of their homeland. The relative ease with which we had reduced successively their mandated island defenses by air power and naval bombardment, and had been able to effect landings on their shores, carried a foreboding for the homeland. To meet the threat, every piece of artillery that would fire, or for which ammunition was available, regardless of its range, caliber or age, was resurrected and placed in position to defend the shore line.

(2) During the war, Coast Artillery in the homeland expanded from an initial strength of 267 officers and 3,074 enlisted men to 709 officers and 18,054 enlisted men.

2. Organization. a. The Coast Artillery, which had a fortress (seacoast) and a heavy field artillery component, formed a part of the artillery corps, which included all artillery except antiaircraft.

b. In matters other than training, Coast Artillery was under the jurisdiction of the Army General Staff which exercised control through the armies, divisions, or fortress commands to which the artillery was assigned. Training responsibility, on the higher levels, was divided between the Inspectorate General of Military Training, which contained an artillery section headed by the so-called "Chief of Artillery", and the Army General Staff.

c. Regiments were the largest tactical units in the Coast Artillery. These were classified as fortress (seacoast) and heavy field artillery regiments. The former manned the fixed guns in the fortresses; the latter were equipped with heavy guns or howitzers of a movable type.

d. Fortress (seacoast) regiments were assigned to fortress commands, which were commands of combined arms. Heavy field artillery regiments usually were assigned to armies or divisions, for defense of coastal areas outside the fortresses. On occasion, they were employed within fortresses.

3. Training. a. The "Chief of Inspection and Training" for artillery (sometimes called the Chief of Artillery), in the Inspectorate

General of Military Training, was charged with the responsibility for preparation of artillery training literature and doctrine, operation of the artillery schools, and inspection of training of all artillery units (other than antiaircraft) in the homeland.

b. Coast Artillery had three separate service schools, the Seacoast Artillery School, the Heavy Field Artillery School and the Subaqueous Sound-Ranging School, all under one commandant.

c. Before the war, coast artillery training was conducted along fixed and stereotyped lines which varied little from year to year. During the war, courses in training, both in units and at the schools, were shortened, and existing training directives were adjusted to meet the changed conditions. Details of adjustment were left largely to coast artillery unit commanders.

d. Training suffered during the war due to two principal causes. The shortage of ammunition and necessity for conservation resulted, in effect, in the discontinuance of target practice. The lack of centralized supervision over training, and the decentralization of the responsibility to regimental commanders resulted in a general lack of uniformity in training procedure and objectives and in the standards attained.

4. Materiel. a. Japanese coast artillery materiel was characterized by a multiplicity of types representative of development through the years from 1890 to 1936. No major article of equipment, in operational use at the end of the war, was developed after 1936.

b. A weapon, once produced, was never scrapped. Thus, weapons in use at the end of the war included numerous heavy howitzers of the vintage of 1890 and smaller caliber guns of similar antiquity, in addition to some modern guns. Fire-control equipment showed a corresponding variation. No radar had been produced.

c. (1) The principal strength of the army seacoast defenses lay in the 11 naval turret-mounted gun batteries, and in the 15-cm Types 45 (1912) and 96 (1936) gun batteries. These were effective weapons. The turret batteries were equipped with a modern electrical fire-control system. A fairly modern system had been developed for the 15-cm guns, but not all of the batteries had been thus equipped.

(2) Without radar fire-control equipment, fire could be conducted only by visual means.

5. Technique. a. The lack of a centralized controlling agency and the consequent latitude left to regimental or battery commanders resulted in the development and use of a variety of techniques, many of

which could be considered archaic by our standards. No uniformity existed.

b. Detailed procedures involving "tried and proven" methods for preparation for firing, use of equipment, or conduct of fire were neither prescribed nor generally followed.

c. The multiplicity of types of equipment and the necessity for the use of improvised equipment where standard equipment was not available contributed to the lack of uniformity in methods of employment.

6. <u>Tactical Employment</u>. a. (1) The mission of the fortress (seacoast) artillery was similar to that of our seacoast artillery. Emplaced in the fortresses, it was a part of a force of combined arms.

(2) The fortress organization and mission were similar to those of our subsectors.

b. In the fortress, the senior coast artillery officer (usually a regimental commander), through his battalion commanders, exercised tactical control (fire direction) over his batteries during the initial phase of an operation. When a landing became imminent, control was to be decentralized to local area or subordinate tactical commanders. The inadequacy of communications severely limited the extent to which centralized control could be exercised.

c. "Battery commander's action" was resorted to only when a complete break down in communications occurred between the battery and the battalion. However, a battery commander could open fire on a submarine identified as hostile at any time.

d. During an actual landing operation, transports and landing craft became the primary targets for all types of weapons.

e. The effectiveness of the seacoast defenses against night attack was severely affected by the complete absence of radar fire-control equipment and the lack of a coordinated plan for illumination by searchlights to permit gun fire.

f. (1) Heavy field artillery units of coast artillery, attached to divisions or armies, usually were emplaced outside fortresses, along the coast line, with the primary mission of covering the likely landing beaches.

(2) Tactical control was exercised by the regimental or battalion commander to the extent practicable.

g. Where Army and Navy seacoast artillery overlapped each other in disposition and missions, as frequently happened, each operated under its separate command system, with little or no coordination between the two.

CHAPTER 2

PERSONNEL

7. General. a. Personnel, both commissioned and enlisted, of the Japanese Coast Artillery were generally representative of the Japanese Army as a whole, except in the matter of physical standards. These standards had been lowered to permit the use of limited service personnel in coast artillery units.

b. From a strength of 267 officers and 3,074 enlisted men in 1939, Coast Artillery in the homeland had expanded to 709 officers and 18,054 enlisted men by the end of the war.

8. Procurement of Personnel. a. Commissioned Personnel. (1) A proportionate share of the graduates of the Japanese Military Academy was assigned to the Coast Artillery. Additional officers were obtained from graduates of the Officer Candidate Section of the Coast Artillery School, which performed the functions of our Officer Candidate Schools.

(2) Upon completion of basic training individuals who had a middle school or higher education were permitted to take a mental examination for qualification as officer candidates. Successful applicants were sent to the Coast Artillery School where, upon completion of a one year course (later reduced to eight months), they were graduated as apprentice officers. After a six months probationary period of duty with troops, they were commissioned as second lieutenants in the reserve corps.

b. Enlisted Personnel. (1) Coast artillery requirements for enlisted personnel were met through the normal procedures governing induction. Inasmuch as military training had been a part of the school curriculum in Japan for years, all entrants into the service had had some previous training.

(2) All men were inducted initially as privates, and dispatched immediately to coast artillery regiments for basic training. Those men who had graduated in the upper half of their class in middle school were appointed senior privates upon completion of basic training. During the early years of the war, promotions to NCOs were not made until completion of the course in the NCO Candidate Section at the Coast Artillery School. After

this section was closed, NCO appointments were made based upon an individual's work in the regimental schools.

(3) Newly activated units obtained their officers, NCOs and key enlisted specialists from certain selected coast artillery units which were maintained at over-strength. The fillers for newly organized units, and those required to fill vacancies created in older units, came from the inductees.

9. Classification and Reclassification. a. Some classification of personnel was made at conscription centers to obtain technical men for Air Corps and Signal Corps units. At replacement depots men were screened as to their past education or experiences. When a request was made on a depot for personnel for coast artillery units the required types were selected if available, but no apparent effort was made to see that these types would be available.

b. No established procedure for reclassification existed. After receiving personnel from conscription centers or replacement depots, it was the duty of the commanding officer to make adjustments within his units and to give inefficient personnel such training and coaching as was necessary to enable them to perform their required duties.

10. Losses and Replacements. a. Battle losses in coast artillery units were insignificant. In 1942 a substantial loss of personnel was suffered with the transfer of 7,000 men to the rapidly expanding anti-aircraft artillery.

b. Losses due to furnishing personnel to new units were quickly replaced. The personnel turnover in the average regiment was 30% during the year. It was stated that about 20% of this was due to the termination of tour of duty of the reservists who were permitted to return to civilian status. It was not until March, 1945, that the tours of duty of all reservists were extended for the duration of the war.

c. (1) Commissioned personnel were not subject to frequent changes of duties or assignments. It was not uncommon for a battery commander to remain with the same battery for at least two years unless he was promoted to a higher grade or was selected as an instructor at the Coast Artillery School or at the Military Academy.

(2) Transfers of officers between the seacoast and heavy field artillery components of the coast artillery were not uncommon. Among the older officers this presented no difficulties, as they had all been trained in the weapons used by both components.

11. Miscellaneous. a. General Officers. There were no general officers in the coast artillery. Coast artillery officers were not used for the general officer commands of the major fortresses, wherein troops of the combined arms were employed.

b. Civilians. Civilians were not used in any technical or tactical capacity within the coast artillery units. In some cases general labor wes provided by civilian personnel for the construction of fortifications and emplacements.

c. Morale. Morale of the Japanese soldiers in the coast artillery was probably lower than that of soldiers in the other arms; however, morale in the Japanese army has never presented any problem due to the national psychology of the individuals. According to witnesses, the greater percentage of the personnel of the coast artillery would have preferred to serve with a more active arm of the service.

CHAPTER 3

ORGANIZATION

Section I
General

12. General. The Japanese Coast Artillery consisted of--

a. Fortress (Seacoast) Artillery, which manned the fixed artillery in what would correspond to our harbor defenses; and

b. Heavy field artillery, which was intended for use either in harbor defenses, in coast defensea roles outside harbor defenses, or with the field armies. The weapons used by the heavy field artillery, which varied from 15-cm guns to 30-cm howitzers, were not mobile weapons, inasmuch as the majority of them required from two days to a week to emplace, and were thus suitable only for use in stabilized situations.

13. Place of Coast Artillery. Although Coast Artillery was considered a separate branch in the Japanese Army, its identity was clearly established only in that it had its own branch schools and its own troop units. In the office of the Inspectorate General of Military Training, where most branches had their own "Chief of Training and Education", there was no separate office for coast artillery. The function of this office was exercised by the Chief of Education and Training for "Artillery", whose jurisdiction included all artillery other than antiaircraft, which had its own chief.

Section II
The Japanese High Command

14. General. The subject matter of this section is presented to show the general relationship of the various war agencies and to give a background for the organization for coastal frontier defense.

15. Emperor. The obvious feature of the Emperor's position (see Fig. 1) was his affinity to the war ministries and commands. Besides being the titular head of the Army and Navy he was the official head of Imperial Headquarters. It is significant that the Minister of War and the Minister of the Navy reported directly to him rather than through the Prime Minister.

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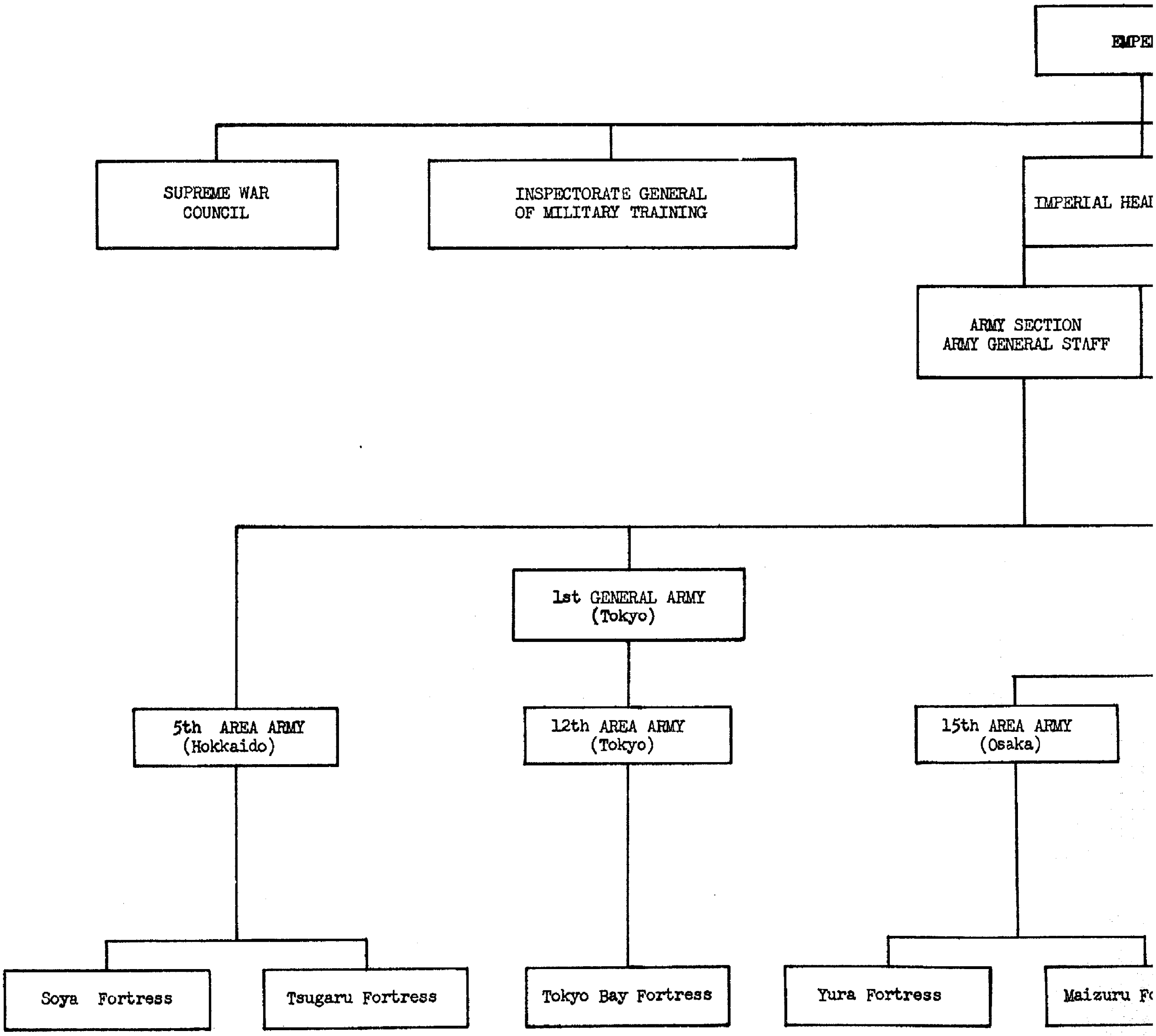

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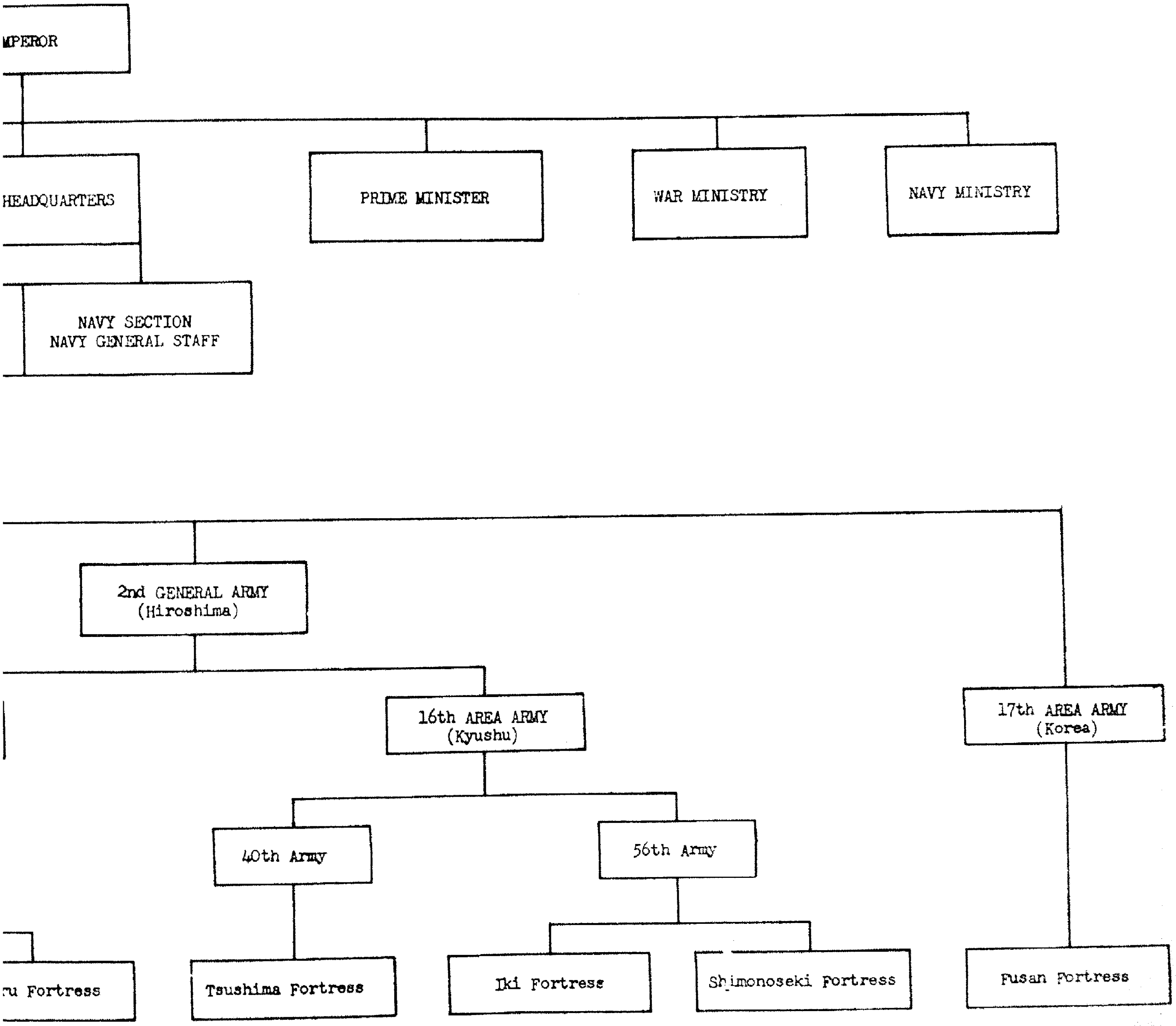

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FIG.1

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16. Supreme War Council. This was the highest policy-forming organization, and acted also as the official advising agency to the Emperor on the conduct of the war. It was composed of the following officials:

Prime Minister	Foreign Minister
Minister of War	Chief of Army General Staff
Minister of Navy	Chief of Navy General Staff

17. Imperial Headquarters. a. The senior authority for the direction of Japanese war operations was composed solely of the general staffs of the Army and the Navy. The Emperor was its nominal head. Army General Staff Headquarters became the Army Department of Imperial Headquarters when the latter was formed after the inception of the war. Joint decisions made by the heads of the staffs - Army and Navy - were issued as orders in the name of the Emperor.

b. The Chief of the Army General Staff was the commander of all Army forces. The general staff sections under him controlled Army operations and the allocation and disposition of operational units, intelligence, transportation and communications, organization and equipment, ordnance, allocation of aircraft and air technical supplies, training, finance, construction, engineering and quartermaster activities.

18. Inspectorate General of Military Training. a. This was an independent agency responsible directly to the Emperor. It was interlocked with the section of Imperial Headquarters responsible for training activities through the medium of its key officers holding similar positions in both bodies - a common Japanese practice in the higher echelons.

b. The Inspectorate General included the offices of the chiefs of the various arms and services, such as the Chief of Infantry, Chief of Engineering, Chief of Antiaircraft Artillery, and Chief of Artillery. These officers were not chiefs of branches such as we had in our service, since their responsibility was limited almost exclusively to matters connected with training.

19. The Ministries. The Minister of War was invariably an Army officer, and his cabinet department was essentially a part of the military organization. Likewise the Navy Ministry was staffed by naval officers and for all practical purposes was a part of the Navy. For some years the government was dominated by the Army and Navy; no Prime Minister could form a government unacceptable to either since their refusal to furnish a Minister of War or Navy was fatal to any effort. The privilege of direct contact with the Emperor held by both these Ministries made them all-powerful.

20. General Armies. These were command headquarters and corresponded to our Army Groups. Activated in May, 1945, their primary mission was defense of the Japanese homeland. The 1st General Army, with headquarters in Tokyo, had under its control the 11th, 12th, and 13th

Area Armies in the northern half of Honshu. The 2d General Army, whose headquarters moved to Osaka from Hiroshima after the atomic bombing, had under its control the 15th and 16th Area Armies located in southern Honshu, Shikoku and Kyushu. Through the Area Armies the General Armies controlled all Army tactical units within their respective areas, except for air force units, and were directly responsible to the Chief of Army General Staff.

21. Air General Army. Comparable to the General Armies in authority, and formed at the same time, the Air General Army had complete operational control of all Army air forces units in Honshu, Shikoku, and Korea south of 38° north latitude.

22. Area Armies. a. Within Japan proper, except for Hokkaido, the Area Armies were directly subordinate to the 1st or 2d General Armies. In their respective areas they controlled the tactical numbered armies which corresponded to U.S. Army Corps.

b. In Hokkaido, (5th Area Army), and in all Japanese-controlled territory outside the homeland, the various Area Armies were responsible directly to the Chief of Army General Staff, and in effect operated as theater commands.

Section III
Organization for Coastal Frontier Defense

23. General. The overall responsibility for land defense of the homeland rested upon the two General Armies, each with its own territorial area. Within these areas, responsibility was decentralized to the Area Armies, each with its own geographical area. Within the Area Armies, there was a further decentralization to armies, divisions and in some cases to fortress commands.

24. Fortress Commands. a. Fortress commands were organized to cover critical coastal areas, especially the entrances to harbors or important straits. These commands contained forces of combined arms. The strength of the infantry component varied, depending upon the importance of the locality. For example, the Tokyo Bay Fortress, which was considered the most important in Japan, contained an infantry division, a separate infantry brigade, and a separate infantry regiment. Yura Fortress (Osaka Bay), which was considered an important fortress, had only a battalion of infantry, although it was intended to assign more in case invasion became imminent. Coast Artillery (both seacoast and heavy field artillery) units formed an important part of the defense force in each fortress.

b. Fortresses were commanded by an officer of rank appropriate to the size of the command (see subpar c, below). Only in some of the smaller fortresses, where the garrison was predominantly artillery, was command exercised by a coast artillery officer.

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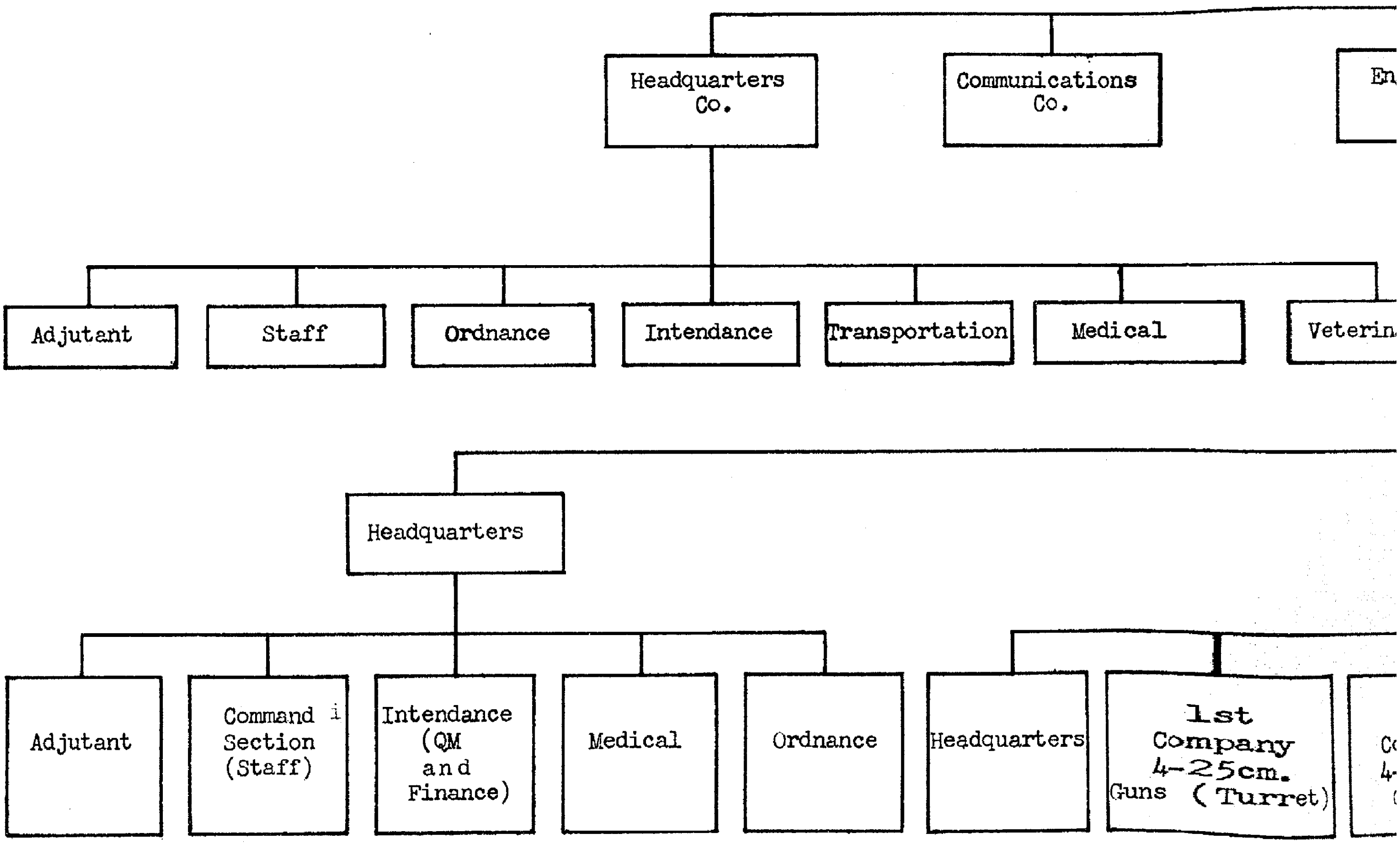

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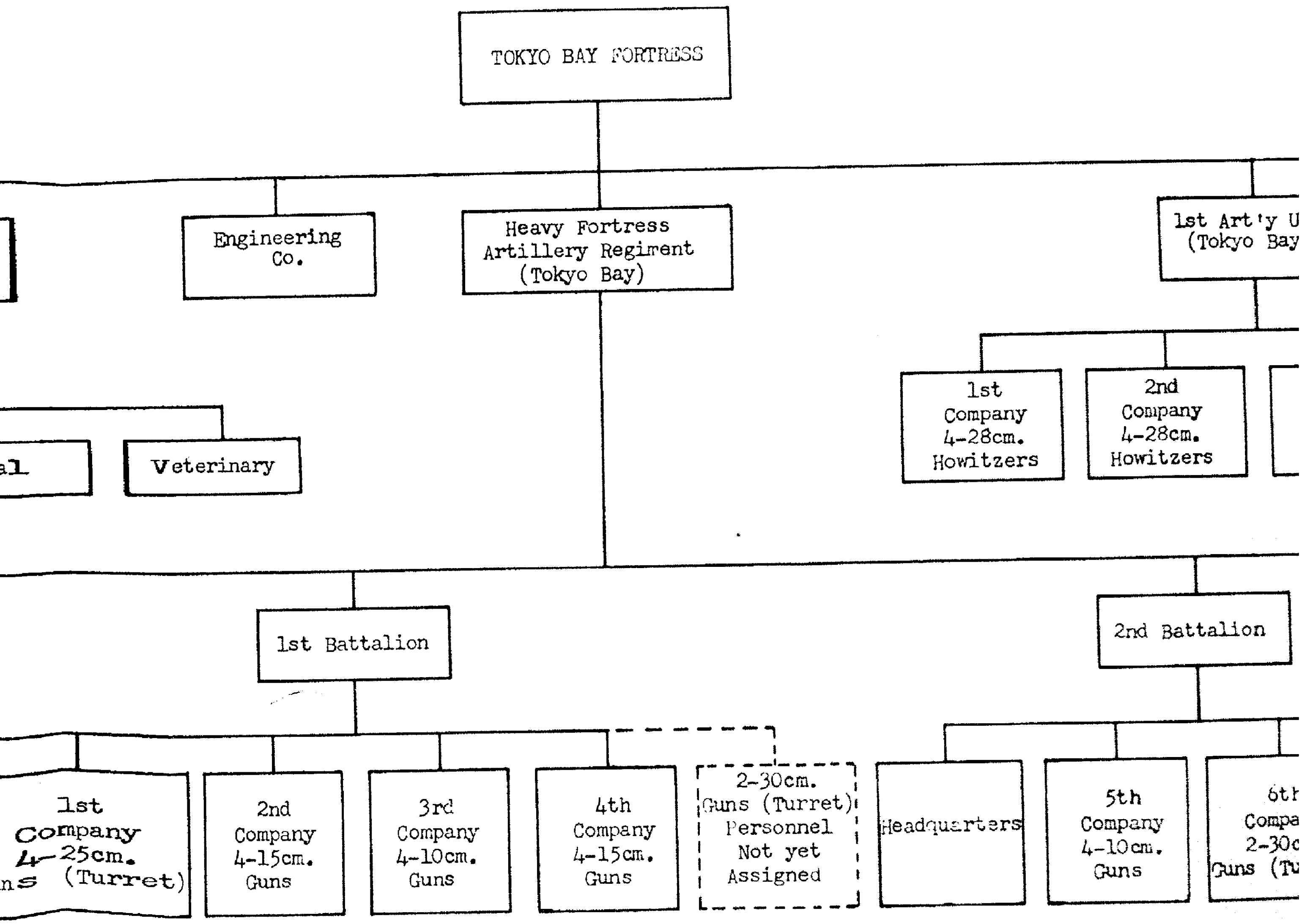
OGANIZATION

TOKYO BAY FORTRESS



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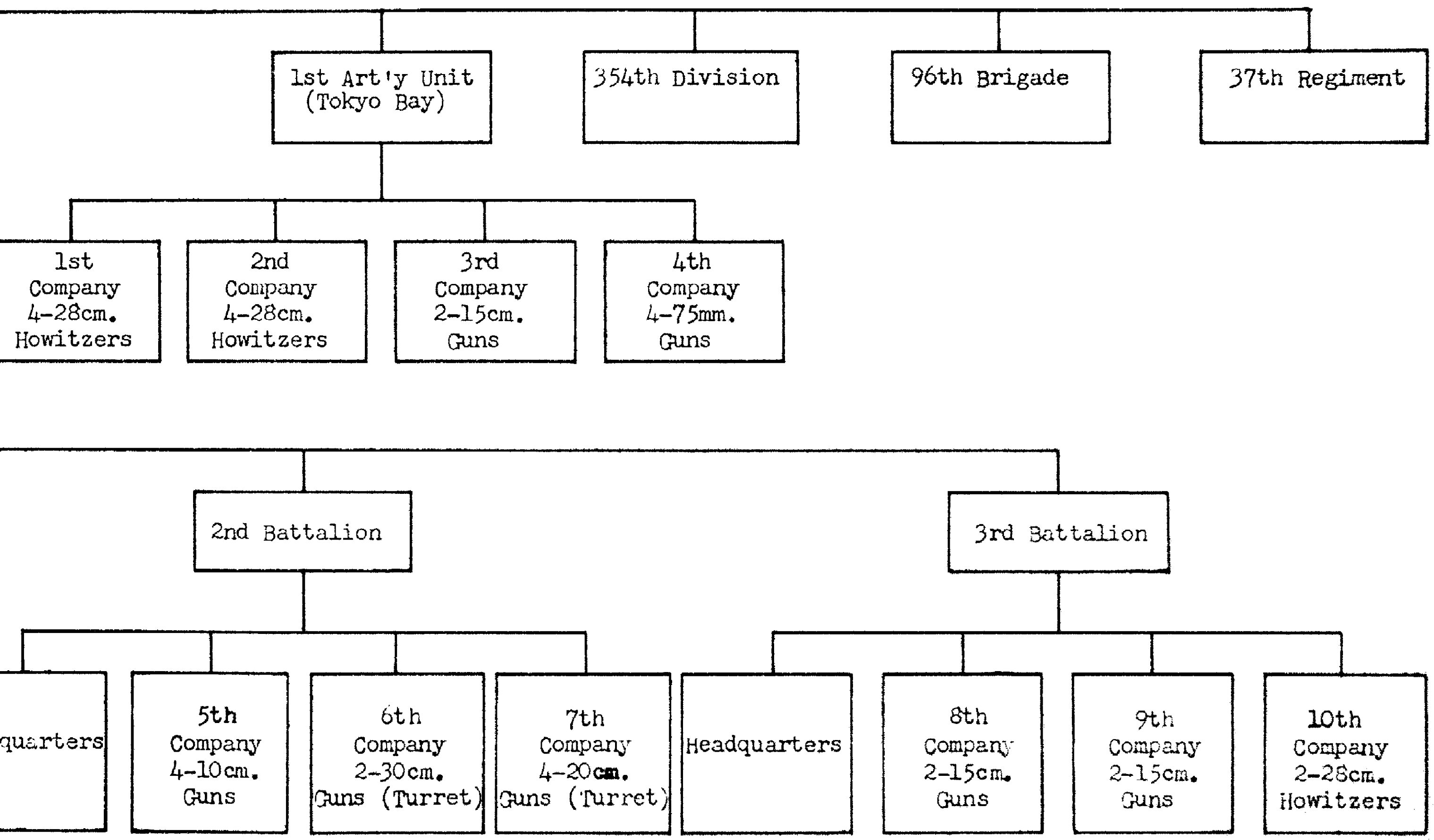

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c. (1) Fortresses were classified as "A", "B", and "C", in the order of their importance. Class "A" was commanded by a lieutenant general; Class "B" by a major general or colonel; and Class "C" by a colonel.

(2) The following fortresses existed in the Japanese homeland (see Fig. 56, page 72), with classifications as indicated:

Tokyo Bay	Class "A"
Shimonoseki	Class "A"
Tsugaru (strait between Hokkaido and Honshu)	Class "B"
Yura (Osaka Bay)	Class "B"
Maizuru (western Honshu)	Class "B"
Hoyo Strait (between Kyushu and Shikoku)	Class "B"
Tsushima (island in Japan Sea)	Class "B"
Iki (island in Japan Sea)	Class "B"
Nagasaki	Class "B"
Kita-Chishima (northern Kuriles)	Class "C"
Soya (Hokkaido)	Class "C"

An additional Class "C" fortress had been planned for Nemuro (Hokkaido), but had not progressed beyond the planning stage.

(3) Fortresses were located at the following points outside the homeland:

Fusan (Korea) Type A
Rashin (Korea)
Eiko (Korea)
Amami O Shima (Ryukyus)
Boko - To (Between Formosa and China)
Port Arthur (Manchuria)
Kirun (Formosa)
Takao (Formosa)
Bonin Islands

It is understood that three additional fortresses had been planned in the Ryukyus and one in Korea.

(4) For organization of the Tokyo Bay and Iki Fortresses, see Figs. 2 and 3, respectively.

Section IV
Coast Artillery Tactical Units

25. General. a. (1) The largest tactical unit in the coast artillery

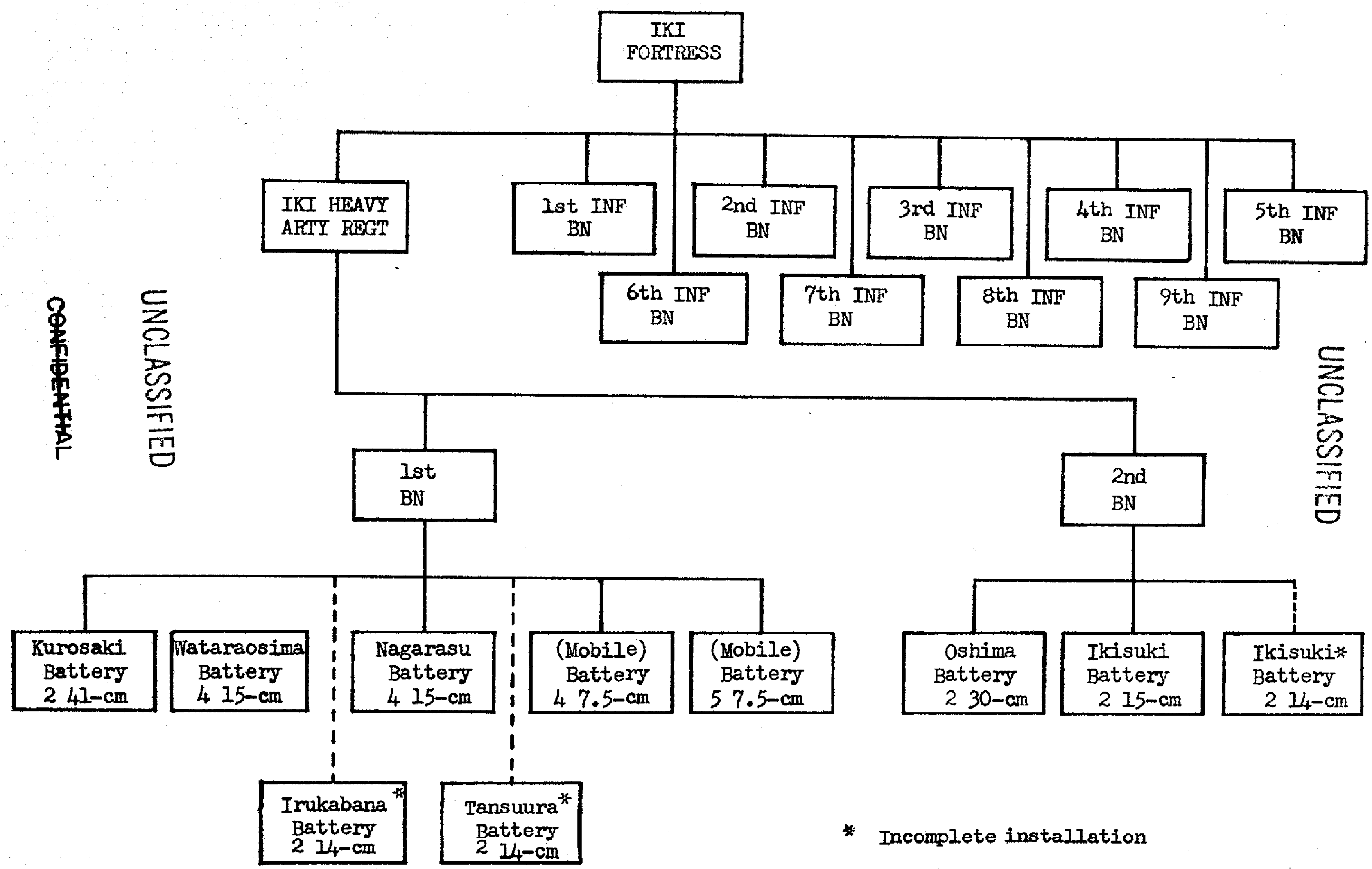
IKI FORTRESS
IKI HEAVY ARTY REGT
1st INF BN
2nd INF BN
3rd INF BN
4th INF BN
5th INF BN
6th INF BN
7th INF BN
8th INF BN
9th INF BN
1st BN
2nd BN
Kurosaki Battery 2 41-cm
Wataraosima Battery 4 15-cm
Nagarasu Battery 4 15-cm
(Mobile) Battery 4 7.5-cm
(Mobile) Battery 5 7.5-cm
Oshima Battery 2 30-cm
Ikisuki Battery 2 15-cm
Ikisuki* Battery 2 14-cm
Irukabana* Battery 2 14-cm
Tansuura* Battery 2 14-cm
* Incomplete installation

FIG.3

was the regiment.

(2) There were 13 regiments of coast artillery before the war, of which six were in Japan, two each in Korea and Formosa, and four in Manchuria. The total strength was about 400 officers and 10,000 enlisted men. Approximately one-third of the total strength was in the seacoast (fortress) artillery, the remainder being in the heavy field artillery. By the end of the war the strength had approximately doubled.

(3) Prior to the war each regiment, except the three regiments which were kept along the Russo-Manchurian border, contained one battalion of seacoast artillery and two battalions of heavy field artillery. In 1941, the mixed regimental organization was abandoned, and thereafter, a coast artillery regiment was classified either as seacoast (fortress) artillery or heavy field artillery. With this change in organization, most of the heavy field artillery regiments or battalions were taken from the semi-fixed positions in fortresses, and assigned to armies or divisions for employment along the coast line.

26. Chain of Command. a. (1) Coast artillery regiments were assigned either to fortress commands or to armies and divisions. The chain of command was thus: Imperial Headquarters - General Army - Area Army - Army - Division - regiment; or General Army - Area Army - Fortress Command - regiment.

(2) The assignment of coast artillery units to higher commands at the end of the war is shown in Fig. 4.

b. There was no coast artillery section on the staff of divisions or higher units. The senior artillery officer (field or coast) in the division or army acted as artillery adviser on all artillery assigned to the division or army, regardless of caliber or type.

27. Regimental Organization. a. The standard organization was a 3-battalion regiment with a 4-battery battalion, although there were variations from this when the mission or local conditions made it advisable. The regimental organization in the Tokyo Bay, Fortress is shown in Fig. 2.

b. The strength of a regiment varied between 1,000 and 1,600, depending upon the number of battalions and the type of armament.

c. Regimental and battalion staff sections varied but little from those in our service.

ASSIGNMENT OF COAST ARTILLERY UNITS
TO HIGHER COMMANDS

UNIT	ASSIGNMENT	CALIBER IN CENTIMETERS														
		GUNS											HOWITZERS			
		7.5	9	10	12	15	20	24	25	27	30	41	12	24	28	30
14th HEAVY ARTILLERY REGIMENT	52nd ARMY (BOSO PENINSULA)	4*		6		2									3	5
TOKYO BAY FORTRESS HEAVY ARTILLERY REGIMENT	TOKYO BAY FORTRESS			8		12	4**		4**		2** 2** ⌿				2	
33rd INDEPENDENT HEAVY ARTILLERY BATTALION	95th IND MIXED BRIG				2	2									8	
34th INDEPENDENT HEAVY ARTILLERY BATTALION	11th AREA ARMY (TOHOKU DISTRICT)	4*		3											6	
35th INDEPENDENT HEAVY ARTILLERY BATTALION	51st ARMY (MITO DISTRICT)	4*		3	2	2**									4	
36th INDEPENDENT HEAVY ARTILLERY BATTALION	53rd ARMY (SAGAMIHARA DISTRICT)													8		
1st HEAVY ARTILLERY BATTALION (not fortress artillery)	TOKYO BAY FORTRESS	4*				2									8	
2nd HEAVY ARTILLERY BATTALION (not fortress artillery)	TOKYO BAY FORTRESS					2									6	
4th INDEPENDENT HEAVY ARTILLERY BATTERY	12th AREA ARMY (TOKYO BAY DISTRICT)														4	
YURA FORTRESS HEAVY ARTILLERY REGIMENT	15th AREA ARMY		4		6	6		10		11					8	
37th INDEPENDENT HEAVY ARTILLERY BATTALION	54th ARMY (KYUSHU)	4*			8	2								3		
38th INDEPENDENT HEAVY ARTILLERY BATTALION	97th IND MIXED BRIG													8		
39th INDEPENDENT HEAVY ARTILLERY BATTALION	55th ARMY (KYUSHU)														6	
5th INDEPENDENT ARTILLERY BATTERY	55th ARMY				4											
5th HEAVY ARTILLERY REGIMENT	15th AREA ARMY HQ. CHUBUGUN					?				?					?	
MAIZURU FORTRESS HEAVY ARTY. REGT. (TRAINING REGT.)	15th AREA ARMY OSAKA									2					4	
TSUSHIMA FORTRESS HEAVY ARTILLERY REGIMENT	40th ARMY	2*				22					4**	2**				
IKI FORTRESS HEAVY ARTILLERY REGIMENT	56th ARMY					10					2**	2**				
SHIMONOSEKI FORTRESS HEAVY ARTILLERY REGIMENT	56th ARMY	2*			5	10										
17th HEAVY ARTILLERY REGIMENT	122nd IND MIXED BRIG (AMAMI O SHIMA)	6*		4											4	
18th HEAVY ARTILLERY REGIMENT	118th IND MIXED BRIG	2*	2		4								4			
15th HEAVY ARTILLERY REGIMENT	98th IND MIXED BRIG (KYUSHU)	4*		2	2	7								8	6	
48th INDEPENDENT HEAVY ARTILLERY BATTALION	57th ARMY			2											4	
6th HEAVY ARTILLERY REGIMENT	16th AREA ARMY (AMAMI O SHIMA)	?		?		?									?	
26th INDEPENDENT FIELD ARTILLERY BATTALION	57th ARMY	12*														
FUSAN FORTRESS HEAVY ARTILLERY REGIMENT	17th AREA ARMY	11* 8	4			7						2**			8	
REISUI FORTRESS HEAVY ARTILLERY REGIMENT	17th AREA ARMY	4*				2										
RASHIN FORTRESS HEAVY ARTILLERY BATTALION	17th AREA ARMY	10*		2									4			
EIKO BAY FORTRESS HEAVY ARTILLERY REGIMENT	17th AREA ARMY (KOREA)	4* 8													10	
SOYA FORTRESS HEAVY ARTILLERY REGIMENT	5th AREA ARMY (HOKKAIDO)			4		4							6			
TSUGARU FORTRESS HEAVY ARTILLERY REGIMENT	5th AREA ARMY			2		12					2**			10	10	
7th HEAVY ARTILLERY REGIMENT	32nd ARMY (OKINAWA)	?*		?		?										
8th HEAVY ARTILLERY REGIMENT	32nd ARMY (OKINAWA)	?*		?		?										
12th HEAVY ARTILLERY REGIMENT	75th IND MIXED BRIG (FORMOSA)	?*				?		?							?	
13th HEAVY ARTILLERY REGIMENT	76th IND MIXED BRIG (FORMOSA)	?*				?				?					?	
16th HEAVY ARTILLERY REGIMENT	100th IND MIXED BRIG (CHICHIJIMA)	?*		?		?									?	

THE 28-cm HOWITZERS WERE SHORT BARRELED TYPE WHICH IN OUR SERVICE **WOULD** BE CALLED MORTARS
* MOBILE ⌿ BATTERY EMPLACED -- PERSONNEL NOT ASSIGNED
** TURRET

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FIG. 4

CHAPTER 4

TRAINING

Section I
General

28. General. In the Japanese Coast Artillery, training had been standardized over a period of years. Although the strength of the Coast Artillery doubled during the war years, the expansion was gradual, and the overall size of the corps never became large. Training was thus affected little by the expansion. Inasmuch as coast artillery troops in the homeland were never required to engage in combat, there was no interference with training on this account. The most serious interference with training during the war years came from the necessity for conserving ammunition for combat. Target practice was largely curtailed, and for some calibers, was discontinued entirely. The overall quality of training was adversely affected by the decentralization of responsibility to regimental commanders. This resulted in a general lack of uniformity in training procedures and objectives and in the standards attained.

29. Higher Level Organization for Training. a. Typical of Japanese organization, the responsibility for training throughout the army was divided between two top-level agencies - the Inspectorate General of Military Training, a purely training agency, and the Army Department of Imperial Headquarters, which controlled the operational armies. However, in accordance with customary Japanese organization, these two agencies were interlocked laterally, through having many key officers hold positions concurrently in both agencies.

b. Although coast artillery units were assigned to operational armies, there was no supervision of training above regimental level except through general training inspections by the division or fortress commander and infrequent artillery training inspections by the "Chief of Education and Training for Artillery" (Office of the Inspectorate General of Military Training).

30. Supervision and Inspection. a. Duties of the Inspectorate General of Training. The "Chief of Education and Training for Artillery" in the Inspectorate General of Military Training was charged with the following responsibilities for all artillery other than antiaircraft:

(1) Operation and control of the various artillery schools.

(2) Preparation of training literature and training doctrine. For Coast Artillery, this was actually done in the Research Section of the Coast Artillery School.

(3) Conduct of artillery inspections of combat units. To provide him with the necessary authority to inspect units in the operational armies, this officer was attached to Imperial Headquarters.

b. Training Directives. (1) During peace time, training directives were contained in training manuals. Practically no changes were made in these from year to year except when the introduction of new doctrine made changes necessary.

(2) During the war, courses in training, both in units and at the schools, were shortened, and the existing training directives were adjusted to meet the changed conditions. Details of adjustment were left largely to unit commanders.

(3) Regimental commanders of coast artillery units prepared their own training programs in conformity with the training directives, based largely upon their estimate of the training requirements of their units.

c. Inspections. (1) Artillery training inspections were made by artillery representatives of the Inspectorate General of Military Training at irregular and infrequent intervals.

(2) General training inspections were usually made once a year by the division commander (for coast artillery units attached to a division). A selected battery from the regiment usually fired a target practice during this inspection. This was more in the nature of a demonstration to show the division commander the capabilities of the battery, than a test of the combat proficiency of the battery. Fortress commanders made general inspections of units under their command at irregular intervals.

Section II
Training of Individuals

31. Training of Officers. Coast Artillery officers came from two rces, the Military Academy or the Reserve Corps.

a. Training at the Military Academy. In peace time, students at the Military Academy received two years of preparatory training, two years of specialized training, and one-half year of practical training in the field. Coast artillery graduates received specialized training in the artillery course. However since the course at the academy was cut to two years shortly after the beginning of the war, war-time graduates had little specialized artillery training.

b. Training of Reserve Officers. Coast artillery reserve officers were obtained from conscripts who had a middle school or college education. After completion of basic training and subject to having passed an entrance examination, they were sent to the Coast Artillery School for eight months where, upon graduation, they were made apprentice officers, and subsequently received their reserve commissions.

32. Training of NCOs. Inasmuch as the NCO candidate course at the Coast Artillery School was discontinued during the war, war-time NCOs were selected on the basis of their work in the regimental schools (see par 34).

33. Basic Training. a. Basic training, which covered a period of five months before the war, was reduced to three months during the war. In addition to covering subjects commonly given to all recruits, some specialist training was also given.

b. Due to the frequent arrival of conscripts in small groups during the war, basic training was usually conducted under regimental supervision.

34. Specialist Training. a. Specialist and technical training was given in -

(1) Regimental schools upon completion of basic training.

(2) Advanced courses at the Coast Artillery School for specially selected students.

b. Most regiments operated their own regimental schools. The training in the regimental school depended upon the type of armament in the regiment. Regiments which had turret batteries had more comprehensive courses than those equipped with only barbette type guns. Regiments with turret guns trained seven classes of specialists. The specialist courses, both pre-war and during the war, are shown in the following table:

	Pre-War	During War
Radio Operator	5 months	3 Months
Turret Operator	5 Months	3 Months
Searchlight Operator	3 Months	1½ Months
Machinist	4 Months	2 Months
Electrician	4 Months	2 Months
Ammunition Technician	4 Months	2 Months
AA Machine Gunner	2 Months	3 Weeks

c. Specialist courses conducted at the Coast Artillery School are shown in par. 42.

Section III
Unit and Combined Training

35. General. There were no provisions for giving units organized during the war a uniform course of training before assigning them to tactical positions. Upon organization these units received cadres of trained artillerymen from other units and were then brought to strength with men called up from the reserve.

36. Unit Training. a. Unit training was confined to "on-site" training. This was conducted daily in all units, and consisted of those subjects specifically necessary for effective use of assigned weapons. In addition, training in such subjects as first aid, camouflage and camouflage discipline, communications, and field fortifications was given. More time was devoted to artillery drill in batteries having the more important and more complicated types of armament, such as turret guns, than in the smaller caliber batteries.

b. As a general rule, regardless of the type of armament in a battery, training was also given on the 75-mm field gun.

c. In addition to artillery training, problems were also given in defense against infantry attack. Important batteries sometimes had an infantry section attached for local defense purposes. In such cases responsibility for its use rested upon the battery commander, but the training responsibility remained with the infantry regiment.

d. In addition to routine training in small arms, physical training and field training, occasional problems were given in defense against a run-by in force and against beach landings.

37. Combined Training. There were no combined training exercises of coast artillery units with other arms.

Section IV
The Coast Artillery School

38. General. a. The Coast Artillery School was established in 1887 at Ichikawa, a suburb of Tokyo. In the same year it was transferred to Urago, near the western entrance to Tokyo Bay. The school had a Seacoast Artillery and a Heavy Field Artillery department.

b. In 1934, a Subaqueous Sound-Ranging department was added. A separate school was established in 1943 for this department at Shimizu.

c. In 1941, the Heavy Field Artillery department was separated from the school and a separate school therefor was established at Komokado.

39. Organization. a. Each of the three separate departments (seacoast, heavy field artillery and subaqueous sound-ranging) of the Coast Artillery School was organized and operated as a separate school. However, the general pattern of organization varied but little. (See Fig. 5). Each school had a research section, an education section, a reserve officer candidates section, and a NCO candidates section. Training troop units (school troops) were provided for the Seacoast Artillery and Heavy Field Artillery Schools.

b. The commandant, whose headquarters was at the Heavy Field Artillery school, controlled all three schools.

40. Functions of Sections, Coast Artillery School. a. Research Section.

(1) The research sections of the schools combined some of the duties of our Coast Artillery Board and the functions of the Training Literature Section of our Coast Artillery School. The primary duties of the Research Section were the development of technique for the operation and use of new weapons and the preparation of training literature and doctrine.

(2) No responsibility for the development of equipment or materiel was charged to the Coast Artillery School. Although members of the Research Section were usually present at the arsenal or the site when new materiel was tested, this was for the purpose of familiarization only. The testing of new materiel was the function of the developing agency (Ordnance Department).

b. Education Section. This section had the primary function of training officers who attended the various courses of instruction.

c. Reserve Officer Candidates Section. This section served a function similar to our Officer Candidate Schools.

d. NCO Candidates Section. This section served the same purpose with regard to NCOs as the officer candidate section did for officers. However, the section was discontinued at all schools prior to the end of the war.

e. Training Troop Units. The training battalions at the Seacoast Artillery and Heavy Field Artillery Schools served primarily as school troops. The Special Training Company at the Seacoast Artillery School gave specialists training to NCOs and privates.

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ORGANIZATION OF
THE COAST ARTILLERY SCHOOL

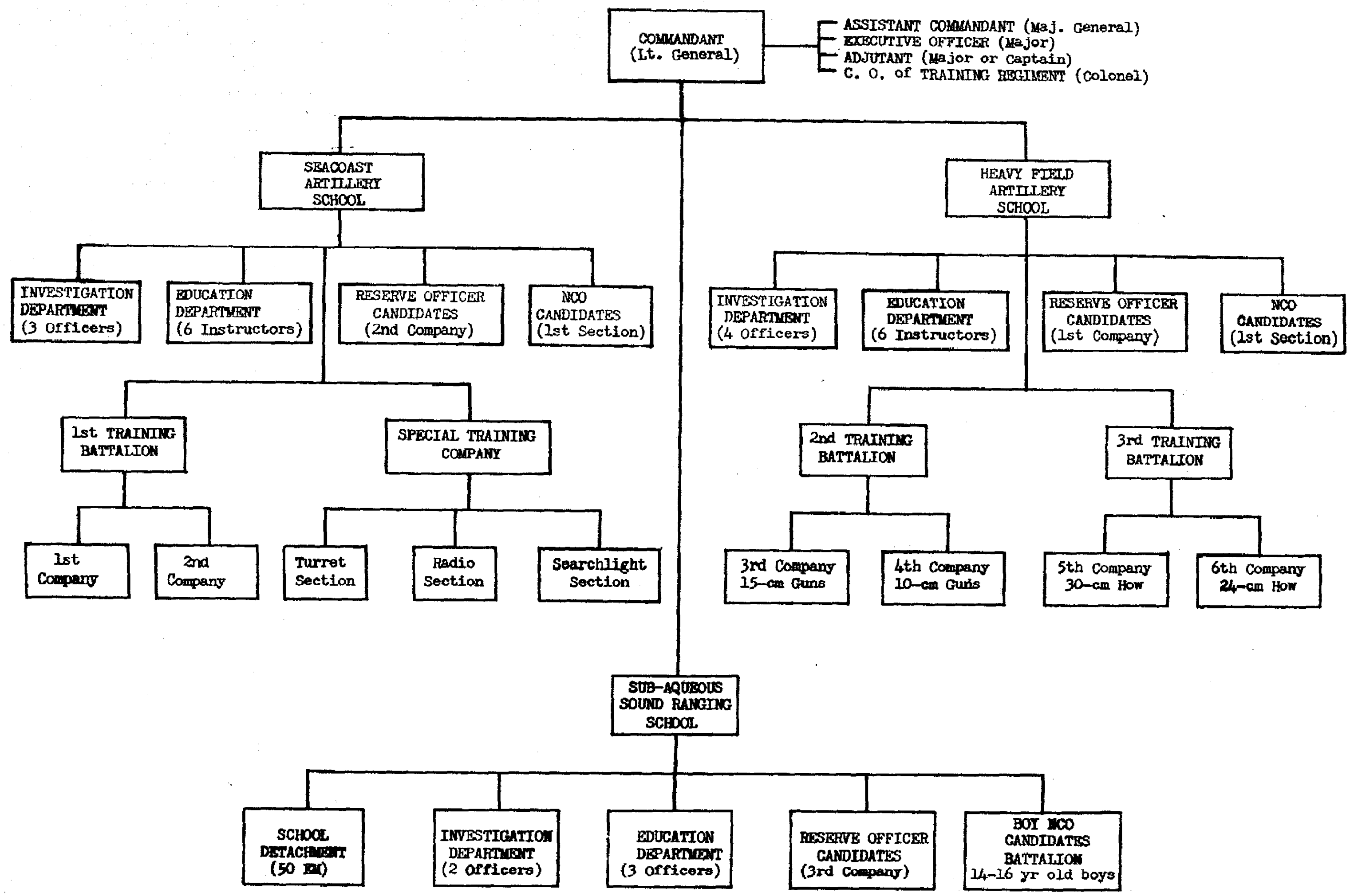

FIG. 5

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41. Courses for Officers. a. Prior hto the separation of the departments of the Coast Artillery School (1941), it was customary for all coast artillery officers to receive instruction in both the seacoast and heavy field artillery departments. However, as a result of the separation and of the war-time requirements for officers, this practice was discontinued during the war. Courses at both schools were shortened, and emphasis was given to specialization.

b. (1) The principal courses offered during the war were as follows:

(a) Seacoast observation and fire-control (SCA School)

(b) 1928 Model Electric Data Computer and Transmitter (SCA School)

(c) Battery commander's course, turret battery (SCA School)

(d) Battery commander's course, except turret battery (SCA School)

(e) Battalion commander's course, (SCA School)

(f) Gunnery, 28-cm and 30-cm howitzer (HFA School)

(g) Motor Transportation, (HFA School)

(h) Battery commander's course, (HFA School)

(i) Battalion commander's course, (HFA School)

(j) Subaqueous sound-ranging, (SASR School)

(2) Courses were generally of from 1 to 3 months' duration. Students were enrolled at such times and in such numbers as were necessary to meet changing emergency conditions. The capacity of the Seacoast Artillery School was approximately 60 officers and of the Heavy Field Artillery School approximately 40.

42. Courses for Enlisted Men. Specialists courses for enlisted men were offered at each school.

a. The Seacoast Artillery School had courses for instruction of NCOs as turret operators (both gunner and engineer courses) (9 months), radio operators (6 months) and searchlight operators (6 months). A course on each of the above subjects was available for enlisted men other than NCOs. The length of all courses was eventually reduced about 50%.

b. The Heavy Field Artillery School had specialist courses for NCOs in radio and motor transportation. These courses were of three month's duration. In addition, a short course was conducted for operators of coincidence range finders.

Section V
Target Practice

43. General. Although the firing of an annual target practice, either with its primary armament or with a 75-mm field artillery gun, was a part of the training program for all units during peace times, this firing was largely curtailed during the war. Due to the shortage of ammunition, many units fired no practices with their primary armament during the war.

a. Procedures. General. General target practice procedures were much the same as those employed in our service. However, due to the decentralized control of all training, and the resulting latitude given to regimental commanders, there was no uniformity in ranges, rates of fire, types of courses, and other conditions governing the firing of target practices.

b. Reports and Critiques. (1) Upon completion of firing a target practice report analyzing the results of the practice was made and forwarded to the Artillery Inspector in the Inspectorate of Military Training.

(2) A critique was held after the practice, during which materiel failures, personnel errors and any unusual features of the practice were analyzed and discussed.

Section VI
Training Literature and Training Aids

44. Training Literature. a. General. Training literature was limited to Field Service Regulations common to all branches. training manuals and technical manuals. Only a few of these were obtained by the Board, as most of the training literature had been burned prior to the occupation.

b. Training Manuals. These consisted of -

(1) Manuals on subjects of general application, such as garrison duties, military courtesy, customs of the service, military law, and others of this nature.

(2) Manuals pertaining to artillery only, such as maneuvers of heavy artillery equipment, gun drill, etc.

c. Technical Manuals. These covered the technical details of construction, operation and functioning of communication equipment and artillery materiel.

45. Training Aids. Training aids, except for a few charts for instruction on the details of the hydraulic system and other features of turret guns, were virtually unknown in the Japanese coast artillery units. It was considered that the training and technical manuals contained all of the information necessary for instructional purposes.

CHAPTER 5

MATERIEL

Section I
Research and Development

46. General. During World War II and the two decades preceding the war the Japanese attached comparatively little importance to seacoast artillery research and development. Their military efforts were directed primarily toward the development and production of equipment for their offensive arms, their Navy, Air Force and Field Armies. Seacoast Artillery, being a defensive arm, without mobility, received only incidental attention. As the war moved nearer the Japanese homeland defense against air attack became the paramount interest. Research and manufacturing facilities were taxed to the utmost in trying to combat our air offensive.

47. Seacoast Artillery Materiel in 1918. At the end of World War I Japanese seacoast artillery consisted largely of minor caliber guns and a considerable number of fixed howitzers. There were practically no major caliber guns of Japanese design and manufacture. There were a few old model 27-cm guns which had been purchased from France many years before the war. Thus, in 1918, the bulk of the seacoast artillery consisted of 10-cm, 12-cm, and 15-cm guns on fixed pedestal mounts, and 24-cm, 28-cm and 30-cm howitzers in permanent emplacements. All of the howitzers were, in reality, mortars, when judged by our standards of barrel length and muzzle velocity. The fire-control equipment for these weapons was of the simplest type, consisting usually of "on-carriage" sights for guns and simple plotting boards for howitzers.

48. Development from 1919 to end of World War II. a. Army Weapons.

(1) The only new seacoast artillery gun developed by the Army was the 15-cm Type 96, designed in 1936. This was intended to be a standard gun for long range mobile artillery. However, several of these were emplaced on concrete platforms for seacoast defense.

(2) The following modifications of existing weapons

were made:

(a) The 24-cm and 30-cm howitzer carriages were redesigned to make them mobile.

(b) The fixed carriage of the 15-cm gun, Type 45 (1912) was modified to permit a greater angle of elevation with a corresponding increase in range.

b. Navy Turret Guns. Following the Washington Disarmament Conference (1922) the Japanese Navy released to the Army certain gun turrets from cruisers and battleships which had been scrapped under the terms of the Conference. These were all two-gun turrets. A total of 2- 20-cm, 2- 25-cm, 6 - 30-cm and 3 - 41-cm turrets were thus taken over by the seacoast artillery. Very little modification was required in the materiel except for power plants.

c. Fire-Control Equipment. Although there was practically no development or production of seacoast artillery guns between the two wars there was considerable experimentation and development of fire-control equipment for their 15-cm and turret guns. Two complete range-finding and data-transmission systems were designed, standardized, and issued to a number of firing batteries. The Type 88, (1928), consisted of an electrical data computer with electrical transmission of data from range finder to guns. The Type 98, (1938), was a simplified version of the Type 88.

d. Searchlights. The Japanese Army did not design a special seacoast artillery searchlight but depended upon modified antiaircraft equipment. The overall development of lights followed the general pattern of that of our own service. At the end of World War I the "dishpan" or open type of light was in use. The "drum" type with a glass front door appeared about 1925 and remote control was added about 1930. These design features were consolidated in the Type 93 (1933), and improved slightly in the Type 96 (1936). No notable improvements appeared until 1941 when attempts to produce a more brilliant and higher intensity searchlight resulted in the Type M-1, (1941), and Type M-3, (1943). These lights were never produced in quantity; thus the majority of the searchlights used in seacoast installations were of the Type 96.

e. Radar. Research and experimentation in radar for seacoast artillery was not initiated until early in 1945 and then only in a small way. In the test model, range errors were small; however, directional errors were as large as 60 degrees. The Japanese considered the results of the experimentation a dismal failure.

f. Sub-Aqueous Sound Ranging. Although there was a Sub-Aqueous Sound Ranging Department in the Coast Artillery School as early as 1934, and a separate school was established in 1943, sub-aqueous sound-ranging equipment was still in the experimental stage at the end of the war.

49. Responsibility for Development of Seacoast Artillery Materiel.

a. Within the Fortress (Seacoast) Artillery itself there was no agency which had a primary interest in, or any direct responsibility for the development of seacoast artillery equipment or materiel.

b. Responsibility for setting up the military characteristics of weapons, for the initiation of development, and for carrying development through to completion rested in the development agency. This agency (the various Ordnance laboratories of the Army), functioned directly under the Chief of Ordnance of the Army, who, in turn, was under the Chief of Staff of the Army.

Section II
Materiel - General

50. General. The piece-meal development of the Japanese seacoast defenses, and a reluctance to abandon any equipment which had once been used, resulted in the Coast Artillery being equipped with a heterogeneous assortment of weapons and materiel. This assortment was representative of coast artillery development through the years from 1890 to 1936. The retention of all of this materiel discouraged modernization by limiting the extent to which improved equipment could be put to general use, made the maintenance problem extremely difficult, and seriously complicated the ammunition production and supply situation.

51. Guns. a. Coast artillery cannon included guns and howitzers ranging in caliber from 9-cm to 41-cm. The predominant weapons, by types and calibers, were -

Minor caliber guns	15-cm
Major caliber guns	30-cm
Howitzers	28-cm

b. A seacoast artillery weapon, once emplaced, was never scrapped. Near the end of the war, the Japanese manned or were contemplating manning every available piece of artillery, irrespective of its range or age. Among the more ancient guns manned by coast artillery were the -

Krupp, Model 1890	15-cm
French St. Chamont, Model 1890	15-cm
French Schneider-Crusot, Model 1894	27-cm
Howitzer (Japanese), 1890	28-cm

Although there were few of the first three-mentioned guns, a comparatively large number of the 28-cm howitzers were used in the homeland.

CHARACTERISTICS

	41-cm Turret	30-cm Turret 45 cal.	30-cm Turret 50 cal.
TYPE, NUMBER AND DATE	40-cm Turret	30-cm Turret	30-cm Turret
CALIBER	410-mm	305-mm	305-mm
LENGTH OF BORE, (CALIBERS)	45	45	50
MUZZLE VELOCITY FT/SEC.	2,500	2,650	2,800
MAXIMUM HORIZONTAL RANGE (YARDS)	32,800	30,000	32,200
ELEVATION LIMITS	-2 to 35°	0 to 33°	0 to 33°
TRAVERSE	270°	270°	270°
RIFLING, (ALL UNIFORM)	RH 1/28	RH 1/28	RH 1/28
RIFLING GROOVES	84	72	72
BREECHBLOCK CONSTRUCTION	Stockett type, operated by hydraulic motor. Welin thread	Carrier supported type operated by hydraulic motor, Welin thread.	
RECOIL SYSTEM	Hydro-pneumatic	Hydro-pneumatic	Hydro-pneumatic

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S OF SEACOAST ARTILLERY WEAPONS

l.	25-cm Turret	20-cm Turret	15-cm Gun	15-cm Gun	10-cm Gun	30-cm Howitze
	25-cm Turret	20-cm Turret	Type 45 (1912)	Type 96 (1936)	Type 7 (1918)	Type 7 Short
	254-mm	206.4-mm	149.1-mm	149.1-mm	105-mm	305-mm
	46.7	46.7	50	50	45	16.4
	2,650	2,500	2,900	2,900	2,300	1,300
	27,000	20,000	26,000	25,000	10,000	12,000
	-5 to 35°	0 to 30°	-8 to 43°	-8 to 50°	0 to 20°	-3 to 73°
	360°	360°	360°	180 or 360°	360°	360°
	RH 1/28	RH 1/28	RH 6°	RH	RH	RH
	64	48	40	40	—	72
	Carrier supported type, operated by handwheel, Welin thread.		Lever pull type, tapered plain slotted screw.		Semiautomatic Sliding Wedge	Lever pull t plain slot
	Hydro-pneumatic	Hydro-pneumatic	Hydro-pneumatic	Hydro-pneumatic	Hydro-spring	Hydro-pneumatic

FIG.6

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ILLERY WEAPONS

	15-cm Gun	10-cm Gun	30-cm Howitzer	30-cm Howitzer	28-cm Howitzer	24-cm Howitzer
	Type 96 (1936)	Type 7 (1918)	Type 7, (1918) Short	Long	(1890)	Type 45 (1912)
	149.1-mm	105-mm	305-mm	305-mm	279.5-mm	240-mm
	50	45	16.4	23.7	--	16
	2,900	2,300	1,300	1,600	1,000	1,200
	25,000	10,000	12,000	16,700	8,600	11,800
	-8 to 50°	0 to 20°	-3 to 73°	-3 to 73°	-10 to 76°	-3 to 73°
	180 or 360°	360°	360°	360°	360°	360°
	RH	RH	RH	RH	LH	RH
	40	--	72	72	64	64
type, tapered otted screw.		Semiautomatic Sliding Wedge	Lever pull type, tapered plain slotted screw.		Tray supported Plain slotted screw	Same as 30-cm Howitzer
ic	Hydro-pneumatic	Hydro-spring	Hydro-pneumatic	Hydro-pneumatic	Gravity	Hydro-pneumatic

c. The most modern weapons were the Navy turret-mounted guns (20-cm, 25-cm, 30-cm and 41-cm) which were released to the Army for use on shore following the Washington Disarmament Conference in 1922. These were fairly effective weapons.

d. For characteristics of seacoast artillery guns see Fig. 6.

52. Fire-Control Equipment. a. Japanese coast artillery fire-control equipment varied with the types of batteries. The turret batteries were equipped with a modern electrical fire-control system. A fairly modern mechanical system, with electrical transmission of data, had been designed for the minor caliber batteries, but only the more important ones had been so equipped. The remaining minor caliber batteries were provided with varying combinations of equipment, many of the components of which were of ancient design. The large howitzers invariably were provided with antiquated fire-control equipment.

b. No satisfactory radar had been developed for seacoast artillery, nor was any set in operational use at the end of the war.

53. Searchlights. Coast artillery units used modified antiaircraft artillery 150-cm searchlights.

54. The various classes of coast artillery materiel are discussed in detail in the following sections of this chapter.

Section III
Minor Caliber Guns

55. General. The last year of the war found the Japanese using a multiplicity of types of minor caliber guns for beach and seacoast defense. Some of these were ancient guns, acquired from foreign sources. However, the principal strength of the seacoast defenses, in minor caliber weapons, was provided by the -

10-cm gun	Type 7 (1918),
15-cm gun	Type 45 (1912), and
15-cm gun	Type 96 (1936).

56. 10-cm Gun Type 7, (1918). This was a built-up gun (see Fig. 7) on a barbette pedestal mount with a shield protecting the gun pointer and range setter. It was emplaced in a shallow concrete pit. Recoil and counter-recoil were hydro-spring. The breechblock was of the sliding block type and was semi-automatic. Ammunition was semi-fixed and the rate of fire was 12 rounds per minute. The gun had 360° of traverse, and a maximum range of 11,000 yards. A simple panoramic sight and a range scale provided "on-carriage" fire-control equipment.

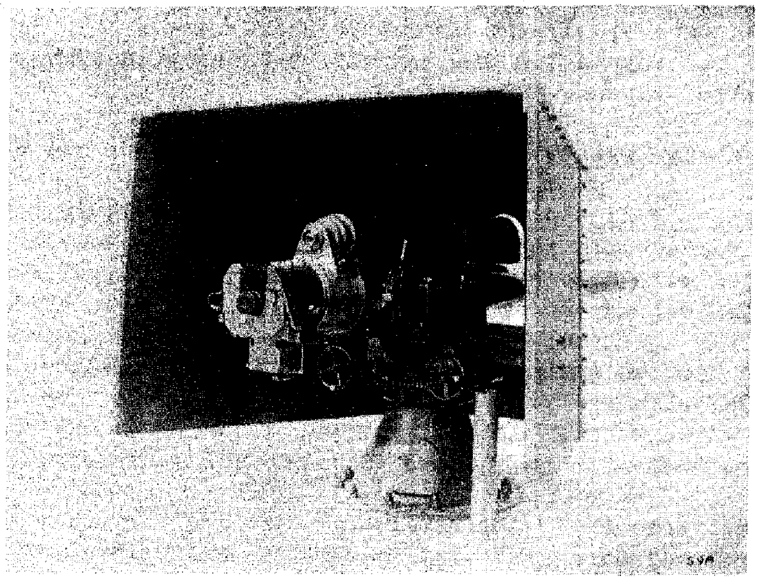

Fig. 7.
10-cm Gun Type 7 (1918)

57. 15-cm Gun Type 45 (1912), Modified. a. General. This gun (Figs. 8 and 9) was a pedestal barbette type, usually mounted in a shallow, concrete-lined pit, with 180° or 360° of traverse. The modification of 1934 was to increase the maximum range of the weapon by providing for greater elevation. To accomplish this, the trunnions were raised by adding height to the pedestal and to the trunnion seats. The muzzle velocity was 2870 ft sec and the maximum range 24,700 yards. The rate of fire was two rounds per minute.

b. Gun. The 149.1-mm 50-caliber gun barrel was of built-up type, and was mounted to slide in the cylindrical cradle during recoil.

c. Breechblock. The plain-thread, slotted-screw breechblock swung laterally, and utilized brass cartridge case obturation.

d. Cradle. The cradle had one recoil cylinder, two recuperator cylinders, and two recuperator expansion cylinders mounted above the cylindrical gun slide. The trunnions were located at the center of gravity of gun and cradle.

e. Carriage. The operating platforms, elevating and traversing mechansims, and open-backed gun shield were mounted on the yoke-shaped upper carriage. A stationary ring gear for traversing was located at the top of the pedestal above the operating platform.

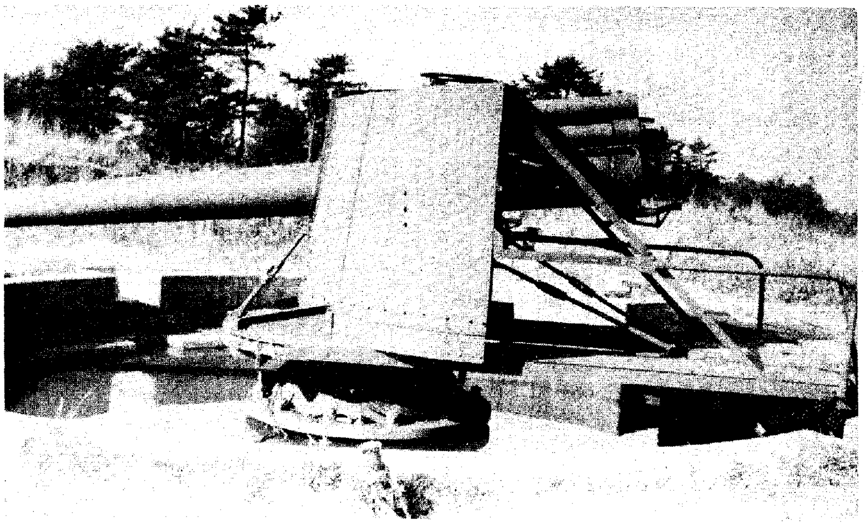

Fig. 8.
15-cm Gun Type 45 (1912)

f. Fire-Control Equipment. There were two general methods of fire control in use. In the normally used method azimuth and elevation receiver dials were mounted on the gun carriage to operate in conjunction with the Type 98 (1938) seacoast fire-control equipment, (par. 70). For emergency use an "on-carriage" control was provided which consisted of a panoramic sight Type 97 (1937) and a range-scale arc mounted on the carriage.

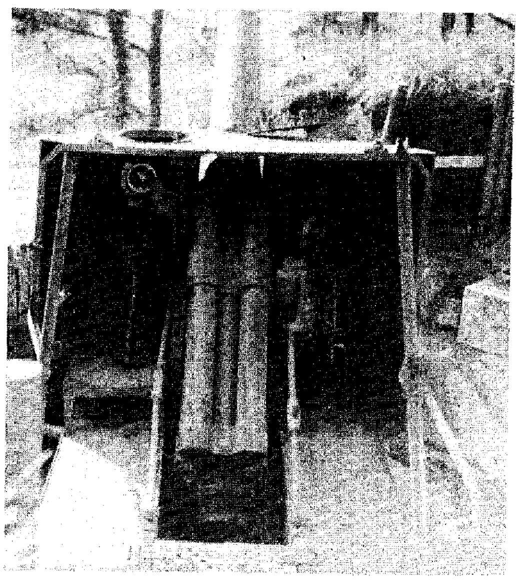

Fig. 9.
15-cm Gun Type 45 (1912)
Note azimuth and range receiver dials for Type 98 fire-control system.

g. Ammunition and Ammunition Handling. Ammunition was semi-fixed and both HE and AP projectiles were used. The ammunition was placed on the loading tray and rammed by hand. The loading tray was mounted on the left rear of the cradle and could be raised to the loading position or lowered to clear the gun in recoil by the operation of a hand crank through pinion and sector gears.

58. 15-cm Gun Type 96 (1936). a. General. This gun (Figs. 10 and 11) was originally designed for a mobile artillery role but several batteries were emplaced on concrete firing platforms for seacoast defense. In the latter role it was usually limited to 180° traverse by filled earth barricades. The muzzle velocity was 2870 ft sec and the maximum range was approximately 25,000 yards. Rate of fire was two rounds per minute.

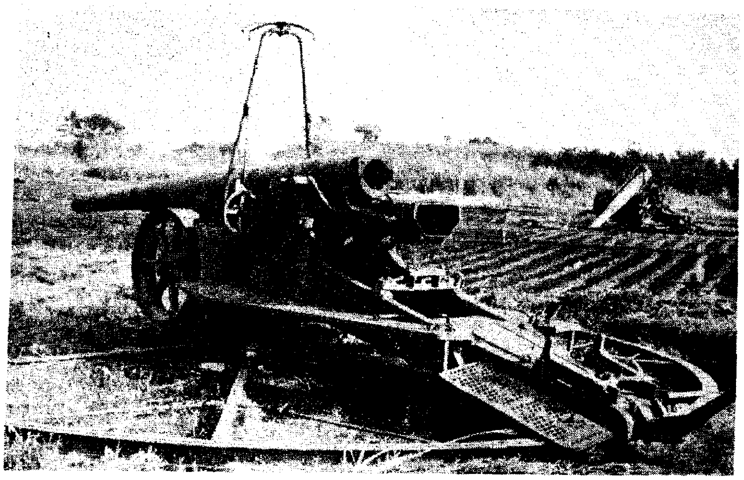

Fig. 10.
15-cm Gun
Type 96 (1936)

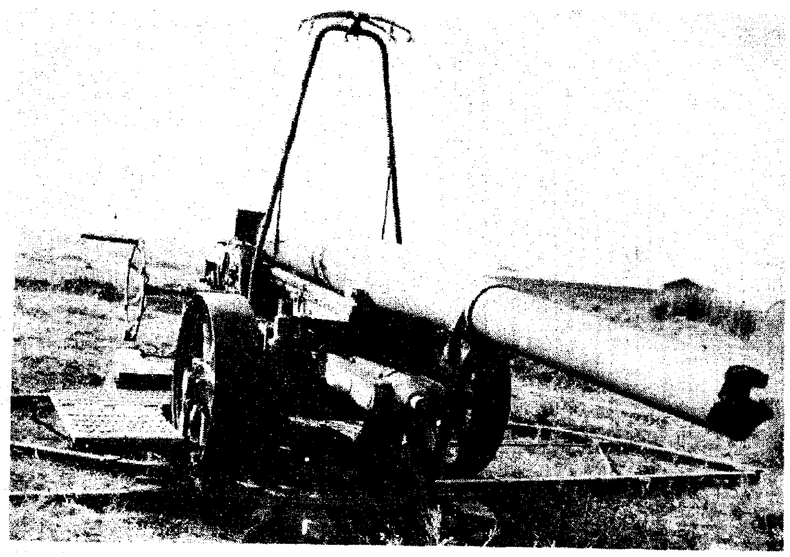

Fig. 11.
15-cm Gun
ype 96 (1936)

b Gun. The 149.1-mm 50-caliber gun barrel was of built-up construction mounted to slide on cradle rails during recoil.

c. Breechblock. The breechblock was a plain thread, slotted-screw type, rotated and swung laterally by the manual operation of a lever. Brass cartridge case obturation was used.

d. Cradle. The cradle trunnions were located well to the rear to allow a 45° maximum elevation. To offset the resulting preponderance of muzzle weight a hydraulically operated equilibrator was mounted horizontally on the upper carriage just below the cradle. The hydropneumatic recoil cylinders were mounted between gun and cradle.

e. Carriage. (1) The upper carriage supported the trunnions, the equilibrator, and the traversing and elevating mechanisms. It was of the box-trail type and was supported by two steel road wheels on a steel axle in the traveling position.

(2) The mobile firing platform consisted of a base plate and a semicircular traversing rail. The traversing rail was securely joined to the base plate by five radial H-beams. Traversing rail and radial beams were slip- and pin-jointed for rapid assembly and disassembly. In the firing position the carriage and steel axle rested on the revolving yoke of the base plate while the end of the trail rested on the traversing rail.

(3) There was no traverse of the gun or cradle on the top carriage. The traversing handwheel, located near the left trunnion, actuated a long shaft connected to a friction roller, bearing against the traversing rail near the towing pintle. Thus the gun, carriage and trail moved in azimuth when the traversing handwheel was rotated. A hand lever, located near the towing pintle, locked the trail to the traversing rail during actual firing.

(4) In siting these guns on concrete platforms for seacoast defense the base plate and the traversing rail were bolted to the concrete. The radial H-beams were thus eliminated. Usually, the traversing rail was a complete circle allowing 360° of traverse.

(5) The elevation handwheel, scale and mechanism were located on the right side of the gun just forward of the trunnions.

f. Fire Control. The "on-carriage" fire control was similar to that on the Type 45 15-cm gun, except that the range scale was graduated in mils of elevation. The azimuth and elevation receiver dials of the Type 98 fire-control equipment were used on those guns emplaced on concrete platforms for seacoast defenses.

g. Ammunition and Ammunition Handling. Ammunition was semi-fixed. It was placed on the loading tray and rammed by hand. The loading tray bracket was attached to the left-hand trunnion and moved with the cradle in elevation. While the gun was in battery and the breechblock open, the loading tray was swung into position for ramming by a handwheel operating through a chain and sprocket.

h. Mobility. The gun could be emplaced on the semi-circular firing platform in 4 to 5 hours if no extensive preparation of the ground was necessary. It required approximately four hours to put the gun into the traveling position. The gun, firing platform and miscellaneous equipment were moved in three loads.

Section IV
Turret Guns

59. General. a. Navy Type turret guns (2 guns per turret) of calibers and numbers as indicated below, were emplaced in the homeland and in southern Korea:

41-cm	(3 turrets)
30-cm	(6 turrets)
25-cm	(2 turrets)
20-cm	(2 turrets)

b. These constituted the only modern long range guns in the Japanese Seacoast Artillery.

60. 41-cm Turret Gun. a. General. This gun (Figs. 12 and 13) was designated as "Turret 45-caliber 40-cm Cannon". The barbette mount

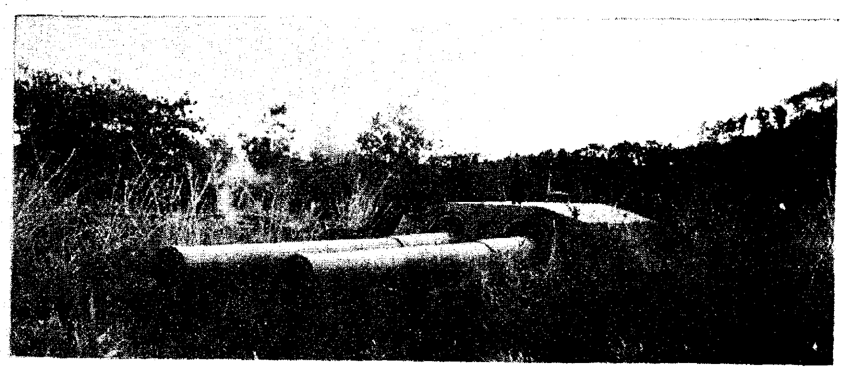

Fig. 12.
41-cm Turret

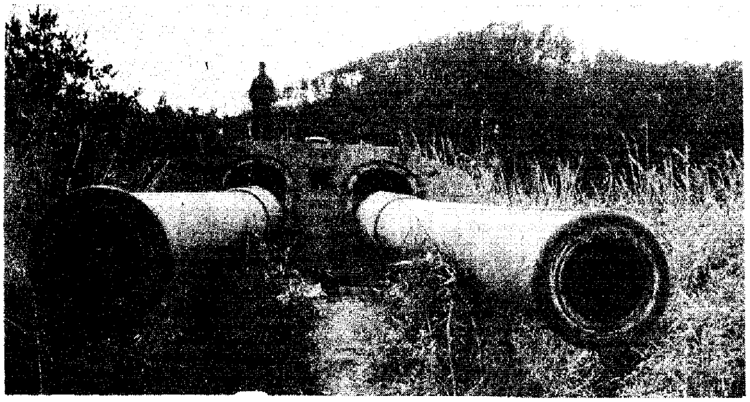

Fig. 13.
41-cm Turret

was designated "45-caliber 40-cm Cannon Gun Tube Type II". Markings had been "41-cm" but had been scratched off and changed to "40-cm". The guns were mounted two per turret and were hydraulically operated. Diesel engines were used to accumulate hydraulic pressure, to compress air for recuperation and bore scavenging and to generate electricity for lighting. Magazines and engine rooms were underground at a level approximately 50 feet below the guns. Ammunition entered the base of the turret at this level and was carried up within the turret.

b. Turret. The turret was approximately 40 feet long, 30 feet wide and 9 feet in height above the ground. Armor plating was 12 inches on face and sides of turret and 4 inches on top. Less than one-fifth of the total height of the turret projected above the ground. The underground portion contained ammunition-handling equipment, controls used in operation, and traversing and elevating mechanisms. The turret weight was carried on tapered rollers located approximately eight feet below the ground level. There was forced ventilation throughout the turret. Communication within the turret was generally by speaking tube. Electricity for lighting and data transmission entered the turret through slip rings at the level of the ammunition handling room.

c. Gun. (1) The guns were 410-mm, 45-caliber, of a combination built-up, wire-wound and auto-frettage construction. They were manufactured at Kure Naval Arsenal.

(2) The muzzle velocity was 2,500 ft/sec and the maximum range 32,800 yards. Rate of fire was one round per gun per minute.

d. Breechblock. The straight, slotted-screw, Welino thread breechblock (Fig. 14) was translated, rotated and swung by a three-cylinder radial hydraulic motor. DeBange obturation was used. A compressed air jet on the breech ring scavenged gases from the bore upon opening of the breech.

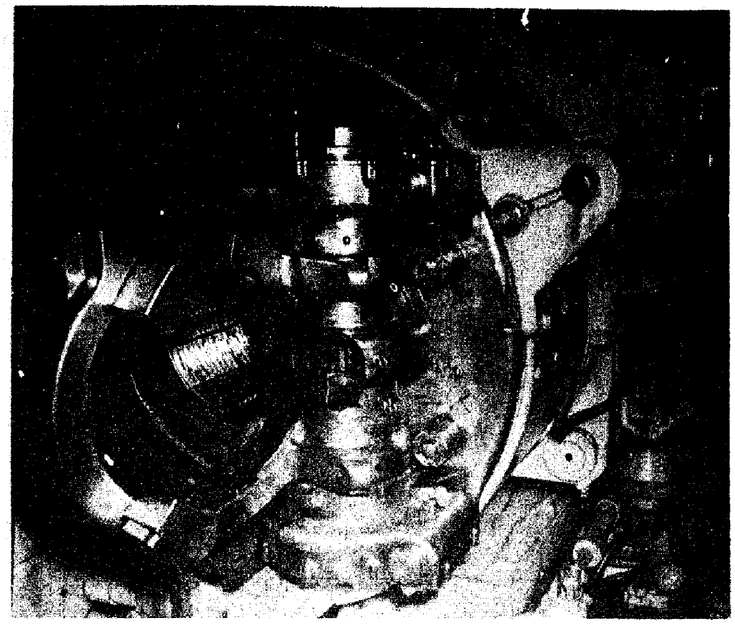

Fig. 14.
Breech of 41-cm
Turret Gun

e. Cradle. The gun slides, recoil cylinder and two recuperator cylinders were mounted on the cradle below the gun. Two recuperator expansion cylinders were located on the upper side of the cradle. All air connections ran through the cradle trunnions. Hydraulic pressure was transmitted through jointed tubing from turret to cradle and through sliding tube connections from cradle to gun. The power rammer was located on a rigid arm projecting from the rear of the cradle. It was operated by a three-cylinder hydraulic motor. A nozzle was located beside the rammer which sprayed water from the hydraulic system through the bore every two or three rounds to supplement the air scavenging.

f. Traverse. The maximum traverse limit of 270° was determined by the jointed hydraulic connections between turret and emplacement. A hydraulic motor, similar to the Waterbury speed gear, moved the turret in azimuth through a pinion meshing with a stationary internal-toothed ring gear. A mechanical-limit stop returned the hydraulic control valve to the "off" position at the limits of traverse.

g. Elevation. Each gun of the turret was elevated and depressed independently of the other. Elevation limits were -2° to plus 35°. A hydraulic jack, connected directly to the rear of the cradle, elevated and depressed the gun. A mechanical-limit stop returned the control valve to the "off" position when the gun reached maximum elevation or depression.

h. Ammunition Handling. The details of ammunition transfer are illustrated in Figs. 15 and 16. The folding loading tray was "kicked"

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SCHEMATIC PLAN VIEW
TYPICAL 41 & 30 cm TURRET GUN
UNDERGROUND INSTALLATION

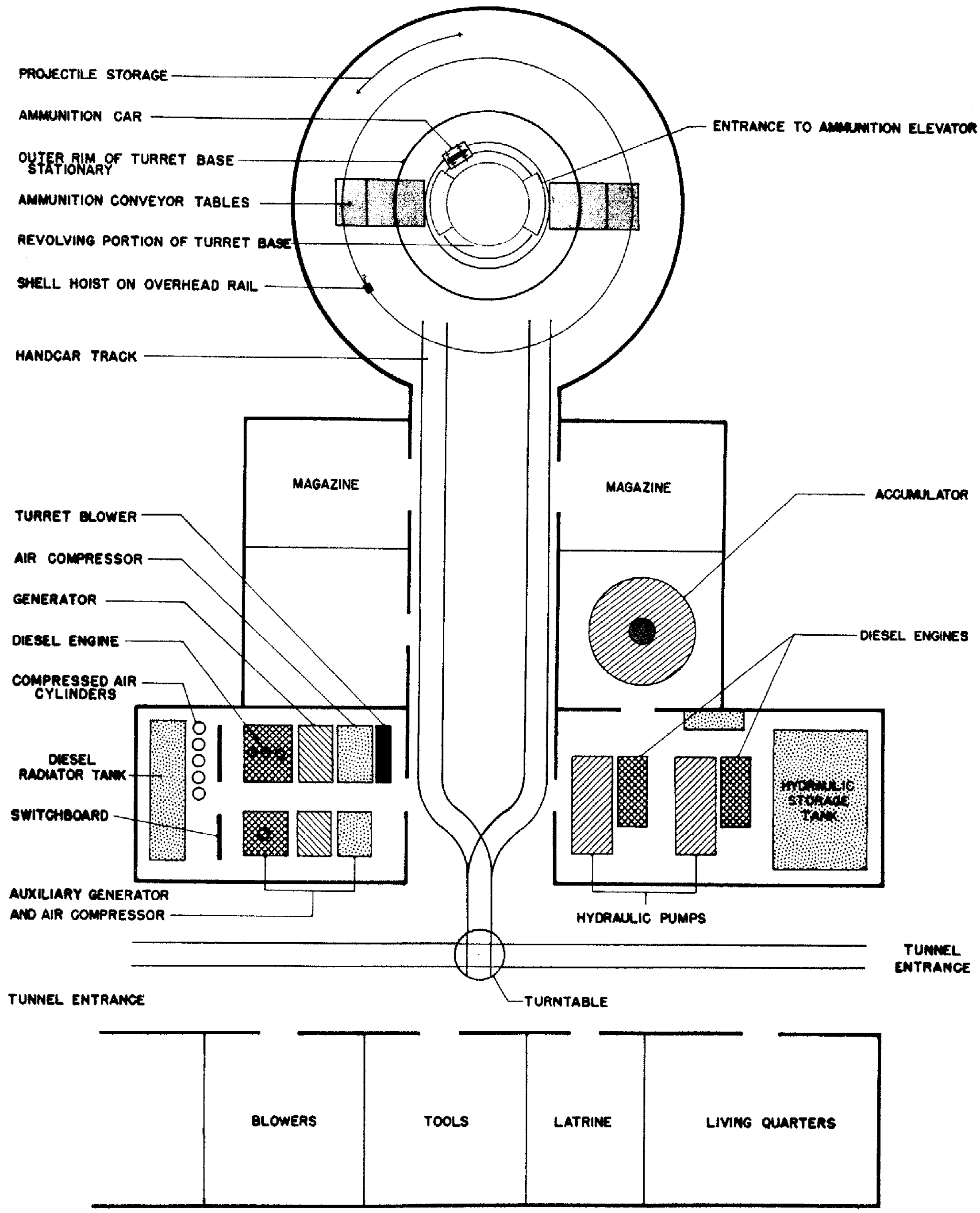

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FIG.15

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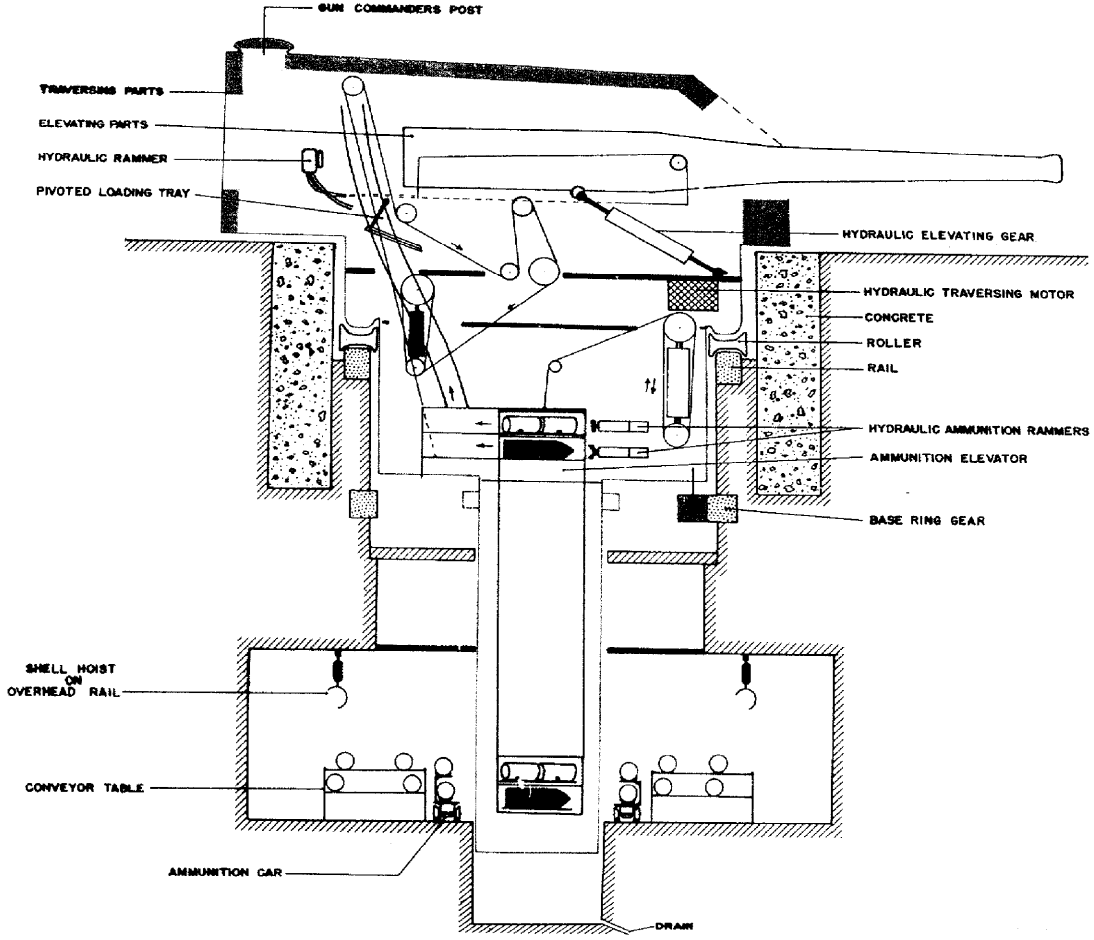
SCHEMATIC SECTION VIEW
TYPICAL 41 & 30CM TURRET GUN
AMMUNITION SUPPLY SYSTEM



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into loading position by the ammunition conveyor when the latter had reached the level of the breech. Theoretically, loading could be accomplished at angles of elevation up to 15°. Actually it took place at not more than 5°. In case the ammunition-hoisting equipment became inoperative ammunition could be lifted up through a vertical shaft by a hand-operated hoist.

i. Hydraulic Pressure. Hydraulic pressure was built-up in the accumulator tank (Fig. 17) by diesel-engine powered pumps. The liquid was fresh water with the addition of a small amount of lubricating oil. Operating pressure was approximately 400 to 500 pounds per square inch.

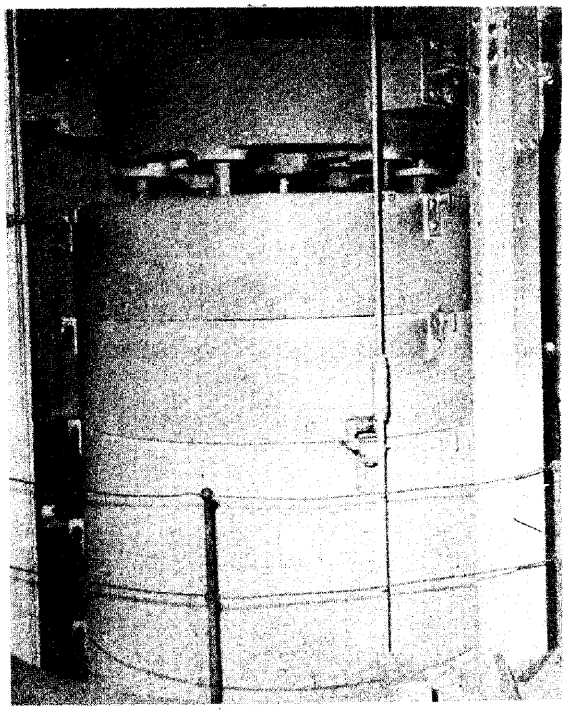


Fig. 17.
Accumulator Tank
41 and 30-cm turret guns
Note the heavy weight on
top of the tank

j. Fire Control. (1) Standard. The standard method of fire control within the turret was through the medium of azimuth and elevation receiving meters of the Type 88 seacoast fire-control equipment (par. 69, below).

(2) Emergency. A telescopic sight, turret gun type, was mounted in the forward end of the turret between the two guns. The observer could traverse the gun in azimuth from this position. Range in meters, as transmitted by telephone from the battery commander's station to the turret, could be set on the graduated range drum.

k. Turret Control Station. The turret commander's station (Fig. 18) contained the electric firing switch for firing the guns, the signaling telegraph which connected to the battery commander's station for "ready" and firing signals, duplicates of azimuth and elevation receiving meters, telephones to the battery commander's station, and speaking tubes to the ammunition handling rooms at the base of the turret. A manhole in the top of the turret permitted the turret commander to direct the fire of his guns in case all communication with the battery commander's station was destroyed.

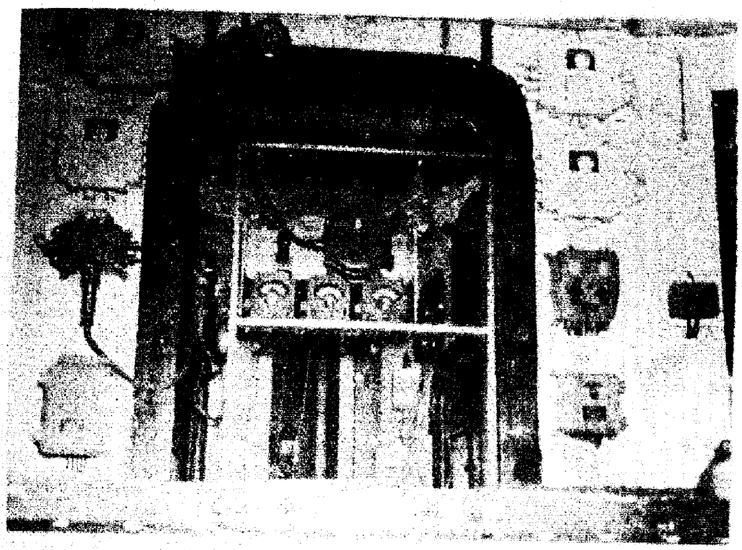


Fig. 18.
Turret Control station, for all turret guns
Note the duplicate azimuth and range potentiometer meters and the signaling telegraph

61. 30-cm Turret Gun. (See Figs. 19 and 20). a. General. Four of the total of six turrets mounted 45-caliber guns while the other two had 50-caliber guns. Guns, carriages and turrets were manufactured by the Kure Naval Arsenal. While there were minor differences in mounting and control, the turret, the hydraulic-power system and the ammunition supply were similar to that of the 41-cm turret gun.

b. Turret. The 30-cm gun turret was generally identical with the 41-cm turret with the following exceptions: (1) Proportionately smaller size and lighter construction; (2) Armor of 8 to 10 inches thickness on face, sides, and back and 2 inches on top.

c. Gun. (1) Both 45- and 50-caliber guns were of 305-mm barrel diameter and were of the combination built-up, wire-wound, auto-frettage construction.

(2) The rate of fire was two rounds per gun per minute. The 45-caliber gun developed 2650 ft/sec muzzle velocity and had a maximum range of 30,000 yards while the 50-caliber gun had 2800 ft/sec muzzle velocity and a range of 32,200 yards.

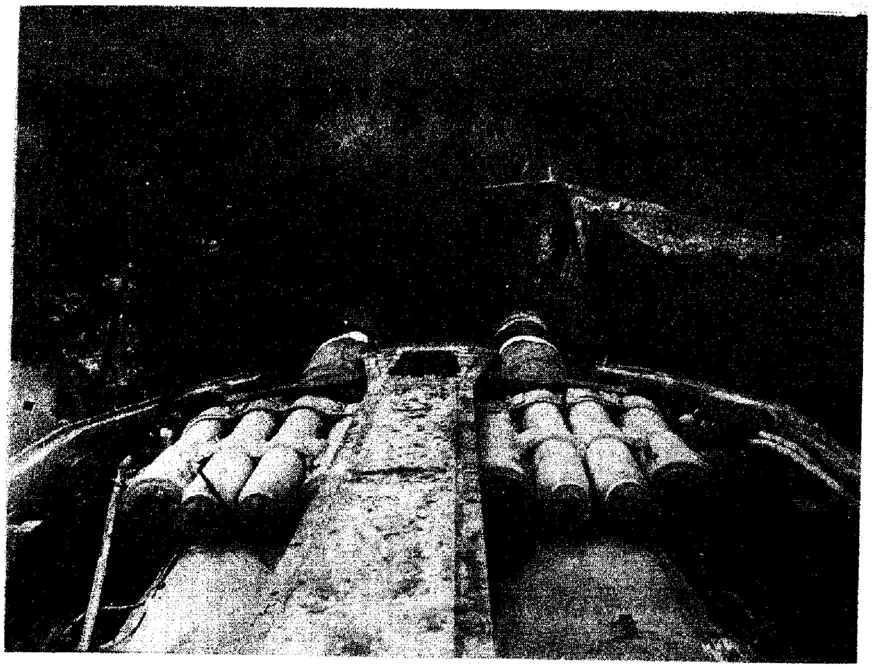


Fig. 19.
30-cm Turret Gun, 45 Caliber
Note camouflage trenches for gun barrels

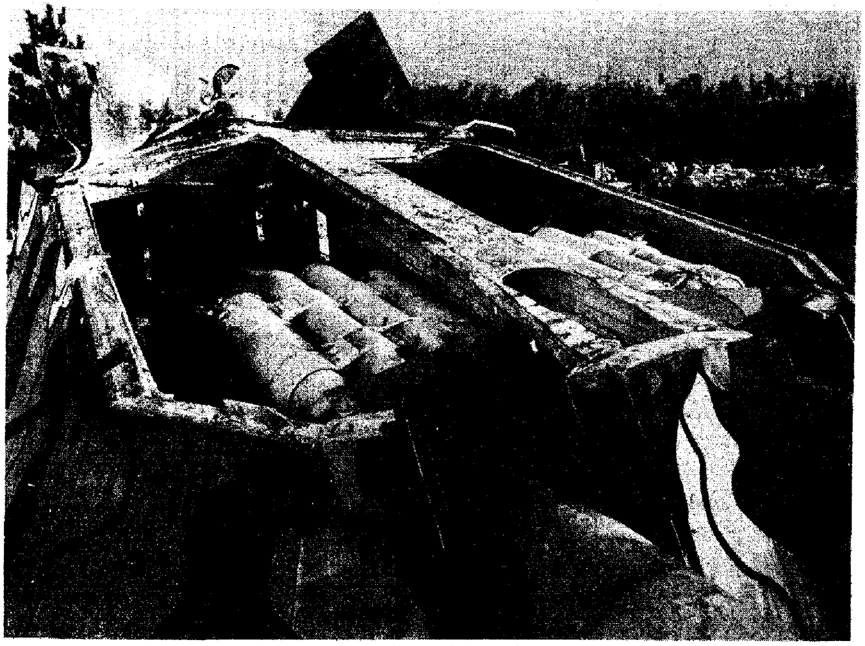


Fig. 20.
30-cm Turret Gun, 45 Caliber

d. Breechblock. The carrier-supported, Welin thread breechblock (Fig. 21) used DeBange obturation and was rotated and swung by hydraulic power. The 50-caliber guns used a 3-cylinder radial hydraulic motor for breech operation while the 45-caliber had a single hydraulic cylinder for this purpose.

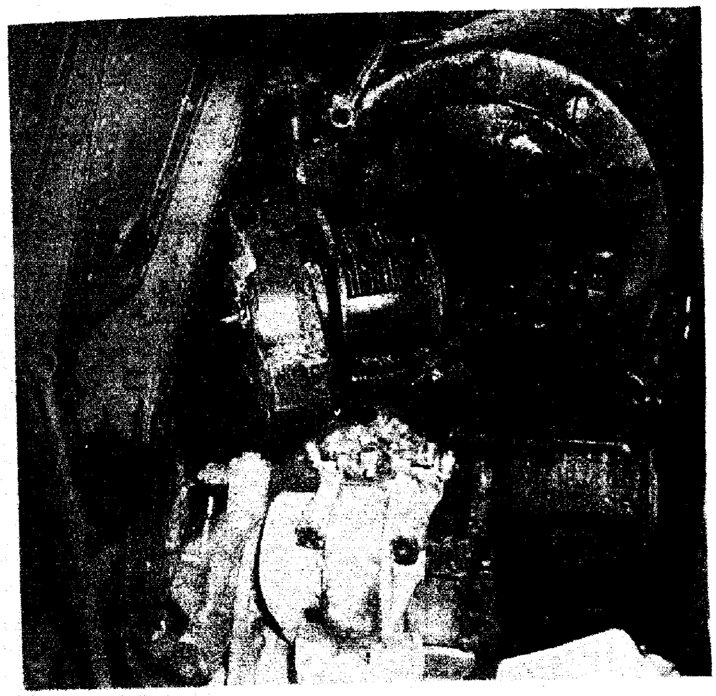


Fig. 21.
Breech, 30-cm Turret Gun, 45-caliber
Note power rammer and controls

e. Cradle. The cradle mounting was similar to the 41-cm turret gun, except in the case of the 45-caliber gun, which mounted four recuperator expansion cylinders on the cradle above the gun instead of two.

f. Traverse. Same as 41-cm turret gun.

g. Elevation. Elevation limits were 0° and plus 33°.

h. Ammunition Handling. Practically the same as for the 41-cm gun turret.

i. Hydraulic Pressure. Identical with the 41-cm gun turret.

j. Fire Control. Identical with the 41-cm gun turret except that there were two telescopic sights, gun turret type, one for each gun, for emergency fire control.

k. Turret Control Station. Identical with that of the 41-cm gun turret.

62. <u>25-cm and 20-cm Turret Guns</u>. a. <u>General</u>. These two types of guns were similar in construction, mounting and operation. The turrets were hand operated. (Fig. 22). Ammunition was served through doors in the rear of the turret, above ground.

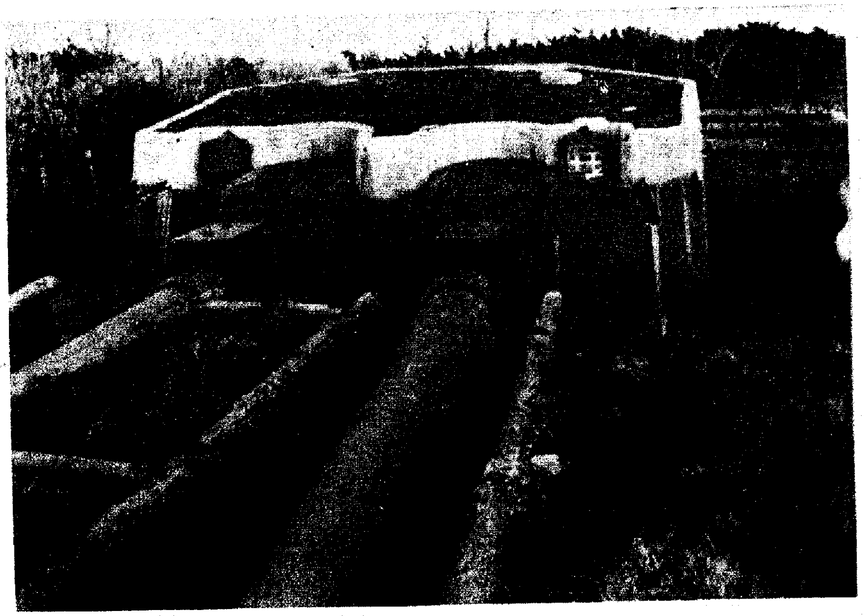


Fig. 22.
25-cm Turret Gun
Note vegetation growth on turret top and camouflage trenches

b. <u>Turrets</u>. The turrets were approximately 20 feet long, 15 feet wide and 7 feet in height above the ground. On the front, sides and back the 25-cm gun turret had 3 to 6 inches of armor plate while the 20-cm gun turret had 2 to 4 inches. The top armor of both turrets was less than one inch but additional protection of 6 inches of concrete and 12 inches of earth had been added. The latter served as camouflage. The turret extended below the ground level only far enough to allow space for the breech of the gun and cradle for recoil at maximum elevation.

c. <u>Gun</u>. (1) The 25-cm gun was a 254-mm, 46-caliber gun of wire-wound construction. The 20-cm gun was a 206-mm, 40-caliber gun of wire-wound construction.

(2) Both guns were designed to slide on rails in the cradle during recoil. Compressed air was used for scavenging the bore after firing.

(3) Both guns had a rate of fire of two rounds per minute for short periods. The 25-cm gun developed 2650 ft/sec muzzle velocity with a maximum range of 27,000 yards. For the 20-cm gun the muzzle velocity was 2500 ft/sec and the maximum range was 20,000 yards.

d. Breechblock. The carrier-supported, straight Welin thread breechblock, using DeBange obturation, was rotated and swung laterally by a handwheel. (Fig. 23). Firing was electrical.

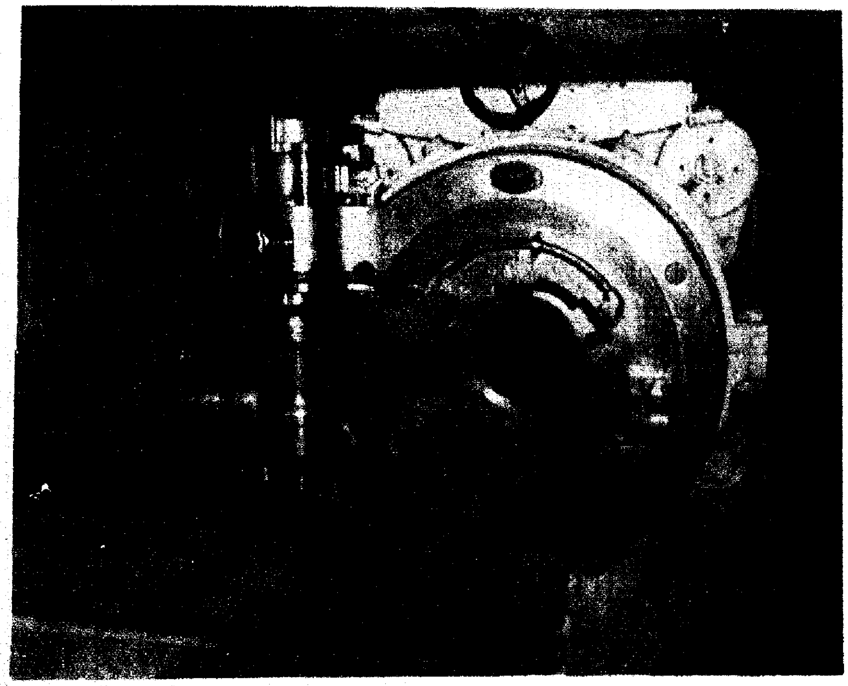


Fig. 23.
Breech of 25-cm Turret Gun

e. Cradle. A recoil cylinder and two recuperator cylinders were mounted on the cradle below the gun. Two recuperator expansion cylinders were mounted above the gun.

f. Traverse. Traverse (360°) was by a handwheel operating a vertical pinion-gear engaging an internal-toothed ring gear. Due to the location of the ammunition, traverse was limited to 180°.

g. Elevation. The guns of each turret were elevated independently. The 25-cm gun had a 35° limit of elevation while the 20-cm gun had 30° maximum elevation. Elevation was by handwheel through a spur gear operating on an elevation rack.

h. Ammunition Handling. (1) Ammunition was stored in a concrete-lined tunnel 20 feet underground, adjacent to the turret. It was brought up a ramp to the rear of the turret on a hand cart or was raised up a vertical shaft by a hand operated elevator.

(2) Projectiles were placed on the loading tray by means of a crane mounted in the rear of the turret. Powder was placed on the loading tray by hand. Ramming was by hand.

i. Fire Control. The Type 88 fire-control equipment (par. 69) was standard for these turret guns. In addition, two sights, turret gun type, were provided for each turret for "on-carriage" emergency fire control.

j. Turret Control Station. This was similar to that of the 41-cm gun turret.

Section V
Howitzers

63. General. a. The following three types (models) of heavy howitzers were used in seacoast defenses -

30-cm Type 7 (1918)
24-cm Type 45 (1912)
28-cm (1890)

b. Because of their short ranges (16700, 12000, and 8600 yds), low muzzle velocities (1600, 1200 and 1000ft/sec), and slow rates of fire (2 minutes per round), these weapons were relatively unimportant for seacoast defense.

c. Two of these types were mobile. The 30-cm howitzer Type 7 (1918) and 24-cm howitzer Type 45 (1912) had been designed originally for fixed emplacement but their respective carriages were redesigned after 1922 to make them mobile. During the last year of the war a number of these mobile howitzers were brought back from Manchuria and Korea for defense of the Japanese homeland. They were generally emplaced to cover landing beaches.

64. 30-cm Howitzer Type 7 (1918). a. General. This howitzer (Figs. 24 and 25) was manufactured in two barrel lengths; the short

Fig. 24.
30-cm Howitzer, Type 7 (1918)

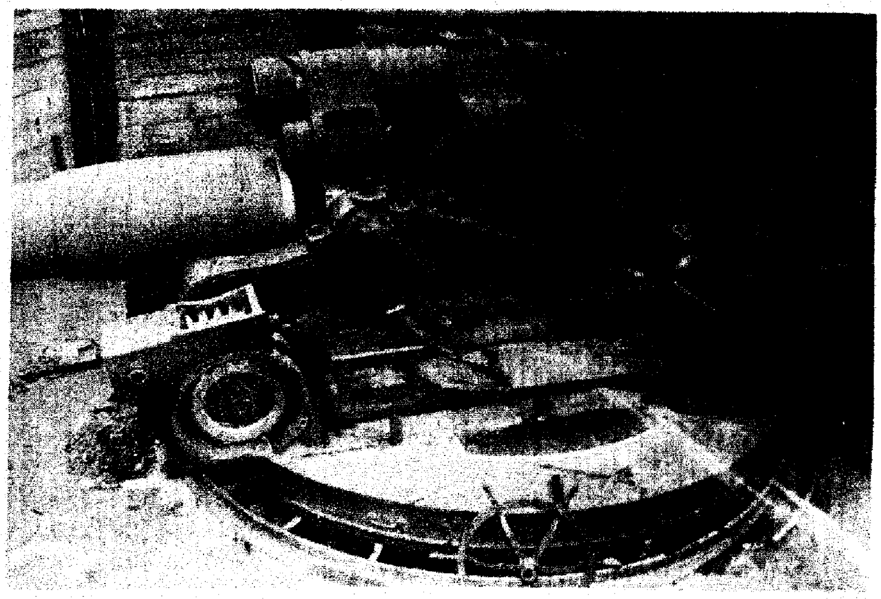


Fig. 25.
30-cm Howitzer, Type 7 (1918)

barrel of 16 calibers length and the long barrel of 24 calibers. The barbette carriage was of the same design for both barrel lengths. Rate of fire was one round every two minutes.

b. Gun. The 305-mm gun was of built-up construction and was mounted to slide in a cradle. The breechblock used brass cartridge case obturation and firing was by percussion primer.

c. Cradle. The recoil cylinder and two recuperator expansion cylinders were mounted on top of the cradle while the two recuperator cylinders were mounted under the cradle. An elevation rack was bolted to the under-side of the cradle.

d. Top Carriage. The top carriage supported the cradle trunnion, the elevating and traversing mechanisms, an ammunition handling crane and was in turn supported on the bottom carriage, on which it rotated, by tapered roller bearings. Traverse was through a vertical pinion shaft which engaged an internal-toothed ring gear on the bottom carriage.

e. Ammunition Handling. A mobile loading tray was supported on four steel wheels that operated on a track between the side rails of the top carriage. Projectiles were placed on this tray by means of the ammunition crane and then the loading tray was rolled up to the breech for ramming. Ramming of projectile and cartridge case (Fig. 26) was by hand.

Fig. 26.
Brass Powder Case,
30-cm Howitzer, Type 7

f. Fire Control. "On-carriage" fire control was standard with this weapon. For direct firing a Type 97 panoramic sight was mounted on the left side of the carriage near the traversing handwheel. An azimuth scale, bolted to the bottom carriage, was used for indirect fire. Range was set as an angle of elevation on the elevation scale or by means of a gunner's quadrant.

g. Mobility. The howitzer, carriage accessories and special heavy mechanical maneuvering equipment made up a total of 12 trailer loads. Eight of these were tracked trailers while the other four loads were transported in trucks. Emplacement and camouflage of position required approximately four nights under combat conditions.

h. Prime Mover and Tracked Trailer. (1) Prime Mover. The prime mover was generally a Type 95 13-ton tractor (Model B). It was full-track laying and was powered by a six cylinder 2-cycle water-cooled diesel engine. Engine cylinders were of 5.6 inches diameter and 7.6 inch stroke. It had four speeds foward and one reverse. Other specifications were:

Weight of prime mover	29,000 lbs (approx)
Maximum drawn load, grade 1/3	29,000 lbs (approx)
Regulation speed	9 m/hr
Overall length	16 feet 6 inches
Seating Capacity	6

(2) Trailer. Eight full-tracked trailers were provided for each howitzer. The trailers for the upper carriage and the base ring were 32 feet long; all other trailers were 22 feet in length. Each trailer had two track spans and steering was "fifth wheel" type.

65. 24-cm Howitzer, Type 45 (1912). a. General. This howitzer (Fig. 27) and its carriage was quite similar to the 30-cm howitzer, Type 7. Rate of fire was one round per minute. Fire control was the same as that of the 30-cm howitzer.

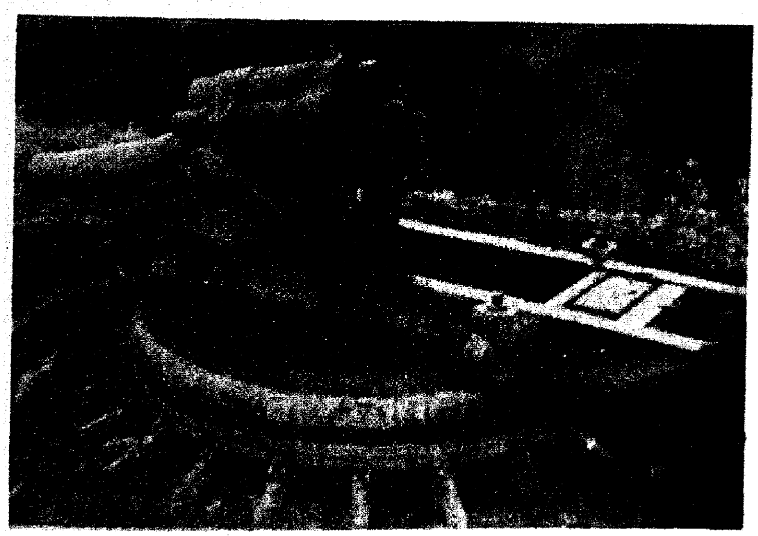


Fig. 27.
24-cm Howitzer, Type 45 (1912)

b. Howitzer and Carriage. The gun was 16 calibers long and of built-up construction. Brass cartridge case obturation was used and firing was by percussion primer. The top carriage was supported on the bottom carriage by four double-flanged steel wheels bearing on a circular steel rail of the bottom carriage. Ammunition was placed on the sliding loading tray by hand.

c. Mobility. The howitzer and carriage were transported in four loads on special axles. Miscellaneous and heavy mechanical maneuvering equipment made up an additional eight truck loads. It required four nights, under combat conditions, to emplace and camouflage the howitzer.

66. 28-cm Howitzer (1890). a. General. A brief description of this howitzer (Fig. 28) is included only because of the comparatively large number of these weapons in use in Japanese seacoast defenses.

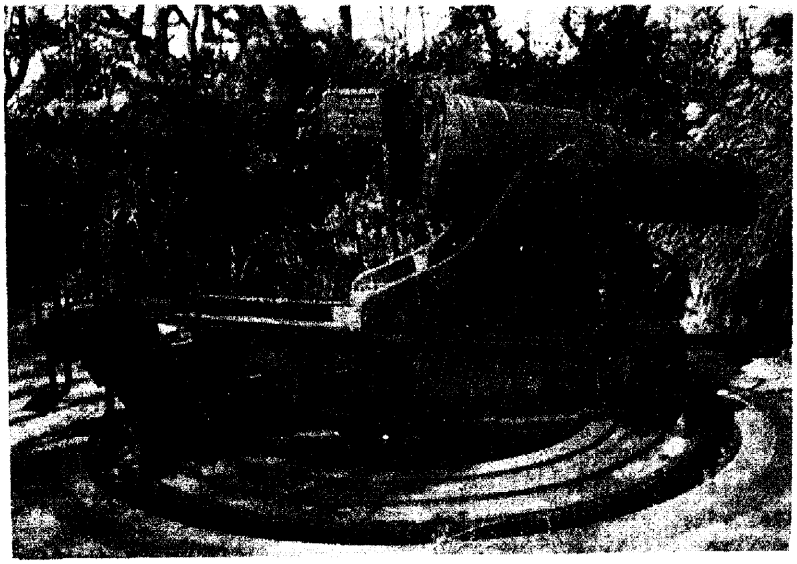


Fig. 28.
28-cm Howitzer (1890)

b. Howitzer and Carriage. The howitzer could be recognized by its short, heavy barrel. The tube was supported by its trunnions in bearings on the upper carriage. In recoil, the upper carriage moved freely on rollers up twin 8° ramps on the lower carriage. The rearward motion was terminated against two heavy coiled springs. A single buffer absorbed the shock of counterrecoil. The breechblock was a three-segment interrupted screw type. Firing was by friction primer and DeBange obturation was used.

c. Ammunition Handling. A wheeled tray brought the projectile from the magazine to the foot of the winch. Tray and projectile were raised and placed on the detachable loading tray.

d. Sub-Caliber Gun. This type of howitzer was frequently equipped with a sub-caliber gun for training purposes. It was a 75-mm gun weighing approximately 250 pounds.

Section VI
Railway Artillery

67. The Board was unable to locate any railway artillery in the Japanese homeland and none of the Japanese artillery officers who appeared before the Board had any knowledge of railway artillery. Early in 1945 one 10-cm gun, Type 7, was moved by railway flat car from one position to another prepared location on the east side of Tokyo Bay. During the process of moving it was decided to experiment with this gun as railway artillery. This experiment was a test firing to determine the type of carriage, or modification of carriage, and the nature of anchorage required for railway artillery of this caliber. This gun could not be classified as railway artillery.

Section VII
Fire-Control Equipment

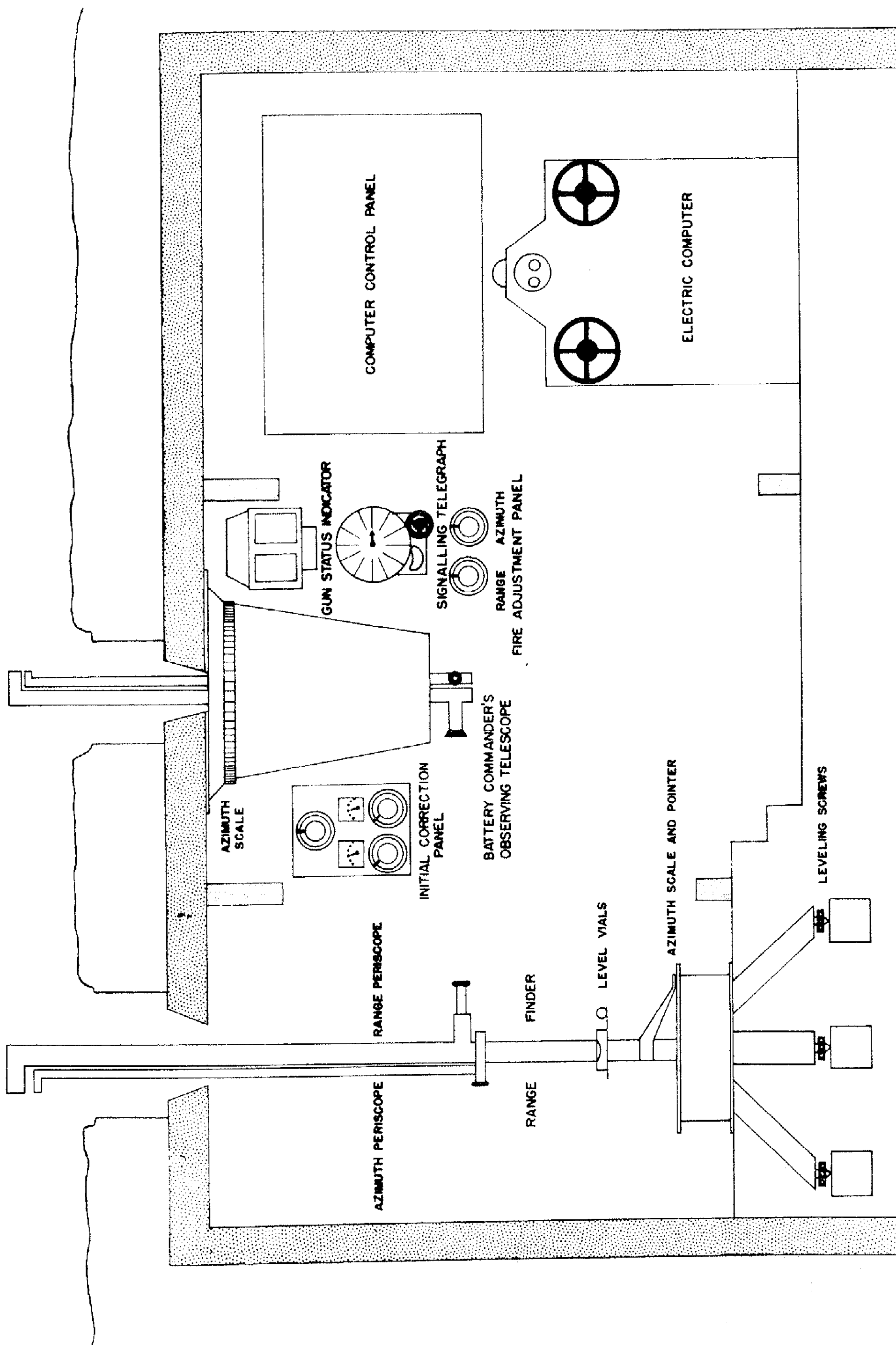
68. General. a. All Japanese fire-control equipment was designed to utilize vertical-base range finding. This was a natural development since the rugged elevated coastal terrain made such a system feasible for use with the comparatively short-range weapons that constituted their only seacoast armament until after 1922.

b. At the end of World War I the Japanese seacoast artillery fire-control equipment was of the very simplest type. It was only after the advent of the naval turret guns, with their substantially longer ranges, that any modern fire-control equipment was designed.

c. While this new equipment for the turret guns and the more modern 15-cm guns was often quite elaborate, the Japanese still retained the old fire-control equipment for their howitzers and older types of weapons.

d. (1) The only two standard fire-control systems were the -

Type 88 (electrical), for turret batteries. (Fig. 29)
Type 98 (mechanical with electrical transmission), for the more important 15-cm batteries.



TYPE 88 FIRE CONTROL SYSTEM
BATTERY COMMAND POST

FIG.29

(2) The remaining fire-control systems were made up of varying combinations of equipment, much of which was obsolescent or obsolete.

69. Type 88 (1928) Seacoast Fire-Control Equipment. a. General. fire-control system was designed specifically for the naval turret Range determination was by periscopic depression position finder. ›rinciple of the Wheatstone Bridge, in conjunction with potentio- 's, was used for the transmission of data from one instrument to ıer, for the compilation of the firing data and for transmission of firing data to the guns. The complete system was invariably in- ed in a battery, and consisted of the following:

(1) Type 88 Range Finder

(2) Type 88 Electric Computer

(3) Type 88 Electric Computer Control Panel

(4) Type 88 Battery Commander's Observing Telescope

(5) Calibration Correction Potentiometers

(6) Fire Adjustment Correction Potentiometers

b. Type 88 Range Finder. (1) This was a periscopic type of depression position finder (Fig. 30). Two periscopic

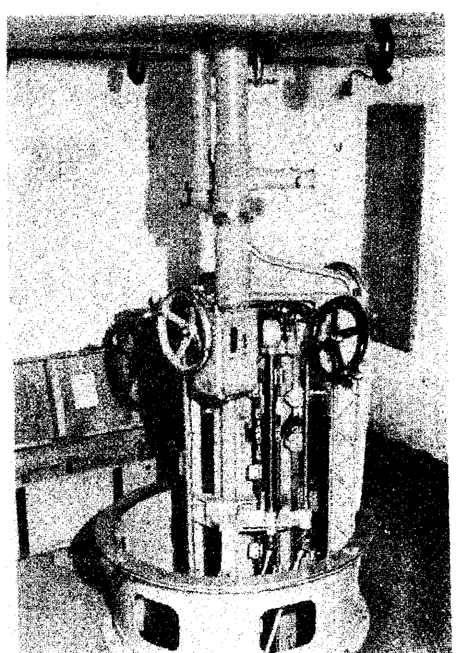


Fig. 30.
Type 88 Range Finder

telescopes with eyepieces 90° apart were mounted on a central rotating base so as to project through a hole in the ceiling of the battery command station. The two periscopes were joined together by yokes and were traversed as a unit. One periscope was used for tracking the target in azimuth in order that the other periscope could waterline the target.

(2) Referring to Fig. 31, the two periscopes were mounted rigidly on the pivot arm (A). Movement of this

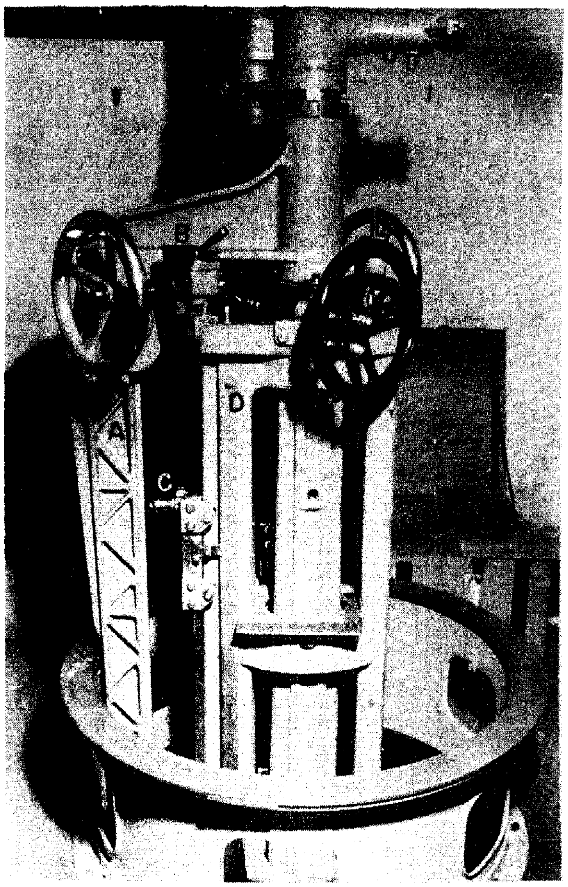


Fig. 31.
Type 88 Range Finder showing range determination features

arm consequently tilted the line of sight of the periscopes through an angle equal to the angular displacement of the pivot arm about its pivot point (B). The pivot arm was displaced angularly when the range-indicator or follower (C) moved vertically on the fixed slide (D). The vertical motion of the range follower was controlled by the range handwheel.

This range-indicator follower was adjustable for the height of site of the instrument. The bearing surface of the pivot arm was slightly curved to correct for refraction and curvature of the earth.

(3) Attached to the range-indicator follower was an electrical contact which, moving over the range potentiometer on the central rotating base, set up in the electric computer the present range of the target. Circumjacent with the central rotating base was the azimuth potentiometer. An electrical contact on the rotating base, moving over this potentiometer, set up in the electric computer the present azimuth of the target.

c. <u>Type 88 Electric Computer</u>. (1) This computer (Figs. 32 and 33) was a manually operated electrical bridge instrument wherein computations and data transmission were made by positioning potentiometers. A schematic diagram of the computation of gun firing data is shown in Fig. 34.

(2) Prior to operation it was necessary to balance each of the Wheatstone Bridges of the system (range bridge, azimuth bridge, two parallax bridges and the data-transmission bridges to the guns). The control panel

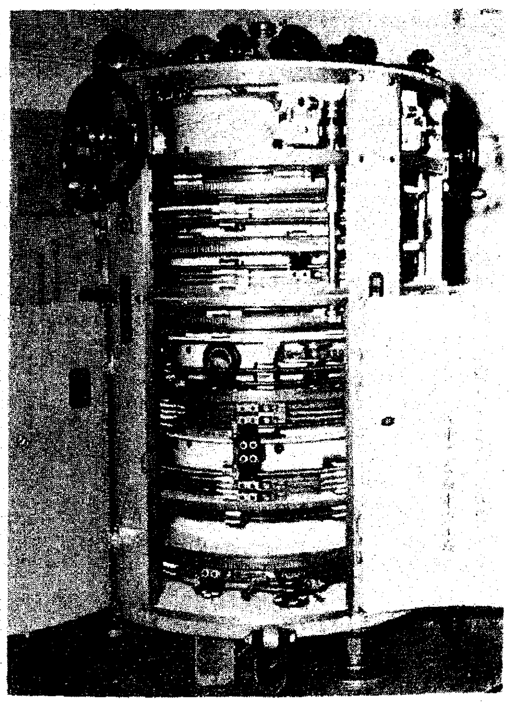


Fig. 32.
Type 88 Electric Computer

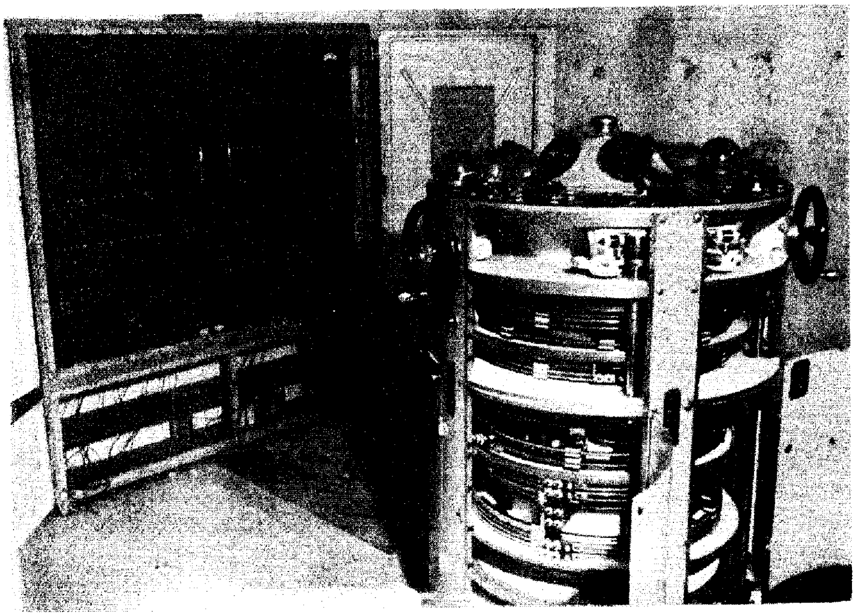


Fig. 33.
Type 88 Electric Computer and Control Panel

contained potentiometers (rheostats) for balancing these bridges.

(3) Operators kept the range and azimuth meters zeroed continuously by rotating handwheels and thereby set in the instrument the present range and azimuth. Another operator pulled a lever which automatically started a stop watch and at the same time engaged gears which moved an azimuth dial and a range dial. When the stop watch reading corresponded to the time of flight of the present position data (as read from a graduated scale) he pulled the lever again. This stopped the watch and disengaged the gears of the azimuth and range-travel dials. He then set the amount of range and azimuth travel, as read from the respective dials, into the computer by positioning other dials. This process was repetitious. An additional operator positioned other potentiometers on the instrument. In effect, the data transmitted to the guns was continuous present position data to which were added predictions determined by the last time of flight.

Schematic Diagram

Electric Data Computer Type 88

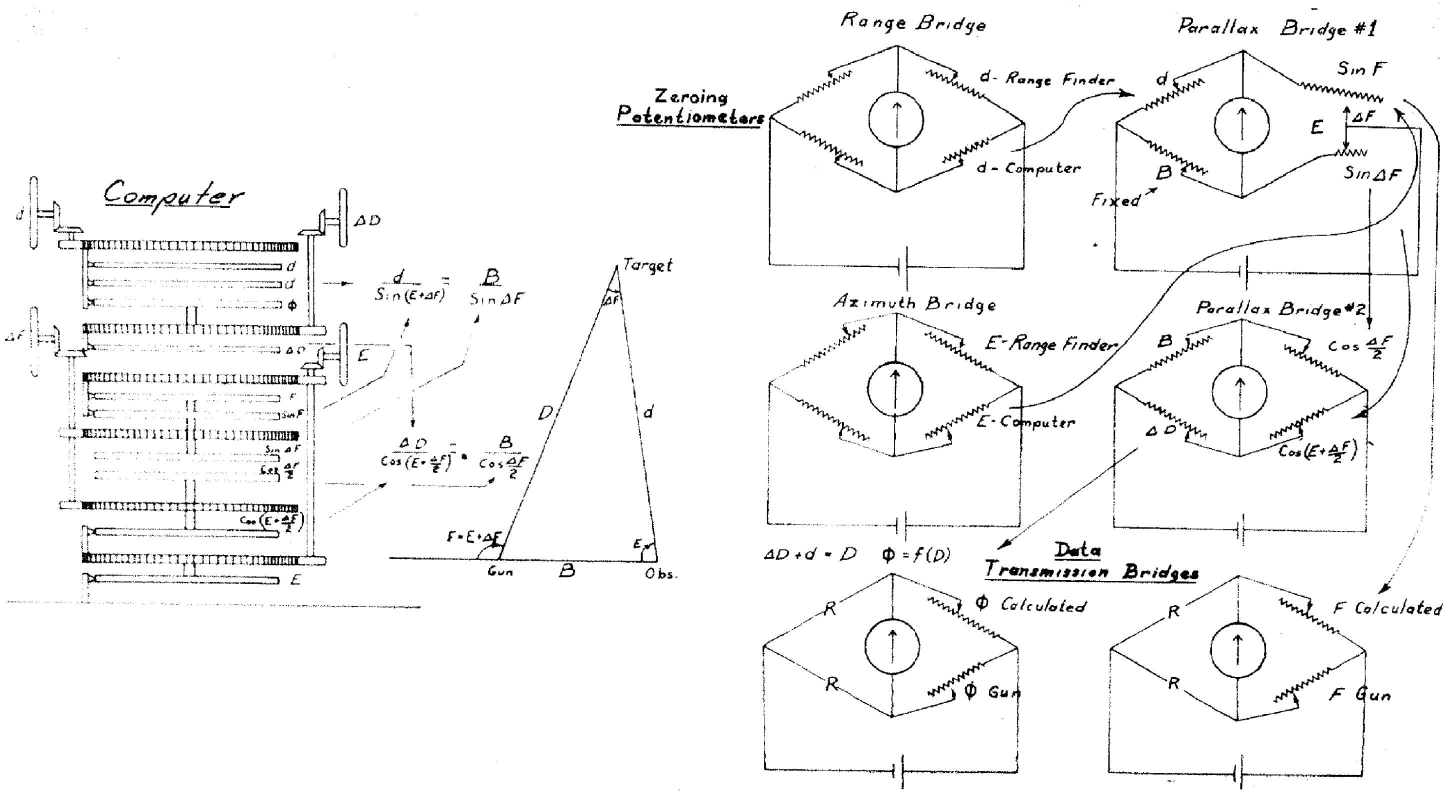


FIG. 34

(4) The limits, as read from the instrument, were:

Range - 2,000 to 35,000 meters
Gun Parallax - 0 to 5,000 meters
Azimuth Parallax - no limit

d. Type 88 Battery Commander's Observing Telescope. This consisted of two periscopes somewhat similar to those of the range finder but smaller in size. They were mounted on a circular base which rotated in a frame bolted to the ceiling of the battery command station. The periscopes projected through the roof of the command station. These were used as spotting scopes for adjustment of fire and control of the searchlight.

e. Calibration and Fire Adjustment Correction Potentiometers. Adjacent to the battery commander's observing telescope were two panels. (Figs. 35 and 36). One panel contained three potentiometers for calibration corrections (one for azimuth of the turret and two for range). The other panel held two potentiometers for use in adjustment of fire in range and azimuth. All of these potentiometers, whether range or azimuth, were connected electrically to their respective data-transmission lines between the electric computer and the guns.

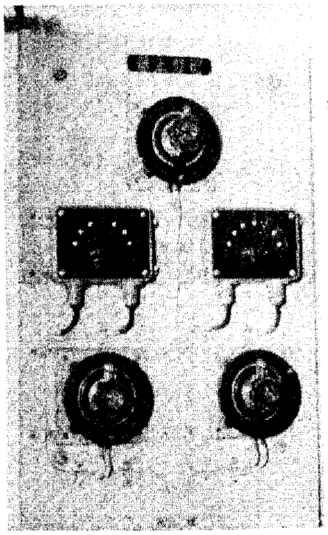


Fig. 35.
Potentiometers for
Calibration
Corrections

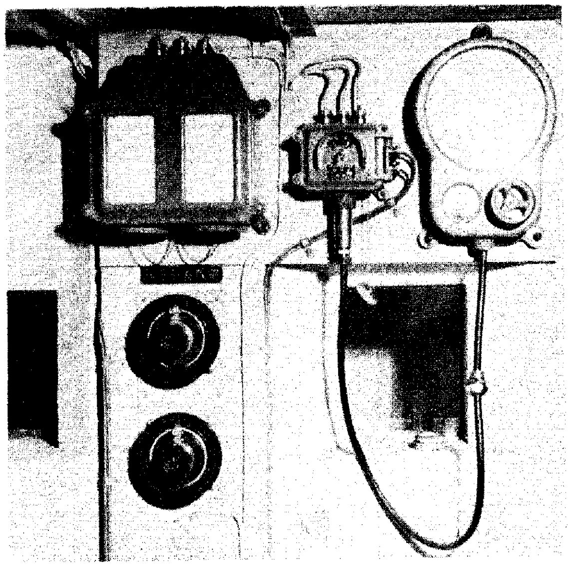


Fig. 36.
Potentiometers for
Fire Adjustment Corrections
and Signaling Telegraph

f. Operating Power. This was supplied by 12-volt dry cell batteries. Batteries were connected into the circuit at the control panel.

70. Type 98 Seacoast Fire-Control Equipment. a. General. This system of fire control was designed for use with 15-cm guns. Present range and azimuth were determined by a depression position finder. Firing data were obtained by adding algebraically range and azimuth travel, azimuth parallax, ballistic corrections and fire-adjustment corrections to the present-position data through a system of dials and differential gears. The firing data thus obtained were transmitted electrically to the azimuth and elevation receiver dials on the guns by a 3-pole rotary switch. The system as employed normally consisted of the following:

(1) Type 98 Range Finder

(2) Type 98 Azimuth and Range Transmitter "A"

(3) Type 98 Range-Elevation Changer

(4) (A Type 89 Battery Commander's Telescope was utilized for observing)

b. Type 98 Range Finder. This instrument (Fig. 37) was a modified version of the Type 88 range finder, the differences being in the optical equipment and the method of transmission of data. Two

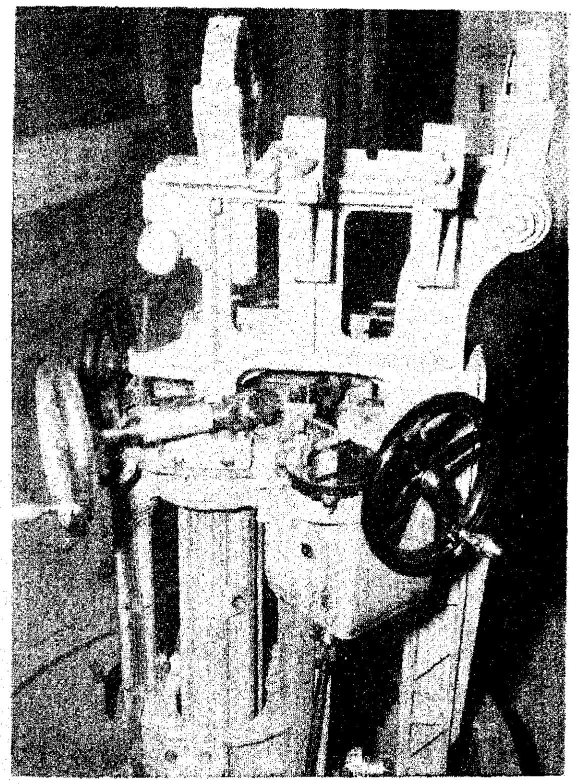
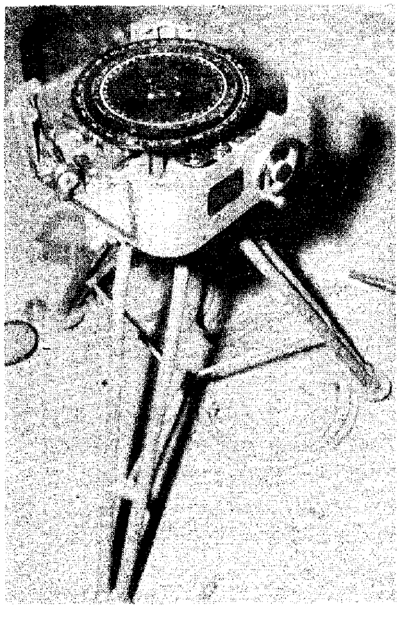


Fig. 37.
Type 98 Range Finder

telescopes were mounted on top of the rotating central base, parallel to each other. One telescope, the azimuth tracking telescope, deflected the line of sight through 90 degrees. Range determination was identical with that on the Type 88 range finder. The present range and azimuth were transmitted mechanically through a system of gears to the Type 98 azimuth and range transmitter "A" which was mounted on the range finder.

c. Type 98 Azimuth and Range Transmitter "A". Present range and azimuth were set up continuously in this instrument (Fig. 38) as the target was tracked by the Type 98 range finder. An operator manually engaged azimuth and range rate dials during the present time of flight. He then set these rates into the instrument. Additional dials were used for setting in ballistic corrections, azimuth parallax and range and azimuth fire-adjustment corrections. The differential gears added algebraically all these separate increments of azimuth and range to the present azimuth and range. The resultant firing azimuth was electrically transmitted directly to the azimuth receiver dials on the gun by a 3-pole rotary switch. The firing range was transmitted electrically to the range-elevation changer.

d. Type 98 Range-Elevation Changer. This instrument (Fig. 39) was a mechanical device for converting the firing range into a function of the angle of elevation. The angle of elevation was transmitted electrically to the elevation receiver dials on the guns by a 3-pole rotary switch.



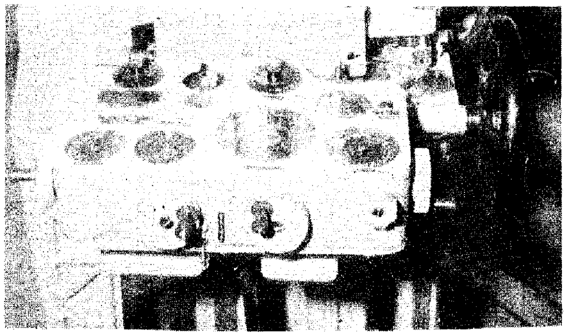


Fig. 38.
Type 98 Azimuth and Range
Transmitter "A"

Fig. 39.
Type 98
Range-Elevation Changer

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e. Operating Power. Adjacent to the command station was a gasoline engine which operated a 110-volt generator. This generator was connected electrically to a motor-generator set which supplied the 24 DC power for operating the data-transmission systems.

71. Type 98 Azimuth Transmitter "B" and Type 98 Range Transmitter "B". These two instruments (Figs. 40 and 41) were designed for use with

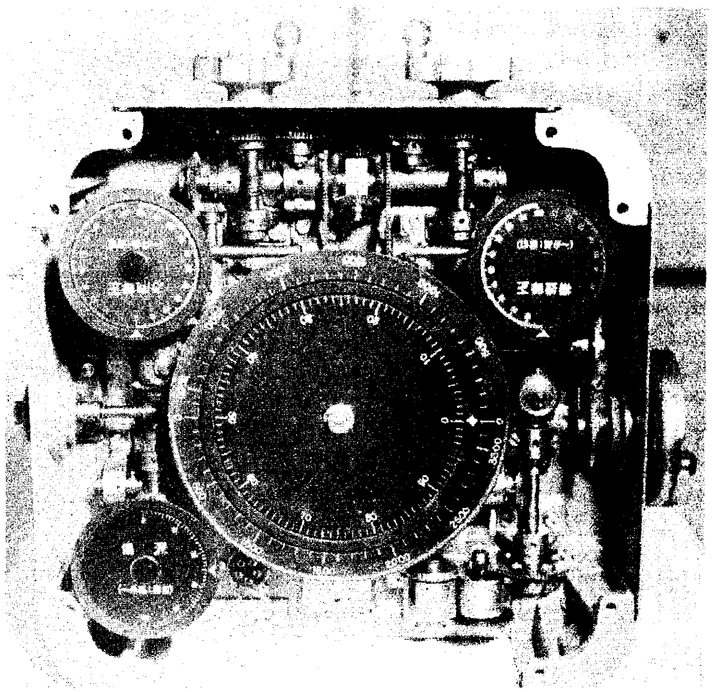

Fig. 40.
Type 98 Azimuth Transmitter "B"

15-cm guns which were not equipped with the Type 98 "A" System. Range and azimuth were determined usually by a Type 89 range finder. Azimuth and range, as read from the range finder, were set manually into the respective transmitters by operation of handwheels. Corrections to the present position data were applied in each instrument by a series of differential gears. The resultant firing data were transmitted electrically to receiver dials on the guns through a 3-pole rotary switch. Operating power was 24 volt DC as used in the Type 98 "A" fire-control system.

72. Type 89 Range Finder. This instrument was standard equipment for 24-cm and 30-cm howitzers when those weapons were sited for firing at moving targets. It was also used with 15-cm guns where the Type 98

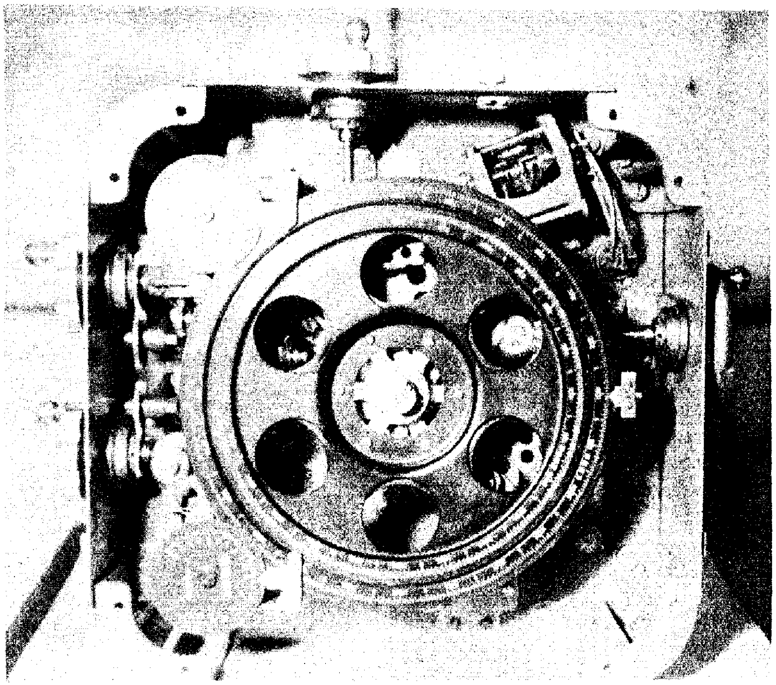

Fig. 41.
Type 98 Range Transmitter "B"

range finder was not provided. It consisted of a portable depression position finder mounted on a tripod. Fig. 42 illustrates the operating principle of the instrument. The height of site of the telescope was determined to the nearest meter, and set in on the height-of-site cam. The angle of depression of the target was then read in terms of range. An azimuth scale around the base of the instrument gave the azimuth of the target to the nearest mil.

73. Miscellaneous Plotting Boards and Range Finders. a. The fire-control system of the 28-cm howitzers included a plotting board. Two boards, both originally of foreign design, were available in Japan - the Ordwald Type and the Brachalini Type.

b. The Ordwald board (Fig. 43) had a telescope mounted on the range arm. This telescope operated as a depression position finder and ranges could be plotted directly from the arm. The Brachalini board (Fig. 44) had two arms pivoted at the center of the semicircle, one being pivoted eccentrically around the other.

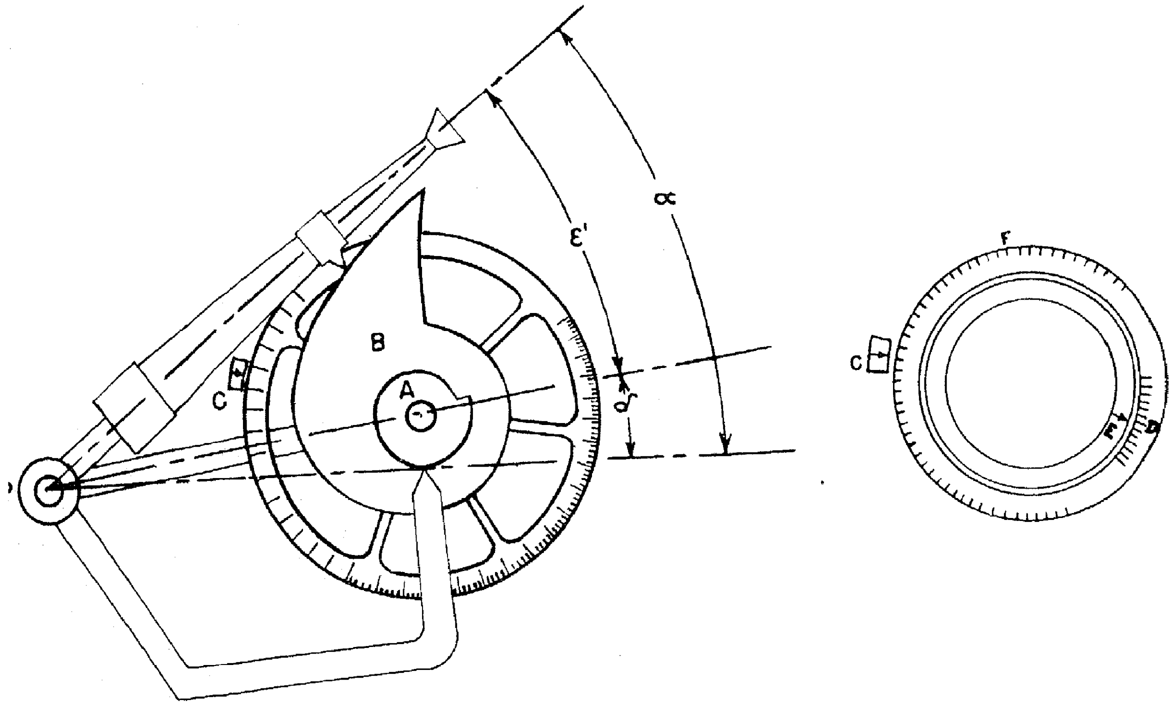

Fig. 42 Type 89 Range-Finder (Schematic)

P - Telescope Pivot
A - Logarithmic Cam for refraction and for curvature of the earth
B - Logarithmic Cam for height of site
C - Fixed index for range
D - Height of site scale
E - Height of site index
F - Range scale

Height of site of instrument was positioned by moving disc (on which height of site cam B was mounted) until index E indicated height of site on scale D. This disc was then clamped to range scale disc.

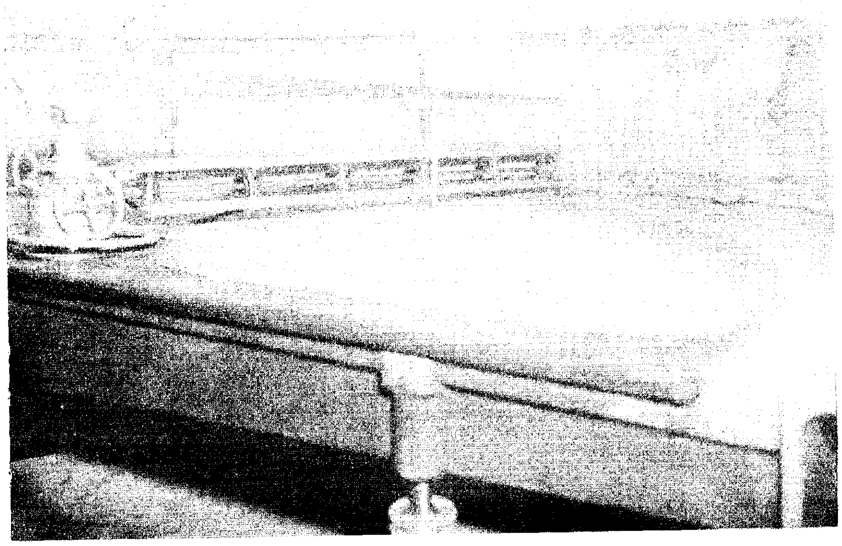

Fig. 43.
Ordwald Plotting Board

Fig. 44.
Brachalini Plotting Board

c. The Brachalini Type range-finder (Fig. 45) was used with the 28-cm howitzer. It also was originally of foreign design. Range was read from a curved glass scale located in close proximity with the eyepiece of the telescope.

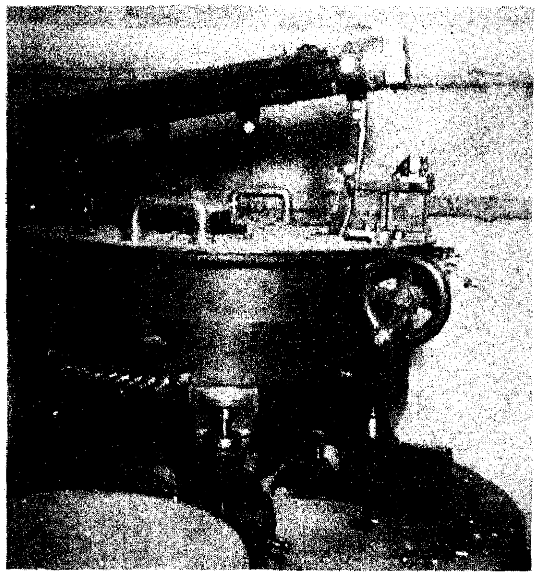

Fig. 45.
Brachalini Type Range-Finder

d. Observing Instruments. Two general types of observing instruments were used in those batteries which were not provided with the Type 88. They were the battery commander's telescope Type 89 (Fig. 46) and the Type 91 (Fig. 47). The Type 89 had a 10-cm objective lens and was of 15 power. It had a single horizontal scale with 5-mil graduations. The Type 91 had a 7-cm objective lens and was of 15 power. It had both a vertical and horizontal scale, each with 5-mil graduations.

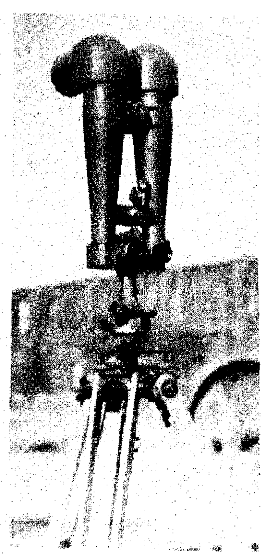

Fig. 47.
Battery Commander's
Telescope Type 91

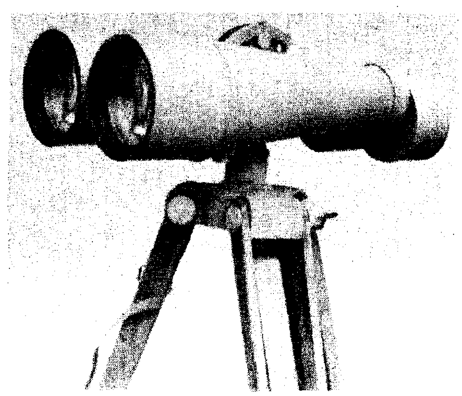

Fig. 46.
Battery Commander's
Telescope Type 89

e. Miscellaneous. (1) Japanese panoramic sights, which were of two types (95A and 97), were very similar to our own panoramic sights.

(2) The turret gun type of Telescope, as shown in Fig. 48, was standard equipment on the turret guns.

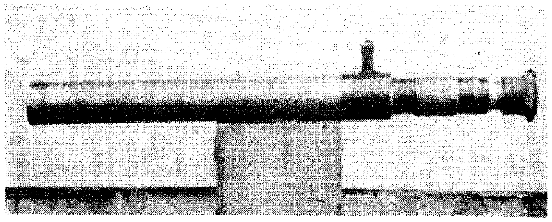

Fig. 48.
Telescope,
Turret Gun Type

(3) The gunner's quadrant was very similar to those in our own service.

Section VIII
Searchlights

74. General. The searchlights commonly used in Japanese seacoast artillery installations were antiaircraft searchlights modified to be used on special mounts which varied to suit the installation.

75. Equipment. a. Searchlights. The most commonly used light was the Army Type 96. (Fig. 49). This 150-cm light developed 600

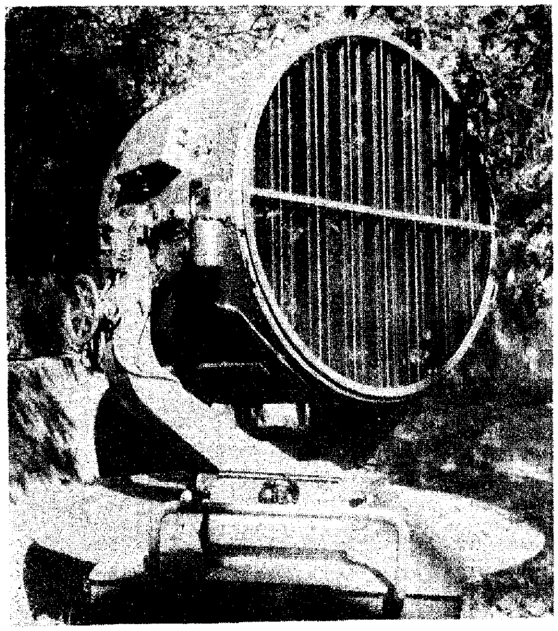

Fig. 49.
Army Type 96 Searchlight

million candle power. The high intensity arc drew 150 amperes at 78 volts. The arc feed system resembled the Sperry type except that no thermostat or other means, except manual, of maintaining positive carbon position was incorporated. The light was equipped with shutters which were controlled either remotely or manually as desired. The searchlight was capable of being positioned in azimuth from a remote station by a drive motor. The elevation drive motor was installed but no means of controlling it was found.

b. Mounts and Emplacements. Two types of emplacements for seacoast searchlights were found by the Board.

(1) The most common type of mount and emplacement was that using a Type 96 light permanently mounted on a small flange-wheeled car running on narrow-gauge track. The track ran from a camouflaged and protected storage shed to the operating position.

(2) In the other type of emplacement the light was mounted on an elevator platform in an underground room. A section of the roof directly above the light could be slid to one side. The platform could then be elevated to the operating position of the light.

c. Control System. The normal control system of the Type 96 searchlight was a step-by-step controller operating a circuit resembling a Wheatstone Bridge. In the seacoast modification a potentiometer built into the base ring of the observing instrument was substituted for the step-by-step controller. The observing instrument was located at the battery command post and controlled the light in azimuth only. For emergency control the regular searchlight control station could be used.

Section IX
Communication Equipment

76. General. a. Means of Communication. The Japanese used conventional means of communication in their coast artillery defense system insofar as quantity and quality of equipment permitted. For a typical seacoast artillery regimental communications net see Fig. 50. Their communication channels consisted of:

(1) Telephone Wire Circuits. Military telephone lines and switchboards were the primary means of communication.

(2) Radio. Radio nets were used to parallel wire circuits insofar as equipment was available. Standard military sets using voice and CW transmission were used.

TYPICAL COMMUNICATIONS NET

FORTRESS ARTILLERY REGIMENT

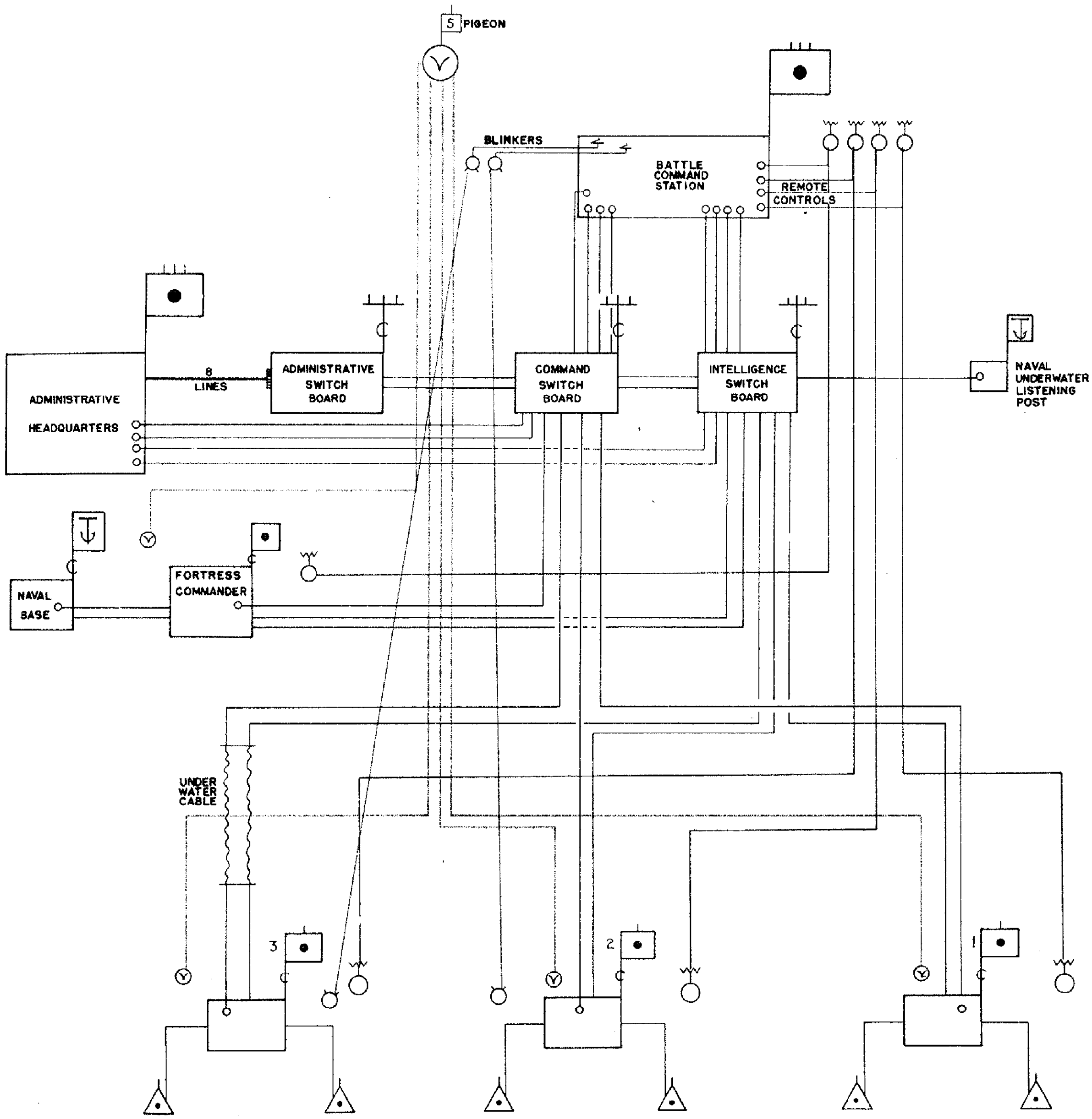

FIG. 50

b. Factors Affecting Use. The physical shortage of equipment and lack of replacements were the greatest factors influencing coast artillery communications.

77. Telephone Wire Circuits. a. Civil wire circuits were used only for liaison and did not affect operations.

b. Military wire circuits were of all varieties, depending upon the tactical, terrain and supply situations. Single wire ground return systems were used extensively.

(1) Conventional open wire construction was used mostly.

(2) Underground cable was used on entrance to batteries insofar as cable was available.

(3) Underwater cable was used between island installations and the mainland. This was rubber-insulated, steel-sheathed, three conductor cable. It was used as a ground-return system for three talking circuits.

(4) Field wire was used in lieu of standard open wire wherever additional lines were needed. It was placed on existant poles or other structures for aerial support except in emergencies.

78. Army Telephones. a. Army telephones were of several types. They all used an antisidetone circuit. Talking range of about 20 miles was claimed but it is believed that this was attained only over high-conductive open wire construction. The most frequent complaint was packing of transmitter carbon granules. A spare transmitter cartridge was furnished on all except the most recent models. The two most commonly used types were the Types 92 and the Type 2. These were magneto type ringing telephones, which were housed in well constructed boxes.

b. The Type 92 was the standard field telephone. It incorporated a key and buzzer connected in the primary of the transmitter circuit, giving a 600-cycle tone telegraph for use when voice transmission was weak. An extra earphone was provided for assistance in hearing or for monitoring of the conversation by another person.

c. The Type 2 telephone omitted the telegraph feature and had no extra earphone. It was of smaller size but similar construction.

d. Other types of telephones were existent but no evidence was found of their use in coast artillery units.

79. Military Switchboards. Military switchboards were of the key-throw and pull-pin type rather than of the plug and jack type as in our equipment. Late Type 93 switchboards were cordless, and contained 8 or

12 drops. The 12-drop was used in the fortress headquarters. Old style Type 96 switchboards having 6 and 16 drops, were used in subordinate units. All boards were neatly and compactly made. A separate bell and magnet box was used. A chest transmitter and headband earphone were provided for the operator. The greatest complaint against these boards was "cross-talk"

80. Installation and Repair. Installation and repair of communications was performed by specialists from each unit.

81. Radio. a. General. Japanese radio sets used conventional type circuits. The quality of the sets varied and makeshifts were frequently encountered. The latest sets were of new and modern design and apparently were efficient. The construction showed extensive handwork with careful craftmanship. Radio equipment was not furnished below battalion level. Radio telegraph was used extensively for security reasons.

(1) The seacoast artillery fortress headquarters used the Type 94 Model 2 radio set. This set had a 200 watt transmitter with a range of about 60 miles with voice, and 350 miles using CW telegraphy.

(2) Battalion headquarters used the Type 94 Model 5 radio set. This was a small hand-powered set with a 3-mile voice and 6-mile CW telegraph range.

82. Other means of communication were semaphore flags and blinker lights. These were used in some areas where bombings disrupted telephone lines and radios were not available. Blinker usage was reported as effective for one-half mile in day time and six miles at night. Carrier pigeons were kept available at the regimental battle command post and fortress and battalion headquarters.

Section X
Ammunition

83. General. Characteristics of Japanese seacoast artillery ammunition are tabulated in Fig. 51. With the exception of the Navy turret guns and the 28-cm howitzer all artillery of Japanese design used semi-fixed ammunition. This almost exclusive use of brass cartridge case obturation in seacoast artillery complicated the ammunition manufacture and supply problem.

84. Projectiles. All of the seacoast guns and howitzers were supplied with AP shell. The minor caliber guns (10-cm and 15-cm) and the 25-cm howitzer were also supplied with a small proportion of HE shell. The 15-cm gun Type 45, in a few instances, was supplied with illuminating shells which, upon bursting in the air, released a parachute flare. All HE shells were point-fuzed while AP were base fuzed.

85. Propellants. These were of two types, square flaked and stick. Both were smokeless nitro-cellulose. The square flakes were approximately 1/10 of an inch in thickness and 1/2 inch square. The stick type grains were usually about six inches long and 3/16 of an inch in diameter with a hole through the longitudinal axis of the stick. Powder bags, when used, usually were made of raw silk. Black powder was used as the igniter.

86. Bursting Charges. These were of three general types, TNT, picric acid, and a composition of 70% picric acid and 30% TNT. Bursting charges in the 41-cm turret gun ammunition were pre-formed.

87. Primers. Percussion primers were used in all Japanese seacoast artillery guns except the Navy turret guns and the 28-cm howitzers. The turret guns normally employed electric primers with percussion primers for emergency use. The 28-cm howitzers used friction primers.

CHARACTERISTICS

TYPE, NUMBER AND DATE	41-cm Turret	30-cm Turret 45 cal.	30-cm Turret 50 cal.
CALIBER	410-mm	305-mm	305-mm
TYPE OF AMMUNITION	Separate Loading	Separate Loading	Separate Loading
TYPE OF PRIMER	Electric	Electric	Electric
PROPELLANT WEIGHT (LBS)	494	250	294.5
PROJECTILE TYPE	AP	AP	AP
PROJECTILE WEIGHT	2142	881.6	881.6
FUZE TYPE	Base detonating	Base detonating	Base detonating

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OF JAPANESE SEACOAST ARTILLERY

.	25-cm Turret	20-cm Turret	15-cm Gun Type 45 (1912)	15-cm Gun Type 96 (1936)	10-cm Type (191
	254-mm	206.4-mm	149.1-mm	149.1-mm	105-
	Separate Loading	Separate Loading	Semi-fixed	Semi-fixed	Semi-f
	Electric	Electric	Percussion	Percussion	Percus
	151.6	70	36.7	44	8
	AP	AP	HE and AP	HE and AP	HE
	517.9	249	88.2	88.2	35.
	Base detonating	Base detonating	AP b.d., HE p.d.	AP b.d., HE p.d.	AP b.d.,

FIG.51

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ILLERY AMMUNITION

ın	10-cm Gun Type 7 (1918)	30-cm Howitzer Type 7, (1918)		28-cm Howitzer (1890)	24-cm Howitzer Type 45 (1912)
		Short	Long		
ı	105-mm	305-mm	305-mm	279.5-mm	240-mm
ɜd	Semi-fixed	Semi-fixed	Semi-fixed	Separate Loading	Semi-fixed
ɔn	Percussion	Percussion	Percussion	Friction	Percussion
	8	44.7	83.1		21.4
ıP	HE	AP	AP	Type 98 AP	HE and AP
	35.1	88.2	88.2	487	439
p.d.	AP b.d., HE p.d.	Base detonating	Base detonating	Base detonating	Base detonating

CHAPTER 6

TECHNIQUE

Section I
General

88. Scope. This chapter is limited to the techniques used in battery or lower echelons insofar as the coordinated use of equipment is concerned.

89. Methods and Doctrines. a. The lack of a central agency for making a continuing overall study of seacoast artillery gunnery and for the promulgation of up-to-date doctrines on gunnery practice was reflected in the frequently encountered archaic methods employed by the firing units. Except in those instances where accomplished automatically, the procedures for computation, application and transmission of firing data varied widely among batteries equipped with the same types of materiel. Although battery commanders usually had a fairly thorough knowledge of their materiel, they often possessed only a rudimentary knowledge of seacoast gunnery, according to our standards.

b. No uniform detailed checks, precise step-by-step procedures, or attention to details to obtain accuracy in fire, were prescribed or observed.

90. Equipment. The low priority given to seacoast artillery installations during the current century and the piecemeal nature of development of the defenses contributed to the lack of interchangeability of fire-control equipment. While a modern fire-control system had been developed for turret batteries, and a fairly modern system for the newer minor caliber guns, neither of these systems could be adapted, in their entirety, to the many old gun batteries. Certain components of various systems were used with these batteries; improvisations were required to complete the systems. Usually such improvised systems were inaccurate, cumbersome, and subject to many personnel errors.

Section II
Preparation of Fire

91. Orientation and Synchronization. a. Initial Orientation. The agency which installed the fixed batteries completed the orientation

thereof by celestial observation and transit traverse. There was no provision for personnel or instrumentation within the coast artillery units for survey purposes. Hence, even the heavy field artillery batteries of coast artillery required assistance from higher headquarters or outside sources in the initial establishment of position.

b. Periodic Checks. It was assumed that once a fixed battery was oriented, it remained oriented, and when data transmitters were synchronized, they continued in adjustment. No periodic checks were prescribed. Usually, datum points visible from the various battery installations were selected and orientation data with reference to each of these points obtained. Where other means were not available, these data were obtained by readings taken from the battery equipment. Where suitable points were not available, such points were established by driving a stake or setting up a marker. These established datum points were used for subsequent orientation of equipment

92. Meteorology. Coast artillery units were not provided with equipment for obtaining meteorological conditions aloft. Provision was made for furnishing ballistic temperature, surface pressure and ballistic wind by a fortress meteorological detail every four hours. Non-fortress units were to receive similar information from the Weather Corps of armies to which attached. Since these data were rarely, if ever, received, surface readings were taken by battery personnel, using a thermometer, aneroid barometer and an anemometer. These instruments were similar to those in use in our service. The effect of relative humidity on atmospheric structure was given no consideration.

93. Corrections to Firing Data. a. General. As a general rule corrections for non-standard ballistic conditions, weight of projectile, height of site, parallax, and similar variations were accumulated on slide rule nomograph-type boards which were improvised locally. These boards provided for the algebraic addition of both range and azimuth corrections for the elements to be considered, so that total corrections were available at all times. In the event boards had not been made for a particular battery, corrections were added algebraically on blank forms where spaces were provided for the elements desired.

b. Manner of Making Corrections. Specific provision was made for the correction of certain items on some of the individual fire-control instruments used with the various systems. Where such was the case, the method for making the correction is outlined under the subsequent paragraphs covering pertinent elements of data. Except as indicated under the respective paragraph headings, corrections were accumulated on boards or charts (as indicated in subpar a) for the following:

(1) Range wind.

(2) Cross wind.

(3) Air pressure.

(4) Air temperature.

(5) Muzzle velocity (powder lots were considered as well as the effect of erosion of guns).

(6) Powder temperature (included in muzzle velocity).

(7) Drift, except in those units equipped with the Type 88 electric computer (turret batteries) and units using the Ordwald plotting board (older batteries). Correction was made in the data nets of the electric computer and on the plotting arm of the Ordwald plotting board.

(8) Variation from standard in weight of projectile.

(9) Height of site, except in those units equipped with Types 88, 89 and 98 range finders. For these units correction was made on the telescope mounts of the range finders.

(10) Parallax, except for those units equipped with the Type 88 electric computer. In the remaining units, parallax corrections were obtained from a graph or table previously prepared for the water area, with range and azimuth used as arguments for entering the graph or table. However, correction was made for the azimuth effect of parallax only.

(11) Curvature of the earth and atmospheric refraction (included in height of site correction).

(12) Rotation of the earth - no correction was made.

(13) Calibration corrections. These were applied directly on the guns in all cases except for units equipped with the Type 88 system. The range correction was applied on the range drum (or elevation dial); azimuth corrections were applied to adjustment scales on the sights for direct fire and to azimuth dials for indirect fire. Range calibration corrections were determined as follows. After determination of range deviations as outlined in par 94 c, below, reference was made to firing tables to determine the muzzle velocity variations of the various guns from that of the base piece which would cause such deviations. A chart was made from firing table data showing the range (or elevation) correction

necessary to eliminate the effect of the previously determined muzzle velocity variation for each gun for each 500 meters of range.

94. Calibration Fire. Batteries ordinarily were calibrated. However, the procedures followed were prescribed very loosely and details were left to the judgment of battery commanders. Between six and twelve rounds per gun were fired. The method outlined below had academic sanction, but from the examination of witnesses, it appears doubtful that the indicated care and preparation were followed.

a. Preparation. Range or elevation scales were checked by use of a gunner's quadrant. Azimuth scales were checked if the firing was to be conducted by indirect methods. Meteorological data were used. Ordinarily, a pyramidal target was anchored at a point at about 80% of the maximum range of the battery. A free floating target was used when excessive depth or tide precluded anchoring the target. When a free-floating target was used, the range to the target was recomputed prior to the firing of each shot.

b. Conduct of Calibration Fire. The actual conduct of the shoot was largely a matter in which the battery commander was required to rely upon his own judgment and experience. No order of firing for the guns, no prescriptions as to rechecks of gun-laying between rounds, no indication as to the speed with which the shoot should be conducted, no lists of data to be accumulated, or no step-by-step check lists were provided.

c. Determination of Deviations. A boat was anchored or maintained station perpendicular to the gun-target line and reasonably near the target to facilitate the reading of range deviations. A range rake was held at arm's length by an observer on the boat. The deviations thus obtained were compared with computed deviations determined from data taken at two spotting stations on shore. These spotting stations were located so as to be intervisible, whenever possible, to verify the orientation of instruments. Lateral deviations were computed from the same spotting station data and compared with angular deviations observed along the gun-target line when such information was available. (This information was not available for the howitzer batteries or for other batteries that had no OP on the gun-target line). In the event any splash was spotted more than four firing-table probable errors from the center of impact of all the rounds fired, it was considered a wild shot and its deviations were eliminated from the computation. Corrections for the deviations were made as indicated in par 93 b (13).

Section III
Application and Transmission of Firing Data

95. General. Many of the older installations were equipped only

with plotting board systems. These systems differed from those in our service in that they lacked time-interval systems. Stop watches were used in the endeavor to synchronize data. Within the battery installation greater dependency was placed on voice tubes than on telephones for the transmission of data. These plotting board systems varied considerably, but in general the flow of data approximated that in the more modern systems described hereinafter. It was expected that these more modern systems ultimately would supercede all of the older systems.

96. Type 88 System. This fully electric system was used with the Navy turret batteries. The system included a Type 88 range-finder from which present position data were transmitted into an electric computer. The electric computer applied data corrections for the travel of the target during time of flight, drift, azimuth and range parallax. The firing data were transmitted from the computer to the guns after calibration and fire adjustment corrections had been applied by means of potentiometers (Fig. 29). Corrections for height of site, curvature of the earth and atmospheric refraction were included within the range-finder. All other corrections were applied as indicated on Fig. 52.

97. Type 98-A System. This mechanical system, adaptable to practically all armament, was available in limited quantities. Fig. 53 shows schematically flow of data in this system. A Type 98 range finder automatically set present position in terms of range and azimuth into a mechanical computor. On the face of this computor was a series of dials where pertinent data were displayed. A stop watch also was set into the panel. In operation, a clutch was thrown for a period of time determined by the stop watch. During this period, range and azimuth travel were recorded on two of the dials. The period of time used was the time of flight for the range to the target. This range was displayed on one of the dials and was used to determine time of flight by reference to an abridged firing table kept convenient to the computor. By manual operation of handwheels the range and azimuth travel (or prediction) during the time of flight were added algebraically, through differential action, to the present range and azimuth, respectively. Provision was made for adding corrections to both range and azimuth by operation of two additional handwheels. These corrections were taken from correction boards as indicated in par 93 a, above. This system was not intended for any installation where the observation station was displaced over 200 yards from the guns. Azimuth parallax was taken from a chart was indicated in par. 93 b (10), above. The corrected azimuth data were transmitted electrically to the guns. Corrected range data were transmitted electrically to the outer dial of a range-elevation box. The scale of this dial was uniform. By handwheel operation the inner dial was matched numerically with the outer dial at the box index. This inner dial had a non-equicrescent scale and, although a quadrant elevation dial, it was graduated in range. Inner dials for use in the range-elevation box were prepared for each combination of gun and ammunition. The location of the inner dial positioned electrically the indicators at the guns. Data were applied at the guns for azimuth as well as range by manual matching of pointers.

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FLOW OF DATA
TYPE 88 FIRE CONTROL SYSTEM

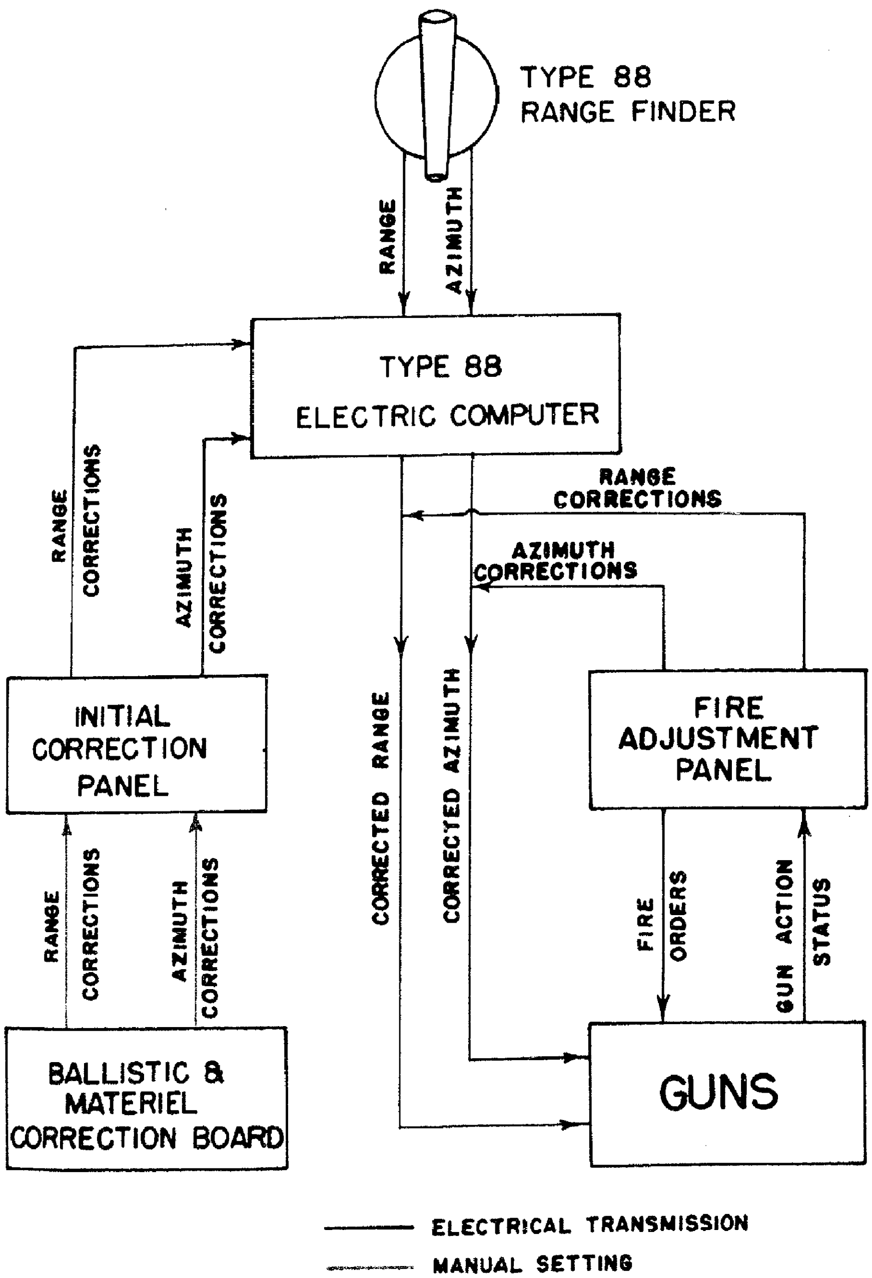

FIG. 52

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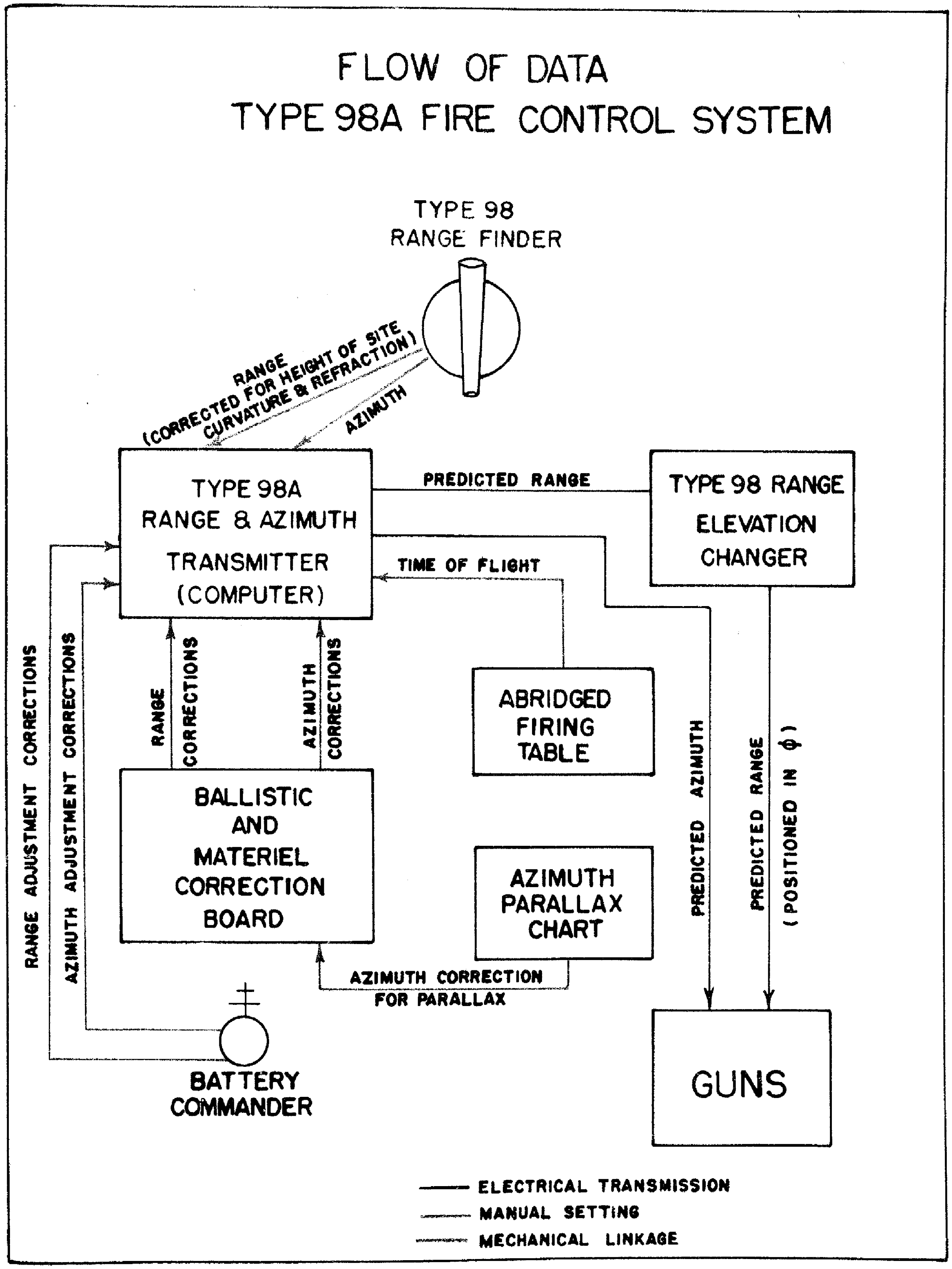
FLOW OF DATA
TYPE 98A FIRE CONTROL SYSTEM
TYPE 98
RANGE FINDER
RANGE
(CORRECTED FOR HEIGHT OF SITE
CURVATURE & REFRACTION)
AZIMUTH
TYPE 98A
RANGE & AZIMUTH
TRANSMITTER
(COMPUTER)
PREDICTED RANGE
TYPE 98 RANGE
ELEVATION
CHANGER
TIME OF FLIGHT
RANGE ADJUSTMENT CORRECTIONS
AZIMUTH ADJUSTMENT CORRECTIONS
RANGE
CORRECTIONS
AZIMUTH
CORRECTIONS
ABRIDGED
FIRING
TABLE
PREDICTED AZIMUTH
PREDICTED RANGE
(POSITIONED IN ϕ)
BALLISTIC
AND
MATERIEL
CORRECTION
BOARD
AZIMUTH
PARALLAX
CHART
AZIMUTH CORRECTION
FOR PARALLAX
BATTERY
COMMANDER
GUNS
ELECTRICAL TRANSMISSION
MANUAL SETTING
MECHANICAL LINKAGE

FIG. 53

98. Type 98-B System. No computor was available for use with the Type 89 range finder used in this system. Ranges and azimuths were read at regular intervals at the range finder and set manually on the range and azimuth transmitters as indicated on Fig. 54. By smooth handwheel operation it was attempted to approximate future readings. Slide rules were used to multiply target travel in range and azimuth during a selected time interval by a variable. The time interval was at the discretion of the battery commander; a 10-second interval often was used. The variable was equal to the time of flight divided by the time interval. Time of flight for the range desired was extracted from an abbreviated firing table convenient to the slide rule operators. The resultant predictions in range and azimuth were added to present range and azimuth by differential action. Azimuth prediction included drift as a slide rule function. Ballistic and materiel corrections usually were applied on the slide rules, but occasionally were added to the battery commander's arbitrary corrections and applied through additional data inputs for adjustment corrections as shown on the figure. Corrections were accumulated as in the Type 98-A system. The range transmitter carried an inner dial similar to that in the range-elevation box of the Type 98-A System. Different elevation scales were available for the various combinations of guns and ammunition. Data were transmitted electrically to indicators on the guns for manual pointer matching. The Type 98-B System was capable of use with any type of range finder.

99. Direct Fire. Case II methods only were contemplated for use with the two standard panoramic sights, Types 95-A and 97, which, except for the turret mounts, were used with all guns sited for direct fire. These turret mounts were equipped with telescopic sights of British design. Fig. 55 shows the flow of data when a telescopic sight was used on the mount. Range was obtained from the range finder, corrected as desired by the battery commander, and set on the range drums on the guns. The cross hairs of the sight were aligned on the target and deflections were set as ordered.

100. Emergency Systems. In the event that any portion of the normal systems except the range finder went out of action, data flowed as indicated in the Case II system, except that azimuth was taken from the range finder, arbitrarily corrected by the battery commander and set on the azimuth scales on the base rings of the guns. In the event that range finders went out of action, two-station observation with improvised or already existent plotting boards was contemplated.

Section IV
Conduct of Fire

101. General. Fire was conducted in two phases, as in our service.

102. Trial Fire. a. Fire from a primary battery was opened usually with the guns spread in elevation to give range differences of 100

FLOW OF DATA
TYPE 98B FIRE CONTROL SYSTEM

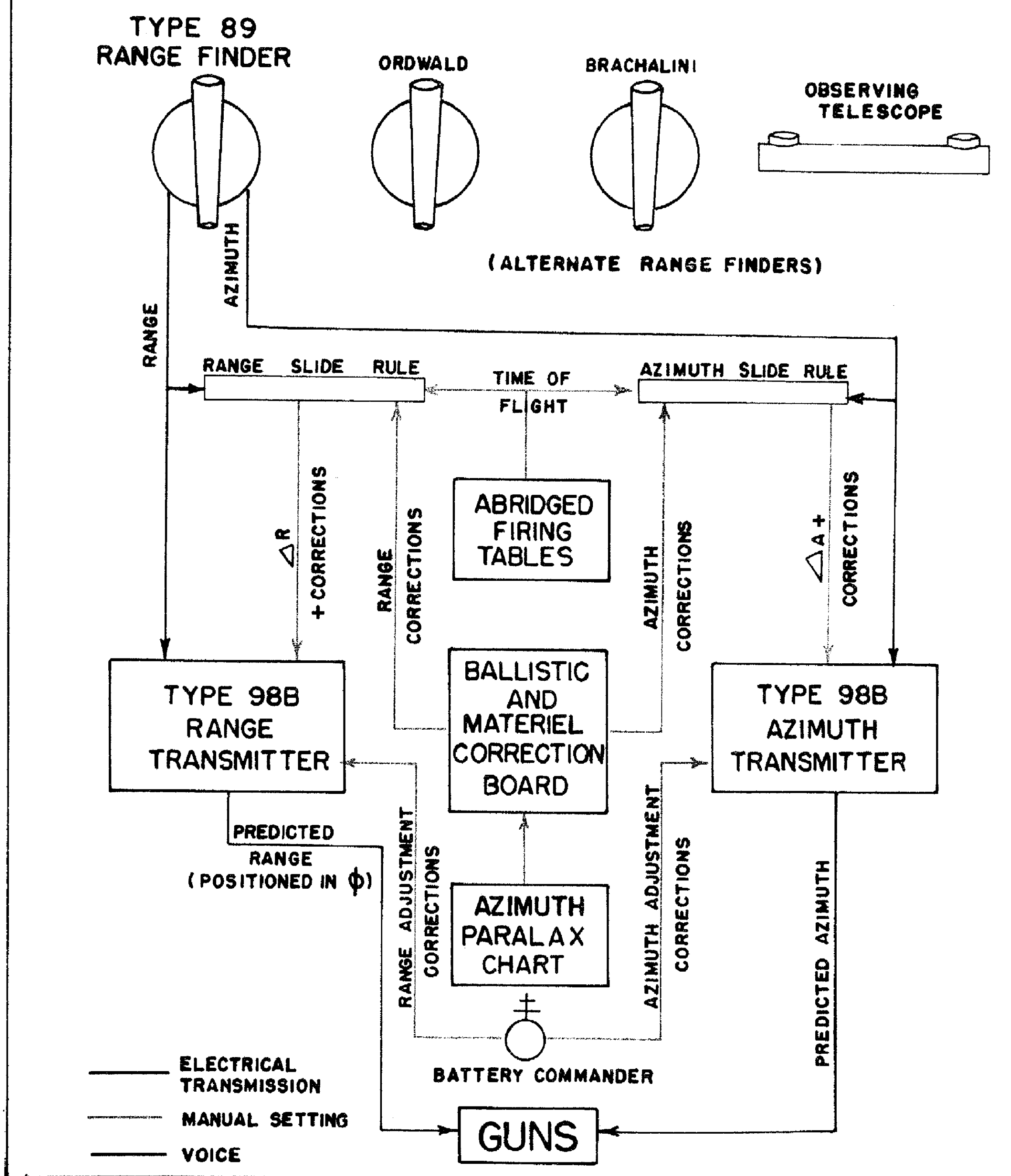

FIG.54

FLOW OF DATA ON CARRIAGE SIGHTS

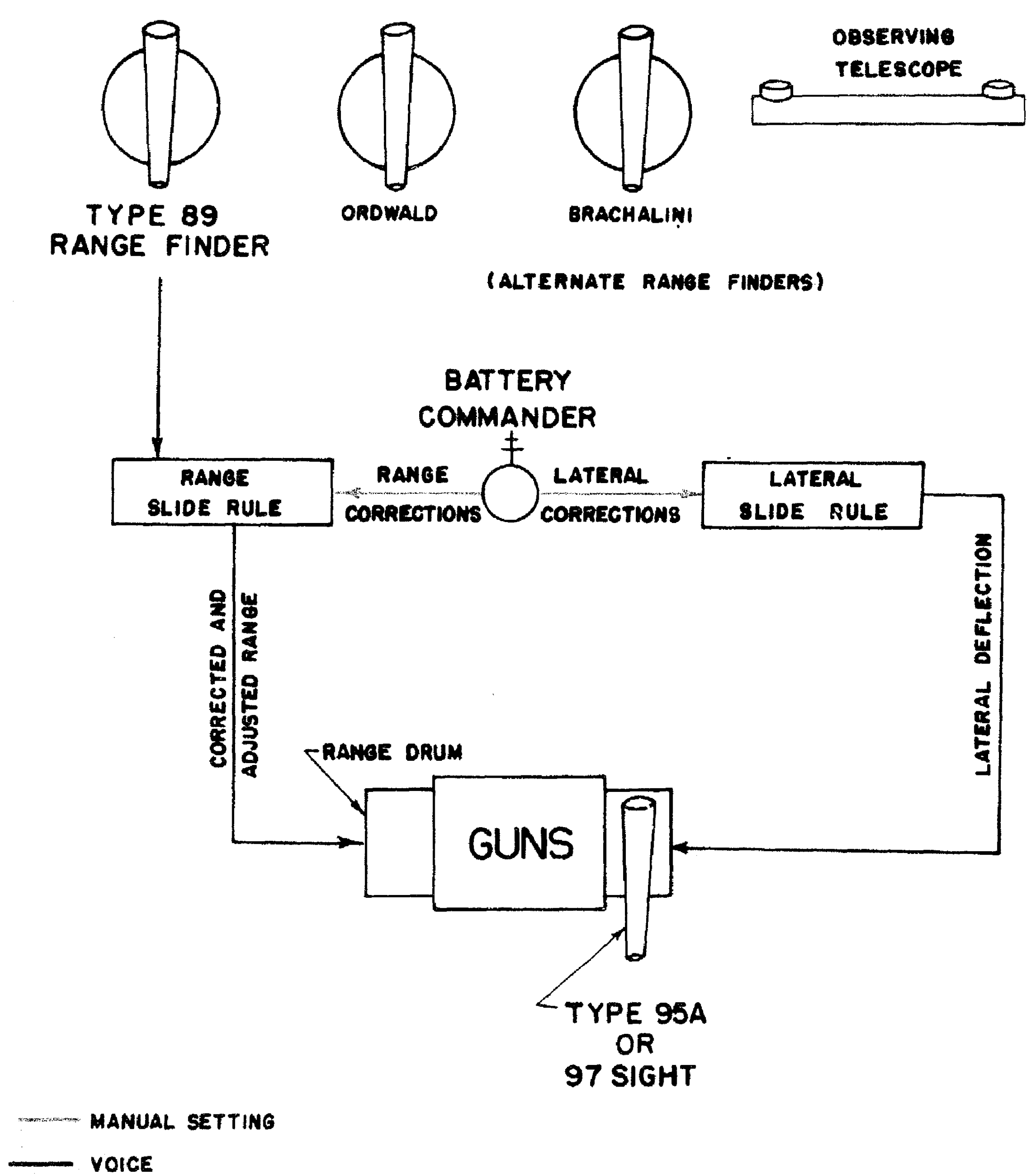

FIG.55

meters for nonmaneuvering courses. If the position-finding system contained large probable errors, or for fire on maneuvering targets, a 200-meter range difference was used. In the latter case, in four-gun batteries, pairs of guns might be laid with the same elevation, or the spread distributed between the separate guns. In a secondary battery, all of the guns were laid at the same elevation.

b. Deliberate salvos were fired and adjustment was made after each salvo was spotted. Full corrections in mils were made in azimuth. All corrections for range were based upon sensings only. Usually, an initial range correction of four firing-table probable errors was made. Corrections were continued in this magnitude until an opposite sensing was obtained when the correction was reduced to two probable errors. Corrections in the amount of two probable errors were continued until a hit, a mixed salvo or three brackets were obtained. All salvos were given equal consideration, irrespective of the number of guns fired. The magnitude of corrections was not prescribed rigidly and in some instances eight and four probable errors were used in lieu of four and two, respectively.

103. <u>Fire for Effect</u>. a. <u>Normal Targets</u>. On completion of trial fire, at the discretion of the battery commander, the range divergence (par. 102 a, above) was removed. Fire for effect was conducted at the maximum rate with continuous further adjustment.

b. <u>Night Firing</u>. Firing with searchlight illumination was not anticipated. There was no coordinated plan for the illumination of targets. The only searchlights in the seacoast artillery defenses were those few that were organically assigned to some of the primary gun batteries. These were used for search purposes.

c. <u>Ground Targets</u>. Map range and azimuth were computed, using map coordinates of the target and the battery. The usual corrections, to include those for height of site and meteorological conditions, were made.

104. <u>Observation of Fire</u>. a. <u>General</u>. Unilateral observation of fire was the normal method used in both seacoast and heavy field artillery.

b. <u>Seacoast Artillery</u>. Observation of fire was conducted normally from the battery command station. Range deviations were made in sensings only while lateral deviations were measured by observing instruments. No effort was made to obtain the magnitude of the range deviation. Occasionally, in the long range batteries, an additional spotter on the flank of the station supplemented the range sensings made at the battery command station.

c. <u>Heavy Field Artillery</u>. Three standard methods were used.

(1) Axial observation was used when the gun-target-observer angle was less than 300 mils. Range corrections were ordered as indicated. Azimuth corrections were based upon the factor representing the proportion between the observer-target range and the gun-target range.

(2) When the gun-target-observer angle was more than 300 and less than 1200 mils, the method was much the same as our own using small "T".

(3) When the gun-target-observer angle was more than 1200 mils a method similar to our system using large "T" was used.

105. Analysis of Fire. No complete analysis of fire was made, nor was there any apparent understanding of its purpose. Replots were made where plotting boards were used, and records were taken of all position and firing data. However, this information was incorporated in reports only to complete the narrative of the firing. No effort was made to strip out personnel errors or to locate systematic errors. The results of firings were given only the most limited distribution.

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CHAPTER 7

TACTICAL EMPLOYMENT

Section I
General

106. Allocation of Fixed Artillery. The strategic plan for the location of fixed seacoast artillery was controlled by the Imperial General Staff. The War Ministry and the Chief of General Staff, when the occasion demanded, appointed a Fortress Construction Committee. This committee consisted of senior officers (of the grade of colonel or above) of the Artillery, Engineers, Air Corps, Infantry, and Ordnance, and a naval officer with the rank of captain. The committee usually was charged with making a study of the fixed artillery defenses throughout the Japanese homeland, Korea and Formosa, although this study might, at times, be restricted to only one or two localities. Additionally, the committee was required to recommend types and numbers of weapons for each Fortress and the actual location of the guns to be emplaced. It could make recommendations as to new types and calibers of guns to be procured for seacoast defense. The committee report was submitted to the appointing authority for approval. After the War Ministry and the General Staff had acted on the report it was turned over to the Heavy Construction Service. This organization made the actual installations. When completed these installations were turned over to the using service.

107. Strategic Considerations. The Japanese Fortress (Seacoast) Artillery, like our own, was sited to protect important harbors, straits, and naval bases. Within the homeland the relative importance of the seacoast defenses were:

a. Tokyo Bay and the Yokosuka Naval Base

b. Entrances to the Inland Sea, namely:

(1) Osaka Harbor entrance

(2) Shimonoseki Straits

(3) Bungo Strait

c. Southern entrance to the Sea of Japan

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d. Nagasaki Harbor and Naval Base

e. Tsugaru Strait at the eastern entrance to the Sea of Japan

f. Soya Strait at the northern entrance to the Sea of Japan

g. Maizuru Harbor and Naval Base.

108. __Fortresses__. a. In order to implement the defense of these vital areas the Japanese established fortresses which, in time of peace, were similar to our Harbor Defenses. Usually a skeletonized regiment of seacoast artillery was assigned to each of the more important fortresses while those of lesser importance were garrisoned by battalions. These skeletonized organizations maintained a semblance of defense in peace time and constituted the framework upon which fortress organization could be expanded in time of war.

b. Upon the outbreak of war the coast artillery organization was expanded to war strength and all fixed armament essential to the defense was manned.

c. When the war moved nearer the Japanese homeland the Fortress Commands were expanded further by the addition of infantry and field artillery for beach defense. Thus, in the last year of the war, the fortresses, which in peacetime were manned by skeletonized seacoast artillery organizations, assumed, in most instances, the general nature of our own wartime coastal sub-sectors.

d. (1) The fortress commander was charged with the defense of landing beaches within his sector, in addition to the defense of the harbor, channel or strait.

(2) No responsibility for air defense was placed upon the fortress commander. Neither antiaircraft equipment (except for two 7.7-mm machine guns furnished each battery for local defense) nor antiaircraft troops were a part of his command. Only in cases where the fortress was included within the general antiaircraft area defense of some more important objective did it receive antiaircraft protection, and this was only incidental.

e. Fig. 56 shows the fortresses in existence prior to the war, those established during the war, and those that had been planned, but never constructed.

f. The Army seacoast artillery sited for the defense of a particular harbor or strait in the Japanese homeland and southern Korea was under the control of a single Fortress Command with one exception. This was in the defense of the southern entrance to the Sea of Japan

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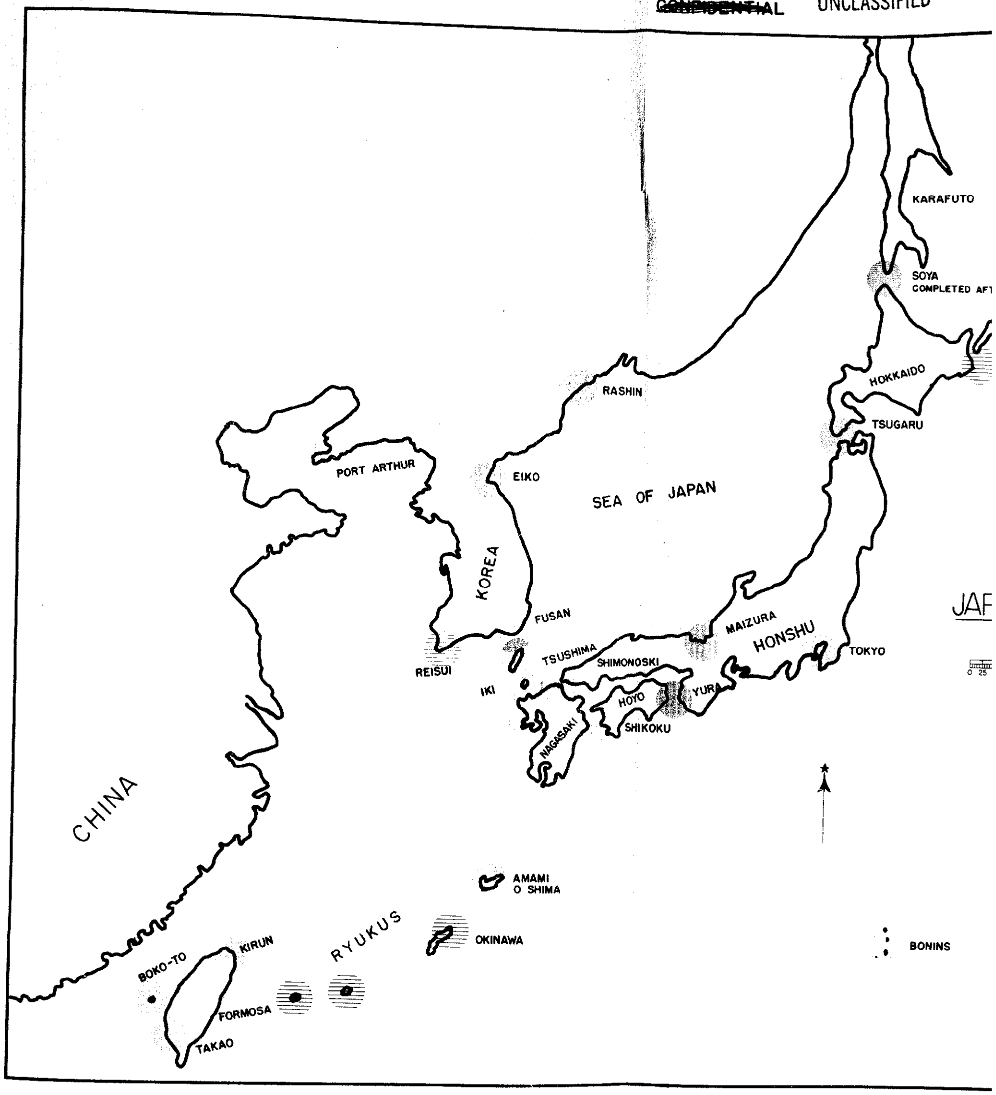

FIG.56

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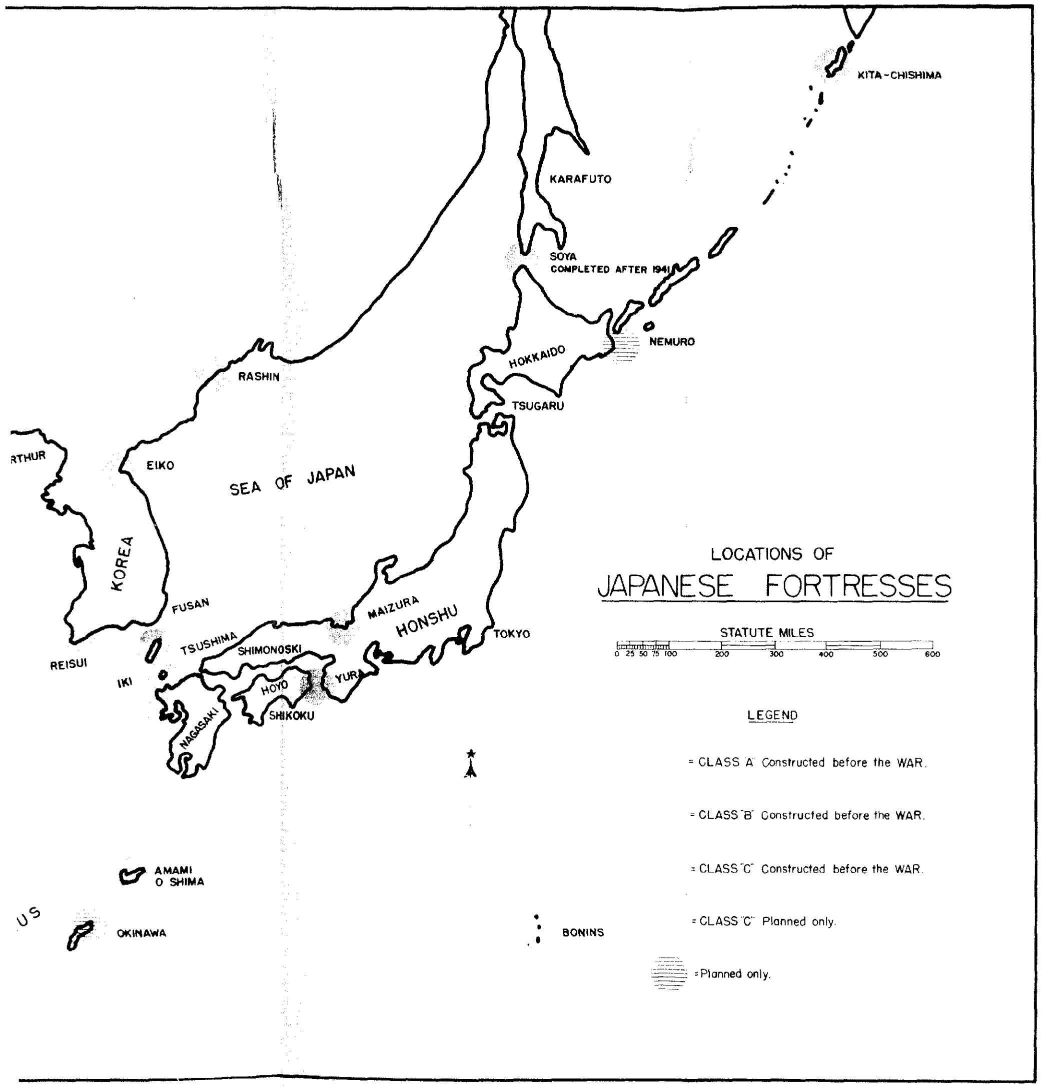

FIG.56

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where three Fortresses (Fusan, Tsushima and Iki) guarded the straits. Each of these three fortresses formed a separate command.

109. Army - Navy Coordination. a. It should be noted that during the war a considerable amount of naval armament was set up on shore, for employment in a seacoast defense role. This was utilized primarily in and around large naval installation, or at critical points along the shore line adjacent to naval installations. In practically every instance, it was superimposed upon the Army seacoast artillery. (For additional information of naval seacoast artillery, see Part Two of this report).

b. Controlled mines were also under the jurisdiction of the Navy. (For complete information on controlled mines see Part Three of this report).

c. The naval seacoast artillery, including controlled mines, functioned under its own separate naval command, and was completely outside the jurisdiction of the army fortress commander, or any other army commander.

d. Coordination between the Army and the Navy in seacoast defense was limited in general to an exchange of information. In some cases there was an exchange of liaison personnel.

e. There was nothing in the Japanese harbor defense organization comparable to our Harbor Entrance Control Posts.

Section II
Tactical Employment and Control

110. General. a. The original Japanese concept of the employment of seacoast artillery in the defense of the homeland was influenced greatly in the later years of the war by the cumulative effect of our successive reduction of their mandated island defenses by aerial bombing and naval gun fire. From these operations had come a realization of -

(1) The relative unimportance of warships as targets when compared with transports and all types of landing craft.

(2) The ineffectiveness of their artillery except at comparatively short ranges.

(3) The inadequacy of their communications for centralized control of fire except during the initial phases of an attack.

(4) The inadequacy in numbers of their long range major caliber guns.

(5) The fact that a battery upon opening fire was usually located quickly and neutralized or destroyed.

b. A consideration of these factors resulted in the following procedure for utilization of their seacoast artillery in the homeland.

(1) Control of fire was to be centralized until it was apparent that a hostile landing operation was to be made. This centralized control was intended to -

(a) Conserve weapons and ammunition for use against landing craft.

(b) Insure that fire was opened at effective ranges only.

(2) Once a landing was imminent, control was to be decentralized to local area commanders.

(3) Heavy mobile artillery was to be emplaced inland for firing on landing beaches.

(4) Effort was to be concentrated on passive means of defense, such as camouflage, and barricades for protection of guns and personnel, even though it was necessary to restrict fields of fire greatly to accomplish this.

111. Control by the Fortress Commander. The fortress commander exercised no operational control over the seacoast artillery batteries.

112. Regimental Control. a. Control was exercised by the senior coast artillery commander (usually the regimental commander) until such time as a landing became imminent. Where there was more than one regiment, as in the Tokyo Bay Fortress (one regiment and a battalion) the extent to which the regimental commander exercised control over the additional artillery was dependent upon the location of this artillery and the communications available.

b. When a landing became imminent, it was intended that tactical control be decentralized to local area or subordinate tactical commanders.

c. Tactical control (fire direction) by the regimental commander was exercised by two methods:

(1) Indirectly, by prescribing standard operating procedure for firing at identified submarines and emergency targets.

(2) Directly, during an engagement, through the tactical channels from the regimental battle command station.

113. The Battle Command Station. a. General. (1) This was the battle station of the Seacoast Artillery Commander in the fortress. It was separate and apart from the command post of the fortress commander, being connected therewith only by telephone and radio. The station was usually located and constructed to permit visual observation of a considerable portion of the harbor entrance or strait. Communication networks with higher and lower echelons of command are shown in Fig. 50, page 65. Where the fortress was located in close proximity to a naval base, a liaison party from the naval base was usually present in the battle command station.

(2) For plan of a typical battle command station see Fig. 57.

b. Equipment. (1) The command station contained an observing instrument, a range finder, telephones, radios, and two plotting charts.

(2) One of the charts, constructed to small scale, was for plotting long range information.

(3) The other chart, constructed to large scale, was for plotting "close-in" information. This chart was approximately eight feet wide and ten feet long and was gridded in 1,000 yard squares. The gridded squares were numbered vertically and lettered horizontally. In addition, the following information was shown on this chart:

(a) The shoreline of the defended harbor or strait.

(b) Location of each firing battery and the regimental OPs.

(c) Field of fire of each battery.

(d) An azimuth circle, circumscribed around each firing battery and each regimental OP position.

c. "Long-Range" Information. "Long-range" information of the enemy was received normally from the nearest naval base, through the fortress commander. This might be relayed from division or army. In those fortresses which were at a considerable distance from any naval

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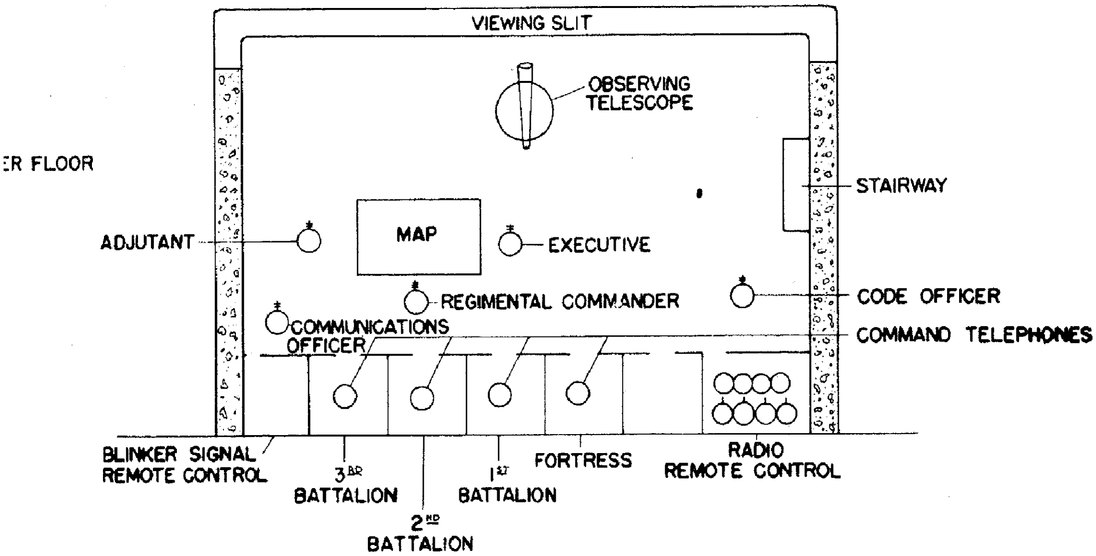
TYPICAL REGIMENTAL BATTLE COMMAND STATION



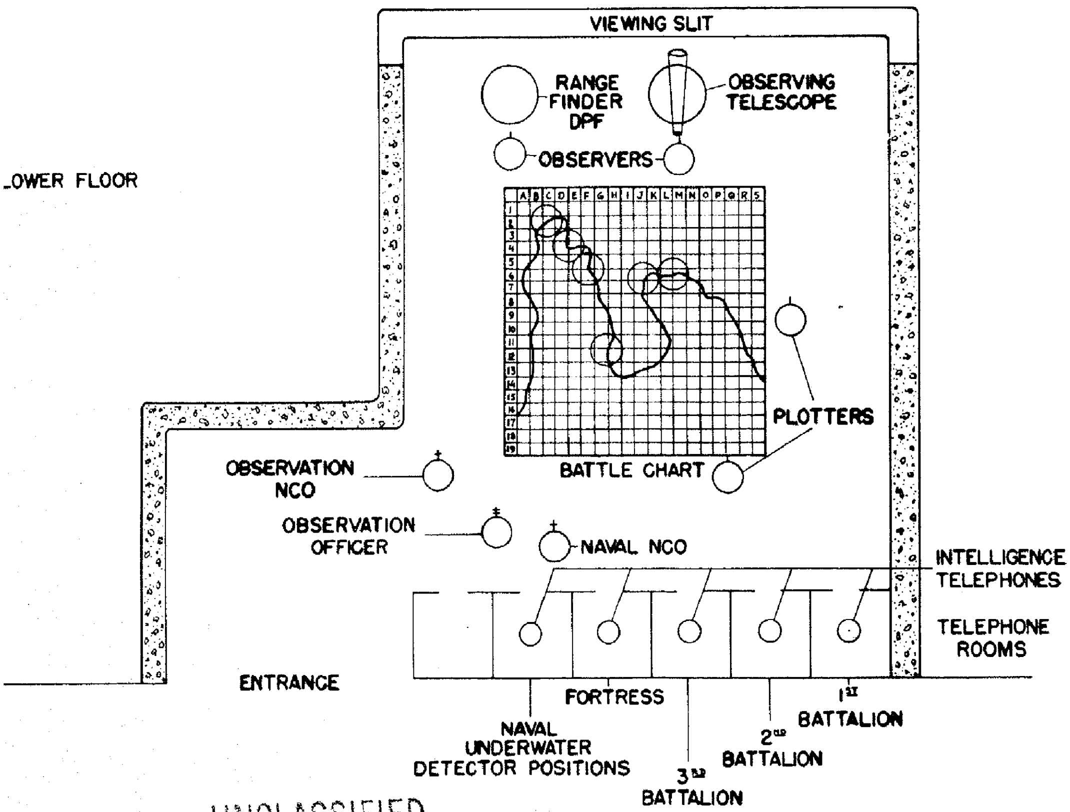


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FIG. 57

establishment the information was received from the next higher echelon of command above the fortress.

d. Local ("close-in") Information. (1) This information, which usually consisted of target description, range, and azimuth was received from the firing batteries through their respective battalions, and from the regimental OPs. Each regiment maintained a limited number of OPs, located in favorable positions for observation of the water area.

(2) With this information plotted on the chart, it was possible, theoretically, for the regimental commander to exercise fire direction. Actually this system of fire direction by the regimental commander had serious faults:

(a) Battery plots were not sent in regularly nor were they filtered at the battalion.

(b) Communication lines were generally too few and frequently they were unreliable.

(c) Command post exercises were far too few to train the battery and regimental personnel properly.

114. Battalion Control. Below the regiment, the next tactical commander was the battalion commander. Battalions often were composed of batteries manning minor caliber guns and major caliber weapons. The battalion commander exercised fire direction of the batteries under him when communications with the regimental command post had broken down or in an emergency. He also exercised fire direction when the naval engagement became general and it was apparent that any control by the regimental commander was impossible. The battalion maintained a semblance of a battle chart and usually had its own observation posts.

115. Battery Control. a. The battery commander was authorized to open fire on his own initiative only under the following circumstances:

(1) When a submarine was sighted in the field of fire and identified as hostile.

(2) When an appropriate target was observed within the effective field of fire of the battery and it was apparent that the target would escape if not engaged.

b. Whenever he opened fire on his own initiative the battery commander reported his action to the battalion commander. "Battery Commander's Action" was resorted to when a complete breakdown in communications occurred between the battery and battalion.

116. Assignment of Targets. a. The Japanese appreciated the effectiveness of our submarines. Any battery could open fire on an identified enemy submarine within range at any time. Otherwise the normal targets for guns and howitzers were the same as in our service. Battery officers questioned on the subject appeared to be well grounded in the proper selection of targets for the guns of their batteries. Targets were to be engaged at effective ranges only.

b. When a landing operation had been initiated transports and landing craft became the primary targets for all types of weapons.

117. Searchlights. Searchlights emplaced in harbor defenses were always assigned to a firing battery. The tactical control of the lights was under the battery commander. Regimental or even battalion control of illumination was not contemplated by the Japanese. Such control would have been practically impossible due to the inadequacy of the communications. Sectors of search coincided with the fields of fire of the respective batteries.

Section III
Tactical Dispositions and Emplacements

118. General. Within the fortress the fixed artillery was emplaced to fire to seaward. In some instances minor caliber guns were so emplaced that direct fire could be brought to bear upon landing beaches. Local protection of the fortress from the flanks and rear was furnished either by the infantry component within the fortress or by the division or army that had overall responsibility for the defense of the area.

119. Siting of Guns. a. Because of the abrupt rise of the land from the water's edge along much of the coast line of Japan, particularly in the neighborhood of the harbors, most of the seacoast artillery guns were sited relatively close to the shore line. All of the major caliber batteries were emplaced on elevations considerably above sea level. Some of the minor caliber batteries were emplaced along the shore at elevations near sea level.

b. Except in the case of the howitzers, all weapons were sited to permit them to employ direct fire. The howitzer batteries were always defiladed.

c. The older guns were emplaced close-in to cover the narrow portions of the channels. The newer guns, particularly the turret mounts, were emplaced farther out on the headlands.

120. Fields of Fire. a. The mounts of 15-cm guns and the heavy howitzers permitted 360° of traverse. The turret mounts were capable of firing through 270°.

b. (1) As a result of the earthwork barricades that had been thrown up around most of the 15-cm batteries, the fields of fire of these weapons had been reduced to 180° - 270°. Few of them had all-round fields of fire.

(2) The howitzers were emplaced invariably to permit fire through 360°.

(3) The fields of fire of the turret mounts varied up to 270°, depending upon terrain restrictions.

c. In general, the channel areas were well covered. Dead spaces appeared in some places due to the high height of sites of some of the weapons.

d. For fields of fire of weapons in the more important fortresses, see Figs. 59 to 62, incl.

121. <u>Battery Emplacements</u>. a. (1) Minor caliber guns generally were sited in shallow concrete lined emplacements designed originally for 360° fields of fire. The guns were usually from 15-20 yards apart. Protection of guns and operating personnel was limited to that afforded by earth barricades, which normally were built up on either flank of the gun emplacement. The battery commander's station, which contained the fire-control equipment, generally was similar in construction to ours.

(2) Ammunition was stored in underground magazines adjacent to the battery. Generally, these underground magazines were concrete or brick lined tunnels or galleries with an inclined ramp or steps leading up to the battery emplacement.

b. Turret guns and gun crews were well protected by the armored turrets. Only a direct hit by a major caliber artillery projectile or a large demolition bomb would have destroyed the turret. A typical turret gun battery installation is shown in Fig. 58.

c. (1) The howitzer emplacements were well defiladed either by natural terrain features or by the construction of dug-in emplacements and the use of earth embankments. All equipment was well dispersed.

(2) Ammunition storage was in underground galleries adjacent to the emplacement. Ammunition was brought to the rear of the howitzers from the galleries by push cars operated on light narrow gauge tracks.

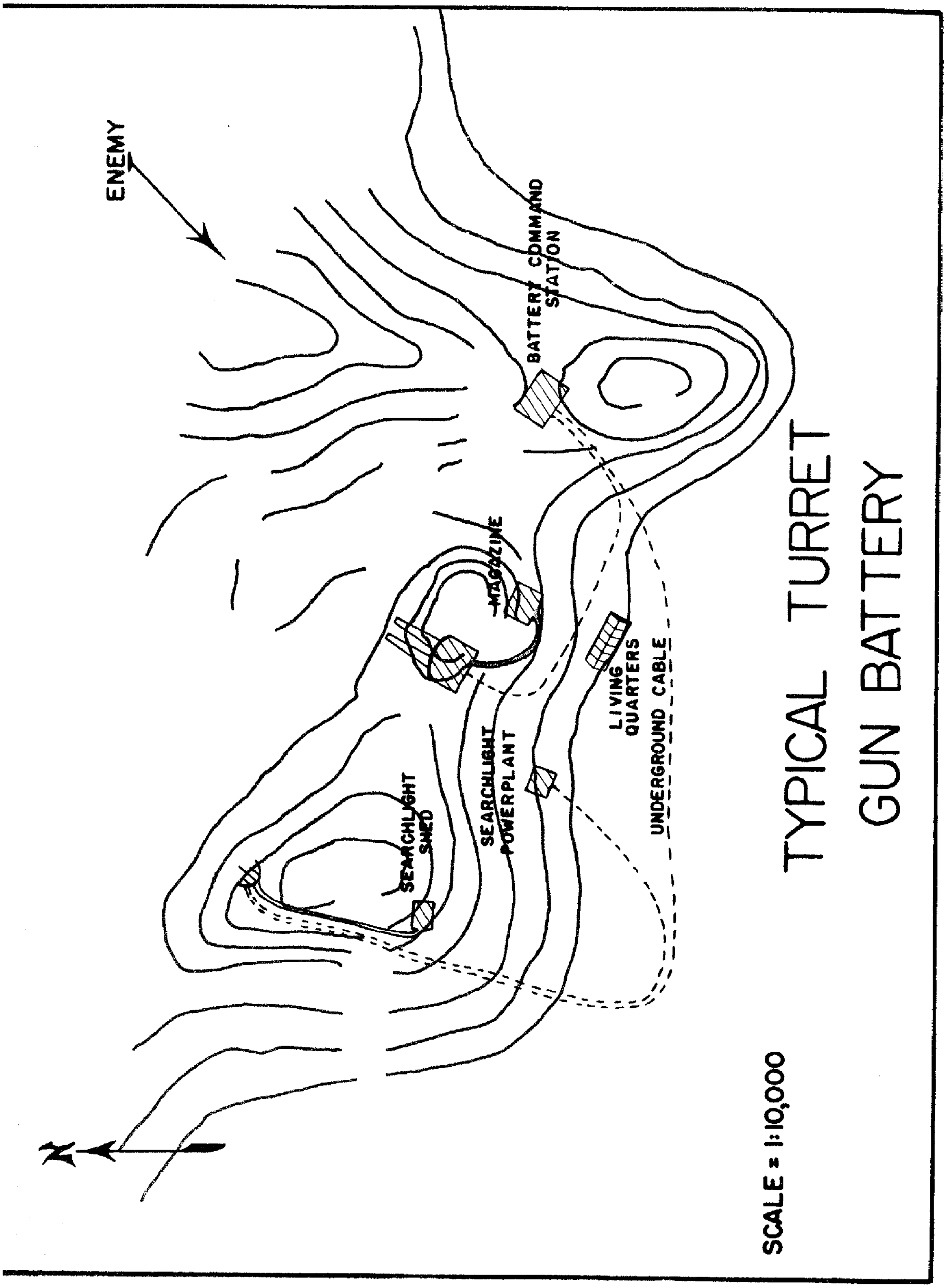

ENEMY
BATTERY COMMAND STATION
MAGAZINE
LIVING QUARTERS
UNDERGROUND CABLE
SEARCHLIGHT POWERPLANT
SEARCHLIGHT SHED
TYPICAL TURRET GUN BATTERY
SCALE = 1:10,000
N

FIG.58

122. Camouflage. a. Camouflage of minor caliber guns, except the 15-cm gun, Type 96, usually consisted of wooden frames attached to the gun carriages. Painted cloth or boards were secured to the frames. The completed camouflage took the general shape and appearance of a small shack. The 15-cm gun, Type 96, was camouflaged usually by a net suspended from the metal frame on the gun (Fig. 11, page 30).

b. Turrets were camouflaged by painting. In the case of the 20-cm and 25-cm gun the tops of the turrets were covered with approximately 12 inches of earth in which local vegetation was planted. In addition, the turrets were camouflaged further by barricaded trenches into which the gun barrels were traversed when the battery was not firing.

c. Howitzers were camouflaged by planting local vegetation on the earth barricades around the howitzer pit.

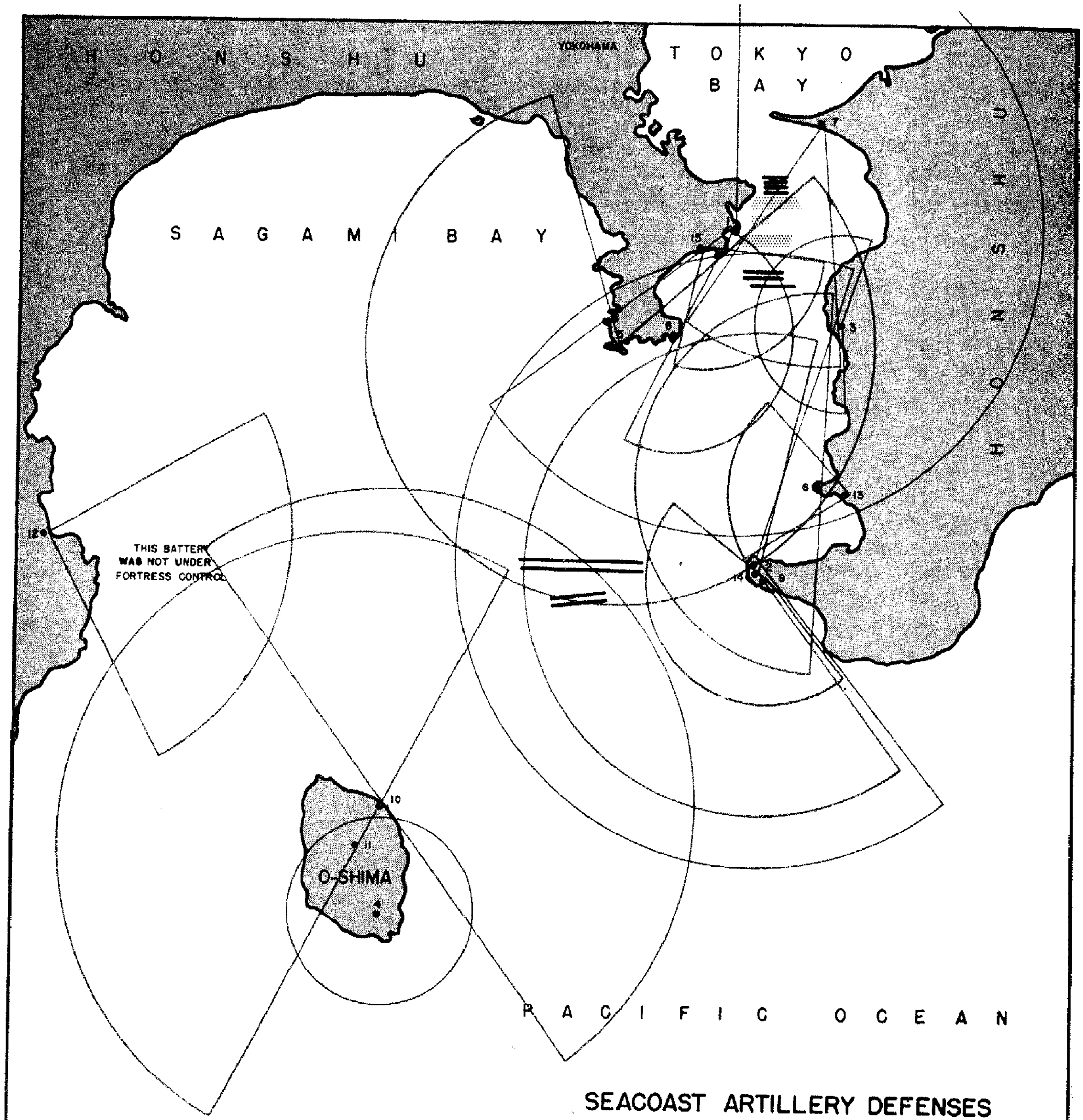
123. Local Defense. All personnel were indoctrinated to fight to the death at their respective batteries. In the organization of the ground for local defense the gun emplacements and the battery command station served as strong points. The local defense was organized in cooperation with other ground forces in the vicinity. The firing battery was equipped normally with two machine guns for antiaircraft and ground defense. Thirty per cent of the battery personnel were equipped with rifles. Hand grenades and land mines were issued to the more exposed batteries.

Section IV
Actual Organization and Dispositions Within Certain Fortresses

124. General. The organization of the seacoast artillery defenses of two important harbors and two straits, together with charts showing the tactical disposition of elements of the defenses, are given in the succeeding paragraphs of this section. Navy mine fields, both controlled and contact, are shown since these fields contributed to the defense of the harbor or strait.

125. Tokyo Bay Fortress. a. The seacoast artillery in the Tokyo Bay Fortress (Fig. 59) was manned by a regiment, the Tokyo Bay Fortress Heavy Artillery Regiment, and one separate battalion, the First Artillery Unit.

b. The regiment was organized into three battalions. The first battalion consisted of four firing batteries and was located on the Yokosuka Peninsula. The second battalion, of three firing batteries, was located generally around the tip of Bozo Peninsula southeast of Tokyo. The third battalion was organized into three firing batteries located on Oshima. This battalion was moved from Manchuria to this location early in 1945.



SEACOAST ARTILLERY DEFENSES OF TOKYO BAY

SHOWING
CALIBER AND NUMBER OF GUNS,
FIELDS OF FIRE, AND
TYPE AND EXTENT OF MINE FIELDS

YARDS
5000 0 5000 10000 15000

POSITION NUMBER	CALIBER OF GUNS	NO. OF GUNS
1	30 CM TURRET	2
2	30 CM	1
3	28 CM HOWITZER	4
4	28 CM HOWITZER	2
5	25 CM TURRETS (2)	4
6	20 CM TURRETS (2)	4
7	15 CM	4
8	15 CM	4
9	15 CM	2
10	15 CM	2
11	15 CM	2
12	15 CM	2
13	10 CM	3
14	10 CM	1
15	10 CM	4

c. The First Artillery Unit, Tokyo Bay Fortress, was located generally on Bozo Peninsula. It was organized into four firing batteries.

d. During the initial phases of a naval attack the regimental commander exercised fire direction over the batteries of his regiment and two batteries of the separate battalion.

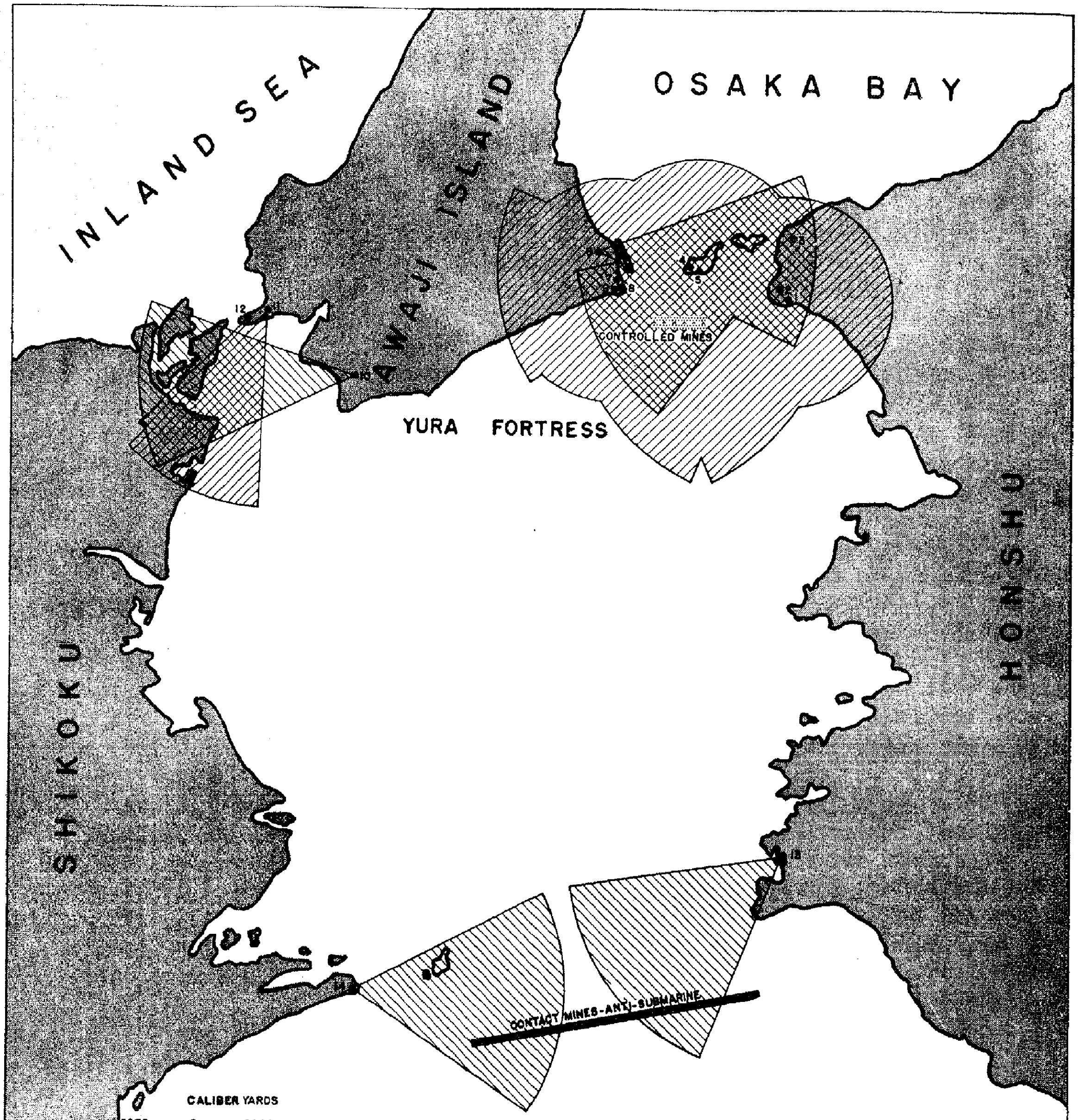
e. When a landing became imminent the tactical control was to have been decentralized. The regimental commander was to control the batteries on Bozo Peninsula, the battalion commander the batteries on Oshima, and the naval seacoast artillery commander those batteries located on Yokosuka Peninsula. This control was based upon the fact that the Navy had considerable seacoast artillery mounted in this area, in addition to having their local mobile defense force and a sector organization for defense.

126. Osaka Harbor-Yura Fortress. This fortress guarded the eastern entrance to the Inland Sea. The defenses of this harbor entrance are of interest primarily because of the large number of guns and howitzers massed to cover the two channels into Osaka Harbor (see Fig. 60). There was no modern major caliber armament in these defenses. Since most of these seacoast weapons had been emplaced before World War I, their dispositions followed the concepts of those days, in that they were all disposed "close-in" to cover the channels.

127. Tsugaru Fortress. (Fig. 61). This fortress guarded the eastern entrance to the Sea of Japan. The seacoast artillery regiment was organized into two battalions. The regimental battle command station and both battalion battle command stations were located on the island of Hokkaido. The regimental commander exercised fire direction for all batteries until a landing became imminent. At that time tactical control of those batteries south of the strait passed to the respective battery commanders.

128. Defenses of the Southern Entrances to the Sea of Japan. (Fig. 62). a. The two entrances, the straits of Korea and the straits of Tsushima, separated by the island of Tsushima, are each approximately 60,000 yards wide at their narrowest points. These straits were guarded by the seacoast artillery of the three fortresses, Fusan (Korea), Tsushima (island in the center) and Iki (island off Kyushu). Each fortress was a separate command. Fusan Fortress was under the control of the 17th Area Army in Korea. Tsushima was under control of the 40th Army on Kyushu. Iki was under control of the 56th Army in northern Kyushu. These defenses constituted the only instance where the seacoast artillery defense of a strait or channel operated under a divided command system.

b. These defenses contained the three 41-cm (16-in) turret guns, the only guns of this caliber in the seacoast artillery. Although these guns, with the addition of three 30-cm (12-in) turrets,



SEACOAST ARTILLERY DEFENSES OF THE SOUTHERN ENTRANCE TO OSAKA BAY

SHOWING MAXIMUM COVERAGE AND FIELDS OF FIRE OF ARTILLERY INSTALLATIONS AND EXTENT AND TYPE OF MINE FIELDS

POS NO	OF GUNS	NO. OF GUNS
1	28 CM HOWITZER	2
2	27 CM GUN	4
3	15 CM GUN	2
4	27 CM GUN	4
5	28 CM HOWITZER	3
6	15 CM (4) AND 14 CM (1) GUNS	5
7	27 CM GUN	4
8	24 CM GUN	4
9	28 CM HOWITZER	3
10	15 CM GUN	2
11	24 CM GUN	2
12	24 CM GUN	4
13	15 CM GUN	4
14	15 CM GUN	4

NOTE: THE FOLLOWING ARE OMITTED FROM THE MAP FOR CLARITY:

COVERING THE EASTERN CHANNEL
- 2 SEARCHLIGHTS (150 CM)
- 6 12 CM GUNS
- 2 9 CM GUNS

COVERING THE WESTERN CHANNEL
- 1 SEARCHLIGHT (150 CM)
- 2 9 CM GUNS

Legend:
- ////// FIELDS OF FIRE 24-28 CM. WEAPONS
- \\\\\\ FIELDS OF FIRE 15 CM. WEAPONS AND SMALLER
- CONTACT MINE FIELDS
- CONTROLLED MINE FIELDS

FIG. 60

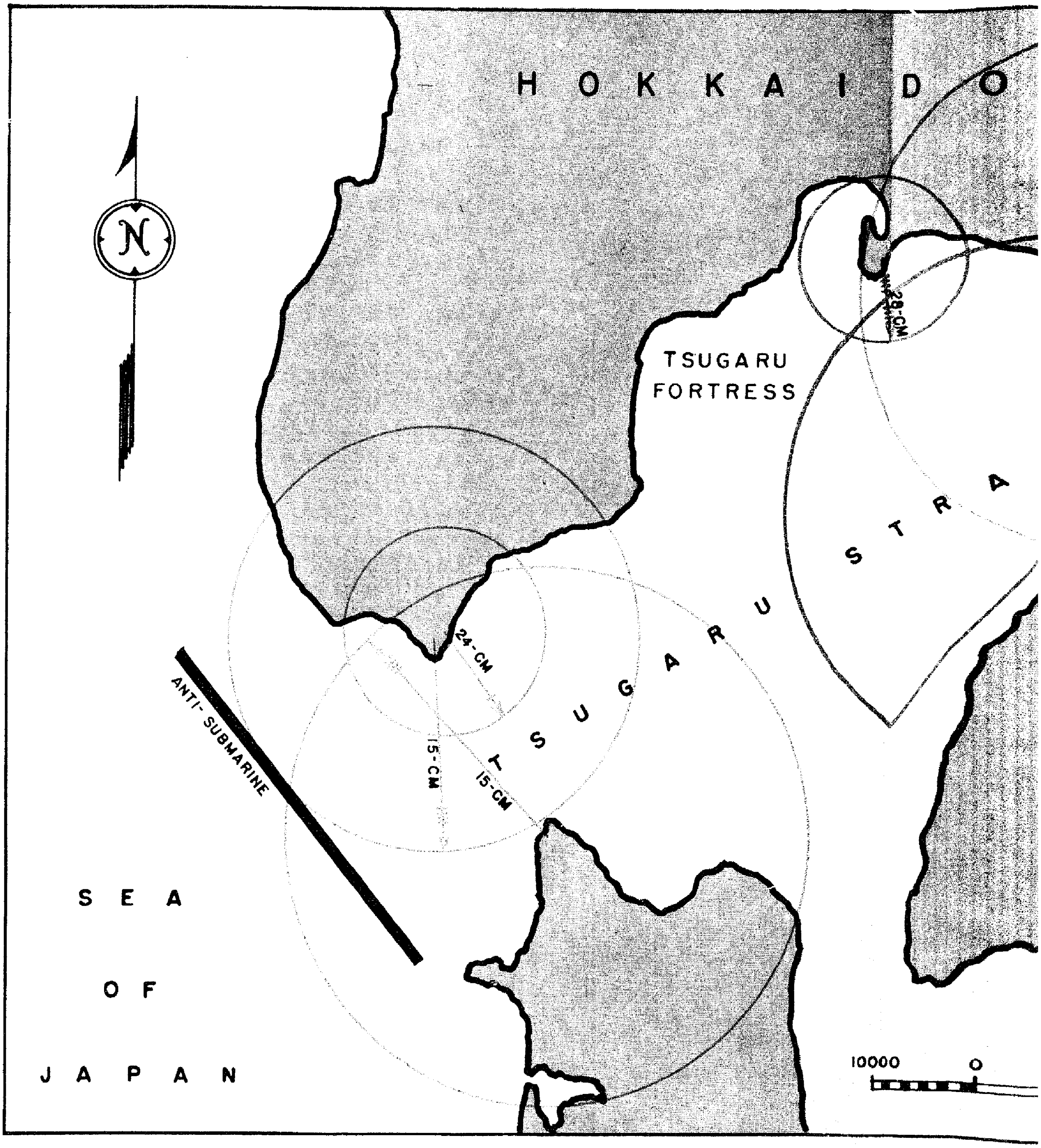

HOKKAIDO
TSUGARU
FORTRESS
28-CM
24-CM
15-CM
15-CM
ANTI-SUBMARINE
TSUGARU STRA
SEA
OF
JAPAN
10000
0

FIG. 61

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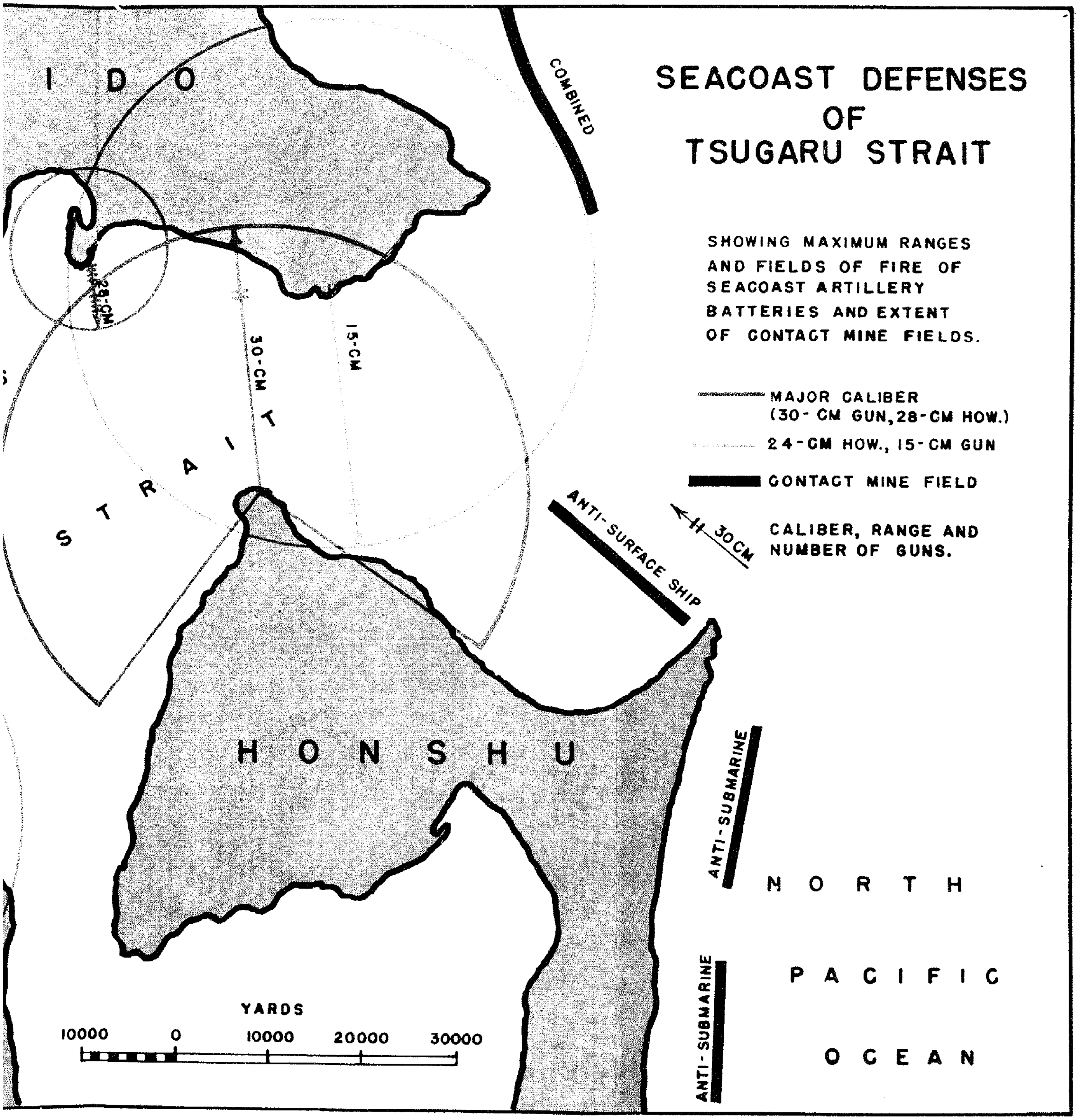

FIG.61

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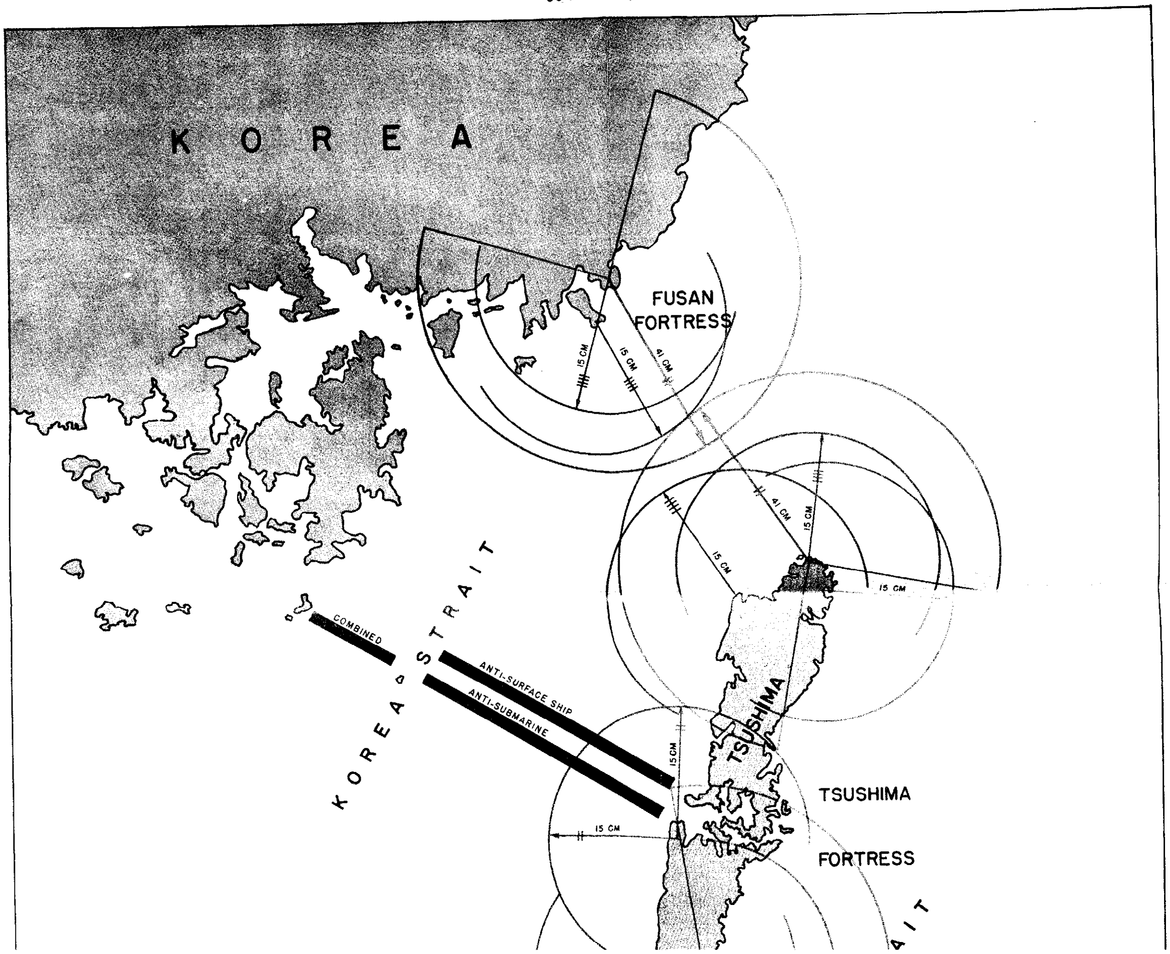
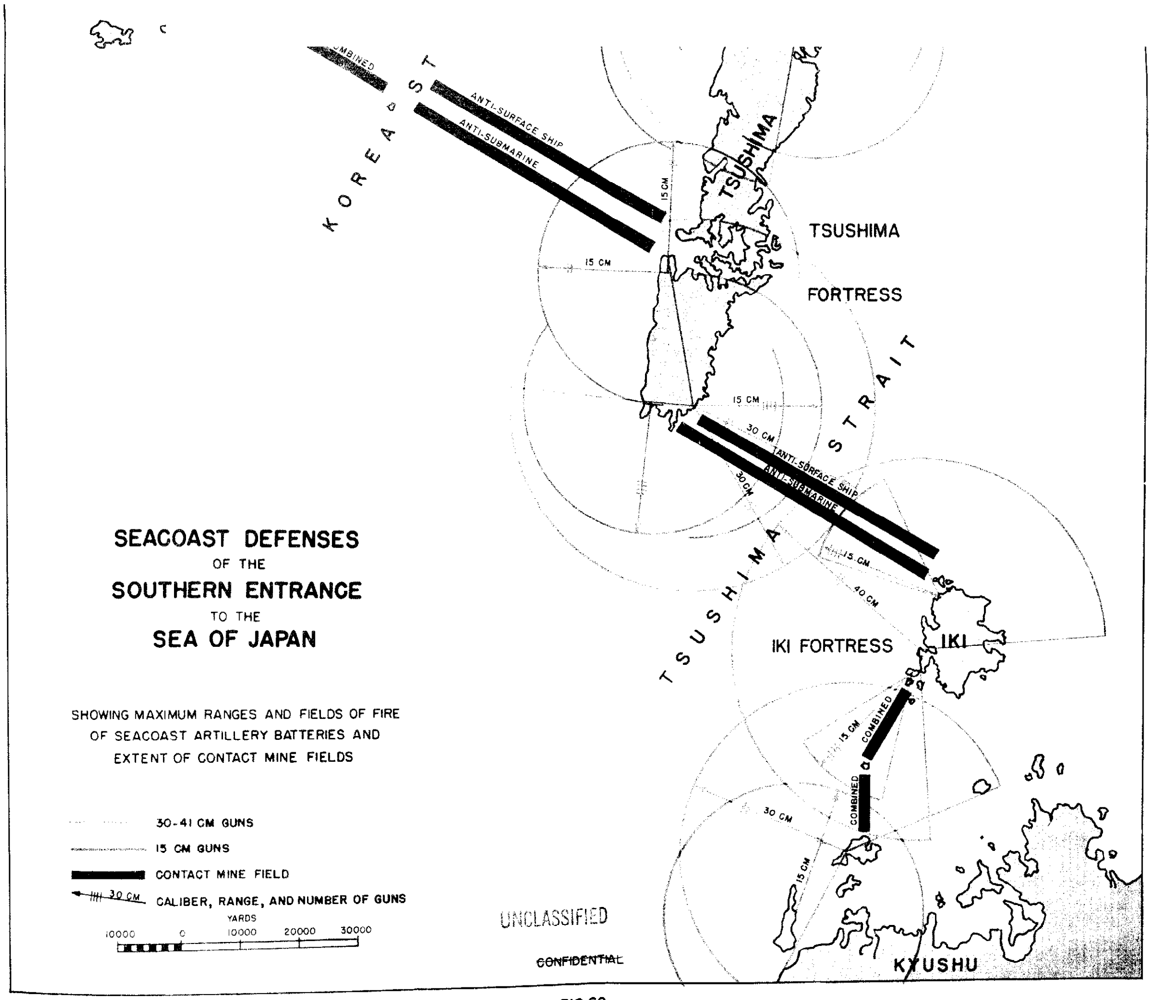

KOREA
FUSAN
FORTRESS
15 CM
15 CM
41 CM
41 CM
15 CM
15 CM
15 CM
KOREA STRAIT
COMBINED
ANTI-SURFACE SHIP
ANTI-SUBMARINE
15 CM
15 CM
TSUSHIMA
TSUSHIMA
FORTRESS



SEACOAST DEFENSES
OF THE
SOUTHERN ENTRANCE
TO THE
SEA OF JAPAN
SHOWING MAXIMUM RANGES AND FIELDS OF FIRE OF SEACOAST ARTILLERY BATTERIES AND EXTENT OF CONTACT MINE FIELDS
30-41 CM GUNS
15 CM GUNS
CONTACT MINE FIELD
30 CM CALIBER, RANGE, AND NUMBER OF GUNS
YARDS
10000 0 10000 20000 30000
KOREA ST
TSUSHIMA STRAIT
TSUSHIMA
TSUSHIMA
FORTRESS
ANTI-SURFACE SHIP
ANTI-SUBMARINE
15 CM
30 CM
40 CM
COMBINED
IKI FORTRESS
IKI
KYUSHU
UNCLASSIFIED
CONFIDENTIAL

FIG.62

were sited to deny an enemy the use of these straits, there was no provision for coordinating the control of fire of these major caliber guns. There were no direct tactical channels of communication between the three fortresses. The potential fire power of these weapons was only partially existent. Lack of radar fire-control equipment for accurate firing at unseen targets nullified to a large extent their excellent tactical location.

Section III
Heavy Field Artillery

129. General. a. During the last year of the war the Japanese anticipated landings on the beaches of the homeland and were making every preparation to combat such landings.

b. Considerable mobile artillery was brought back from Manchuria and Korea. Other heavy mobile artillery was taken out of storage. A comparatively large number of old 28-cm howitzers (1890) were withdrawn from harbor defenses. The weapons thus made available included 24-cm and 30-cm howitzers, 15-cm guns, and 10-cm guns, in addition to the 28-cm howitzers. Anything that would fire, and for which ammunition was available, was being deployed for beach defense.

c. All of these weapons, manned by heavy field artillery units of the Coast Artillery, were either emplaced or in the process of being emplaced to strengthen the defenses of likely landing beaches.

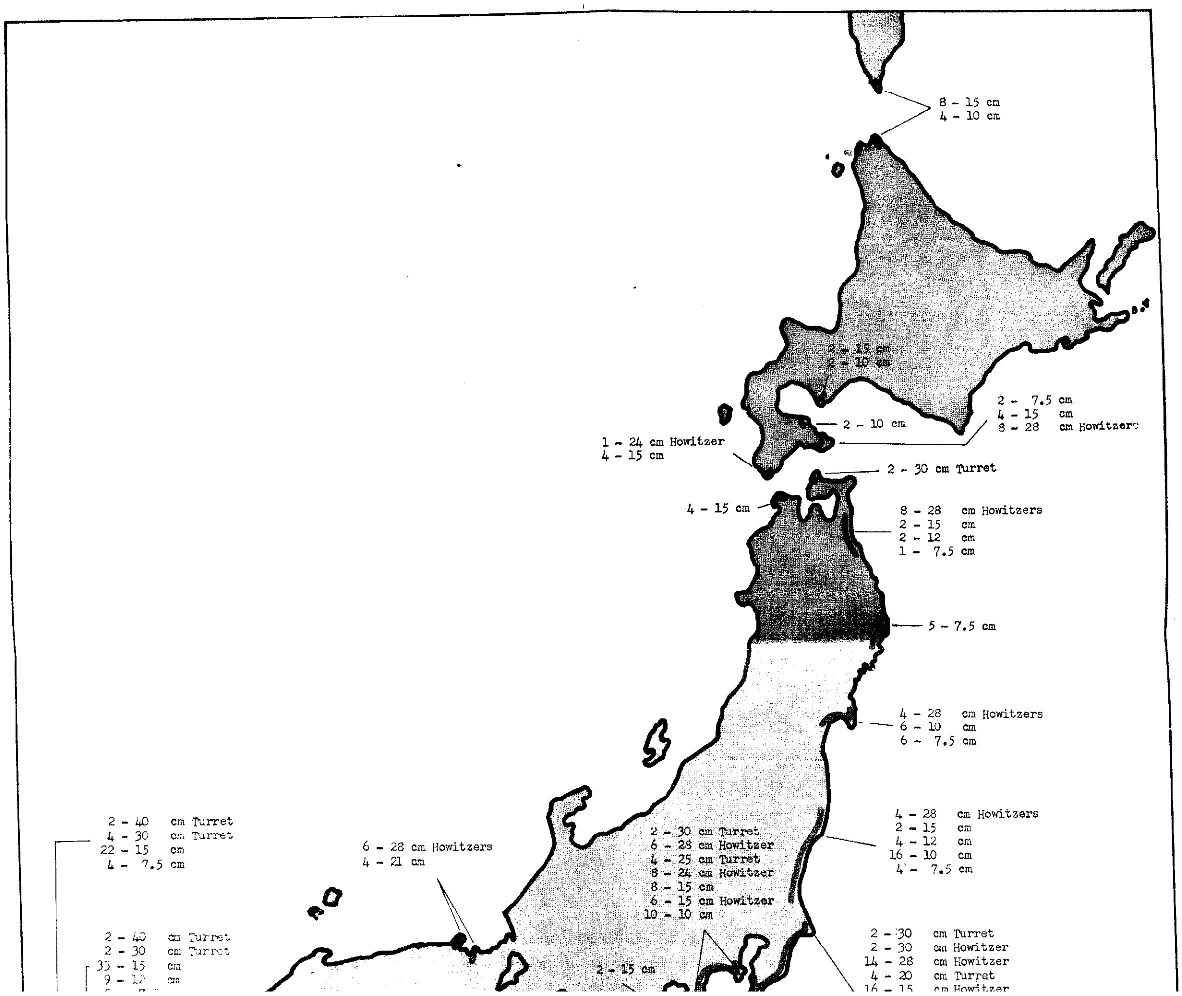
130. Tactical Dispositions. This artillery was disposed along the coast line, outside the fortresses, in positions from which it could cover the landing beaches. (For general tactical dispositions, see Fig. 63). Generally, the weapons were emplaced a distance inland corresponding to 75% of their maximum range although the availability of a suitable position for local defense was often the governing factor. In some cases they were sited on headlands so that they could cover with flanking fire the intervening beaches between adjacent headlands.

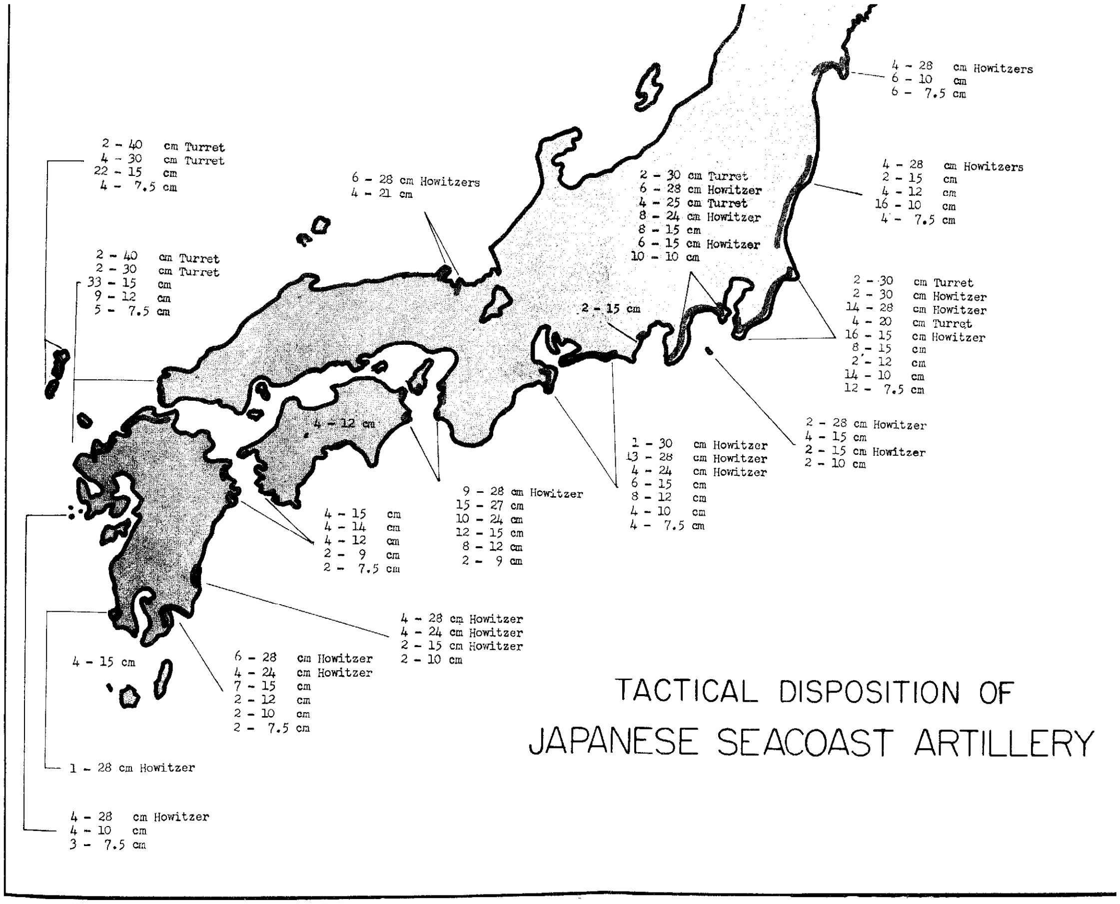
131. Control. The coast artillery regiment or independent battalion was assigned to the army or division responsible for the defense of the area. There was no Fire Direction Center, as in our service, for the control of fire of these weapons. Fire direction was exercised by the regimental or battalion commander. However, this fire direction was limited largely to the designation of sectors of fire for the different batteries. Each battery established its own observation posts for observing and spotting fire. Ranges to points on the beach, to road crossings, to high ground in rice paddy fields and to other critical points were pre-determined and were always available.

132. Emplacements. a. The 30-cm, 28-cm and 24-cm howitzers were emplaced generally on concrete foundations. Defilades of 40° were not

uncommon. Earth was filled in against a wooden revetment surrounding the howitzer. Trees were then planted on the sides and rear of the emplacement. A wooden frame for vegetation camouflage was built over the rear of the howitzer. Ammunition was stored in hastily constructed under-ground tunnels when the terrain permitted. Otherwise it was dispersed along a narrow gauge track.

b. The 15-cm guns emplaced for beach defense were generally of two types, the Type 96 and the Type 45. The Type 96 was emplaced on its mobile firing platform. Earth barricades were constructed on either flank of the guns and covered trenches were provided for the gun crews. The field of fire was restricted to less than 180°. The Type 45 15-cm gun and the 10-cm guns generally were emplaced on concrete platforms. Wooden revetments, backed by earth fill, were constructed to provide protection for the gun and the operating personnel. Covered trenches were constructed for protection of personnel during air attack. The Type 96 15-cm gun was camouflaged in a manner similar to that used for these guns in harbor defense. Camouflage for other minor caliber guns usually consisted of wooden pole frames constructed to extend over the carriage and the rear of the gun. Local vegetation, nets or painted cloth was secured to this frame.


8 - 15 cm
4 - 10 cm
2 - 15 cm
2 - 10 cm
2 - 7.5 cm
4 - 15 cm
8 - 28 cm Howitzers
2 - 10 cm
1 - 24 cm Howitzer
4 - 15 cm
2 - 30 cm Turret
4 - 15 cm
8 - 28 cm Howitzers
2 - 15 cm
2 - 12 cm
1 - 7.5 cm
5 - 7.5 cm
4 - 28 cm Howitzers
6 - 10 cm
6 - 7.5 cm
4 - 28 cm Howitzers
2 - 15 cm
4 - 12 cm
16 - 10 cm
4 - 7.5 cm
2 - 40 cm Turret
4 - 30 cm Turret
22 - 15 cm
4 - 7.5 cm
6 - 28 cm Howitzers
4 - 21 cm
2 - 30 cm Turret
6 - 28 cm Howitzer
4 - 25 cm Turret
8 - 24 cm Howitzer
8 - 15 cm
6 - 15 cm Howitzer
10 - 10 cm
2 - 40 cm Turret
2 - 30 cm Turret
33 - 15 cm
9 - 12 cm
2 - 15 cm
2 - 30 cm Turret
2 - 30 cm Howitzer
14 - 28 cm Howitzer
4 - 20 cm Turret
16 - 15 cm Howitzer



TACTICAL DISPOSITION OF
JAPANESE SEACOAST ARTILLERY

UNCLASSIFIED FIG.63 UNCLASSIFIED

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Part Two - Naval Seacoast Artillery

1. General. a. The Japanese naval seacoast artillery was a war-time organization which was set up to reinforce the army seacoast defenses. It was utilized primarily in and around large naval installations, or at critical points along the shore line adjacent to naval installations. Where these defenses were superimposed on the army seacoast artillery, there was no organization for overall command. Each operated independently, with only a limited amount of coordination between the two.

b. Use was made of surplus naval guns, fire-control equipment and personnel which became available in increasing quantities as the Japanese Navy was gradually driven from the seas. Guns and fire-control equipment that had been intended for vessels never completed, that had been replaced by modern equipment, or that had been salvaged from damaged vessels were set up in shore positions. Manning personnel were taken from naval vessels, or from personnel that had been intended for use with the fleet. No special training was given this personnel, since the materiel and methods of fire-control were the same as those used on naval vessels.

c. When the war ended, the project of installation of these guns had been given a high priority. However, only about 40% of the guns available had actually been emplaced and none of the electrical fire-control equipment had been installed.

2. Organization. a. General. (1) The naval seacoast artillery defenses were under the direct control of the naval sector commanders. Each sector defense organization consisted of a small air force (flotilla), a mobile defense force, a water defense command, and a land defense command.

(a) The mobile defense force was available primarily as a mobile ground force reserve.

(b) The water defense command consisted of patrol boats, mine sweepers and a mine-laying command.

(c) The land defense command consisted of antiaircraft defense commands, seacoast artillery commands, local security guard detachments and antiaircraft lookout detachments.

(2) The largest naval seacoast defense headquarters was the Seacoast Defense Command. The number of these commands varied within each sector, depending upon the number of localities where naval seacoast defense was provided.

b. Seacoast Defense Command. (1) The seacoast defense command, operationally responsible to the naval sector, consisted of a headquarters and a variable number of naval seacoast batteries. Thus, the naval seacoast command defending the approaches to Tokyo consisted of 1 20-cm, 1 15.5-cm, 2 14-cm, 1 12.7-cm, 7 12-cm and 6 8-cm batteries. (This was in addition to the Army Coast Artillery in the same defensive area, which functioned under another command). On the other hand, the naval defense of Nagoya consisted of only 3 14-cm batteries.

(2) The chain of command was direct from defense command to battery, there being no intermediate echelon, such as battalion or regiment.

(3) Command was exercised by a naval officer, usually with the rank of captain.

(4) The headquarters of the defense command was a provisional organization within each area and its strength depended upon the number of batteries assigned and the personnel available. The primary function of the headquarters was to train and control operationally the batteries assigned to the command.

c. The Battery. The battery was the fire unit. It was organized into four sections; a headquarters section, range section, gun section and searchlight section. The gun section manned one to four guns and the searchlight section manned two searchlights. The personnel strength of a battery was not fixed and in most batteries, it was the minimum with which the equipment could be operated. The use of skeleton crews was common.

3. Training. a. No special training was conducted for newly organized naval seacoast batteries. The personnel of these units, having received training on the same or similar equipment aboard ship, were assumed to be qualified to use the equipment on shore. Training was thus limited largely to a review of pertinent subjects which had been included in training given in Navy fleet units and schools. In theory, the responsibility for this training rested with the commanders of the various naval seacoast artillery commands, but actually it was left largely to the battery commanders.

b. Due to shortages of ammunition and to the fact that most of these batteries were not installed until late in the war, no target practices were conducted. However, when a battery first occupied its tactical position, an allowance of six rounds of ammunition was authorized for functional and familiarization firing.

4. Materiel. a. Guns. (1) Guns used by the Naval Seacoast Artillery were of Navy design. They varied in caliber from 8-cm to 20-cm, and included short barrel 8-cm and 12-cm guns. All guns were of the fixed type that had been intended for mounting on Navy vessels or had been removed from these vessels.

CHARAC

TYPE OF GUN	20CM	15.5 CM	15 CM		
MODEL (YEAR)	1926	1928	1913 1914	1914	1919
CALIBER	50	50	40	45	50
MAXIMUM ELEVATION	60	60	50	50	50
MAXIMUM DEPRESSION	-3	-3	-5	-5	-5
TRAVERSE	360	360	360	360	360
MUZZLE VELOCITY (ft/sec)	2,300	2,460	2,300	2,300	2,300
TYPE OF RECOIL SYSTEM	Pneumatic	Hydraulic	Hydraulic	Hydraulic	Hydraul
TYPE OF BREECH BLOCK	Welin	Welin	Welin	Welin	Welin
AUTOMATIC RAMMER	yes	yes	no	no	no
RATE OF FIRE (Rds/min)	3*	3*	6*	6*	6*
TYPE OF MOUNT	Turret	Turret	Barbette	Barbette	Barbett
COUNTER RECOIL SYSTEM	Pneumatic	Spring	Spring	Spring	Spring
MAXIMUM RANGE (Yds)	27,250	22,000	21,800	21,800	21,80
TYPE OF AMMUNITION	Semi-fixed	Semi-fixed	Semi-fixed	Semi-fixed	Semi-fi
TYPE OF PRIMER	Electric Percussion	Electric Percussion	Electric Percussion	Electric Percussion	Electri Percussi
TYPE OF PROJECTILE	Armor piercing and HE	HE	HE	HE	HE

* Rate of fire when installed aboard ship

** Twin Guns

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RACTERISTICS OF GUNS AND AMMUNITION
NAVAL SEACOAST ARTILLERY

	14 CM		12.7 CM (II)	12.7 CM (I)	12 CM		
1919	1915	1919	1924	1914	1916	1919	1930
50	50	40	50	50	45	40	40
50	55	55	55	77	80	80	80
-5	-5	-5	-5	-5	-3	-3	-3
360	360	360	360	360	360	360	360
2,300	2,330	2,330	2,950	2,985	2,625	2,625	2,30
Hydraulic	Hydraulic	Hydraulic	Hydraulic	Hydraulic	Hydraulic	Hydraulic	Hydraul
Welin	Welin	Welin	Welin	Welin	Welin	Welin	Weli
no	no	no	no	no	no	no	no
6*	6*	6*	11**	11**	6	6	6
Barbette	Barbette	Barbette	Barbette	Barbette	Barbette	Barbette	Barbet
Spring	Spring	Spring	Spring	Spring	Spring	Spring	Spri
21,800	21,800	21,800	20,000	20,000	19,600	19,600	10,9
Semi-fixed	Semi-fixed	Semi-fixed	Fixed	Fixed	Fixed	Fixed	Fix
Electric Percussion	Electric Percussion	Electric Percussion	Electric Percussion	Electric Percussion	Electric Percussion	Electric Percussion	Percus
HE	HE	HE	HE	HE	HE	HE	HE

UNCLASSIFIED

FIG. I

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AMUNITION

Y

12 CM		8 CM		12 CM (SHORT BARREL)	8 CM (SHORT BARREL)	
1916	1919	1930	1928	1935	1916	1918
45	40	40	40	--	--	--
80	80	80	80	80	80	80
-3	-3	-3	-3	-2	-1	-1
360	360	360	360	360	360	360
2,625	2,625	2,300	2,300	985	985	985
Hydraulic	Hydraulic	Hydraulic	Hydraulic	Spring	Spring	Spring
Welin	Welin	Welin	Welin	Welin	Welin	Welin
no	no	no	no	no	no	no
6	6	6	6	6	6	6
Barbette	Barbette	Barbette	Barbette	Barbette	Barbette	Barbette
Spring	Spring	Spring	Spring	Spring	Spring	Spring
19,600	19,600	10,900	10,900	4,150	1,300	1,300
Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
Electric Percussion	Electric Percussion	Percussion	Percussion	Percussion	Percussion	Percussion
HE	HE	HE	HE	HE	HE	HE

(2) When used on ships, guns of 12.7-cm and larger caliber were elevated, traversed, and fired electrically. However, in seacoast positions they were without the electrical power equipment and were operated manually.

(3) The short-barrel guns were similar to our howitzers. They were cheap and easy to manufacture, and had been produced originally for use aboard transports and cargo vessels for defense against submarines.

(4) For detailed characteristics of naval seacoast guns see Fig. 1. Photographs of the more commonly used guns are given in Figs. 2-13, inclusive.

b. Ammunition. (1) Semi-fixed ammunition was used with 14-cm and larger guns, and fixed ammunition with 12.7-cm and smaller guns. The 15.5-cm and 20-cm were provided with both armor-piercing and high explosive projectiles. Smaller caliber guns had only high explosive projectiles.

(2) All high explosive projectiles were equipped with point-impact fuzes and in addition, the 12.7-cm projectiles had a time fuse.

(3) All guns were fired by percussion primers although the 12.7-cm and larger caliber guns were originally equipped to be fired either electrically or by percussion.

c. Automatic Weapons. Naval antiaircraft automatic weapons, (13.2-mm, 25-mm, and 40-mm) were used in many of the naval seacoast defenses. Inasmuch as their primary mission was antiaircraft defense, they were normally under the operational control of the antiaircraft defense commander rather than the seacoast defense commander.

d. Searchlights. Both the Navy 90-cm antiaircraft searchlight (see Fig. 14) and a smaller, older type of searchlight with a maximum elevation of 45° and a minimum of minus 5° were used for illumination. Searchlights used at the various tactical positions had been removed from naval vessels.

e. Fire-Control Equipment. It had been intended eventually to use Navy electrical fire-control equipment. However, the installation of this equipment had not been accomplished at the end of the war. In general, the only fire-control equipment in operational use at the end of the war consisted of-

(1) "On-carriage" sights.

(2) Stereoscopic range finders (1- or 2-meter base).

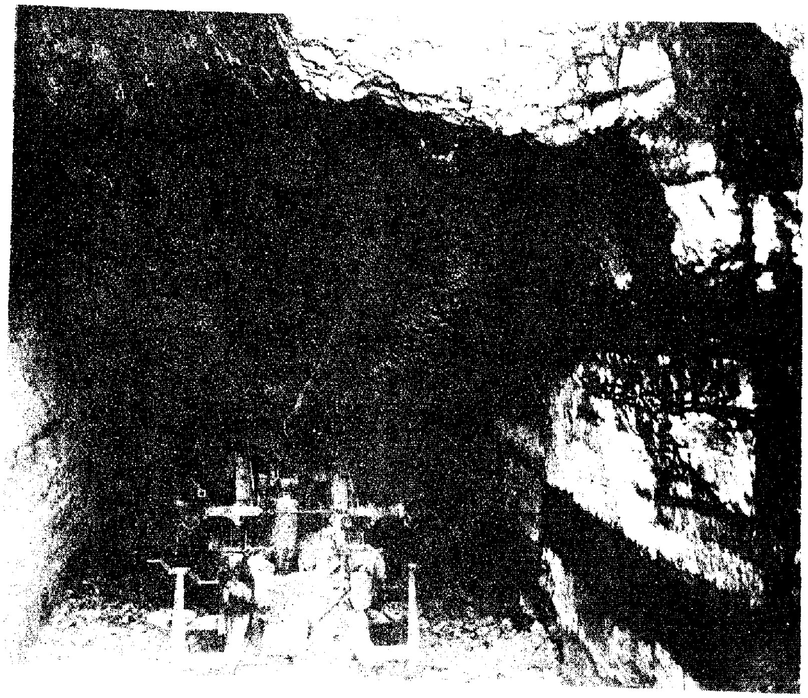

Fig. 2
12-cm Gun in Tactical Position

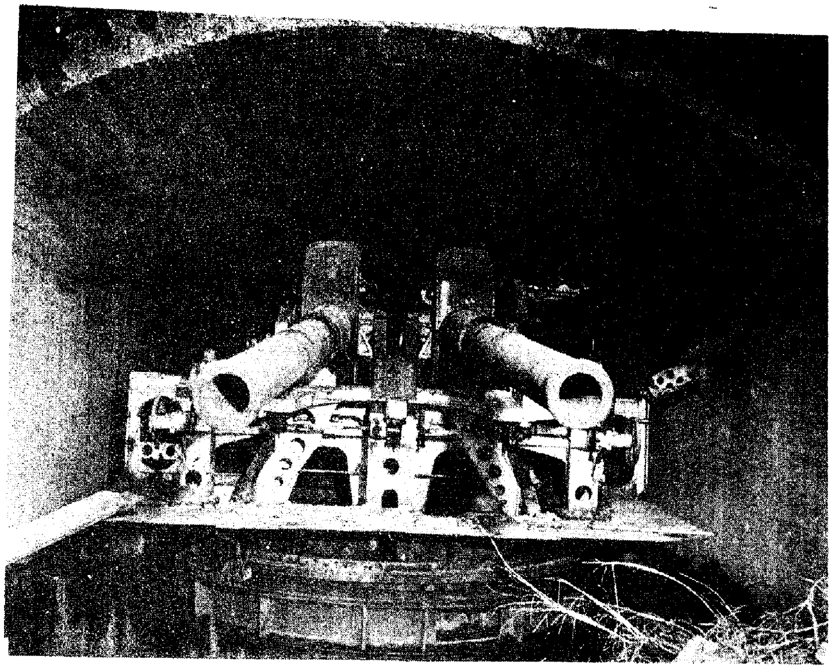

Fig. 3
12.7-cm Gun (Front View)

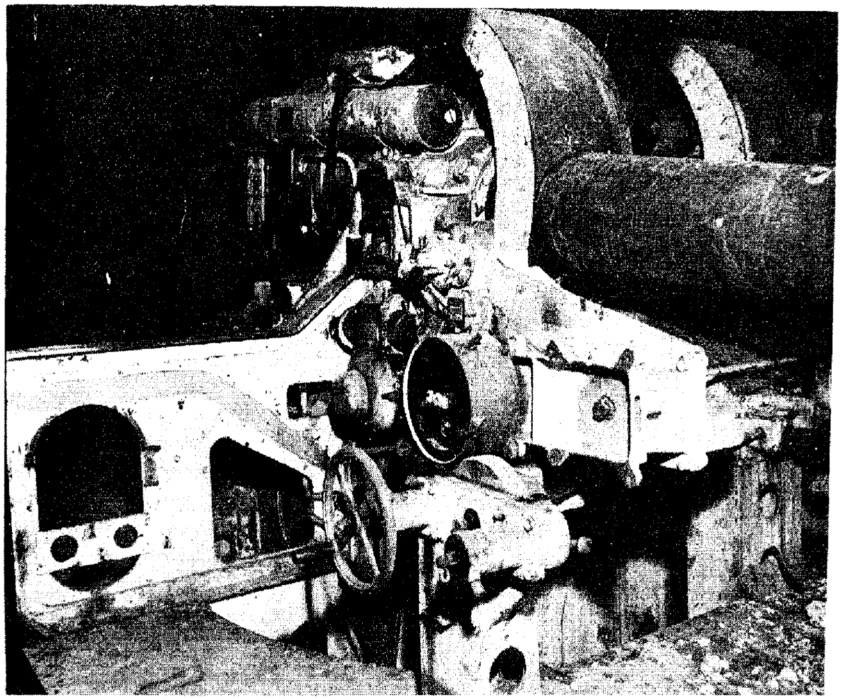

Fig. 4
12.7-cm Gun (Right-Front View)

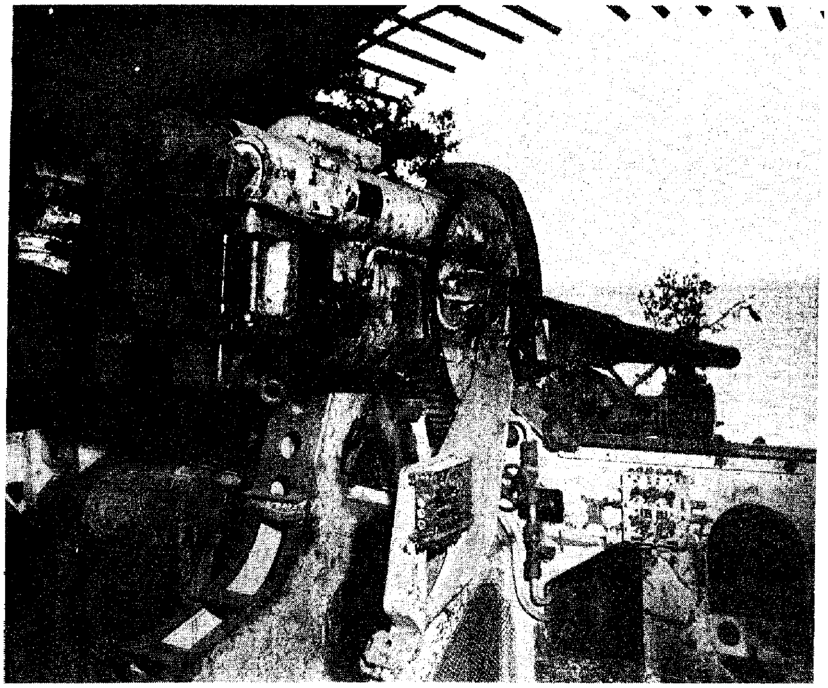

Fig. 5
12.7-cm Gun (Right Rear View)

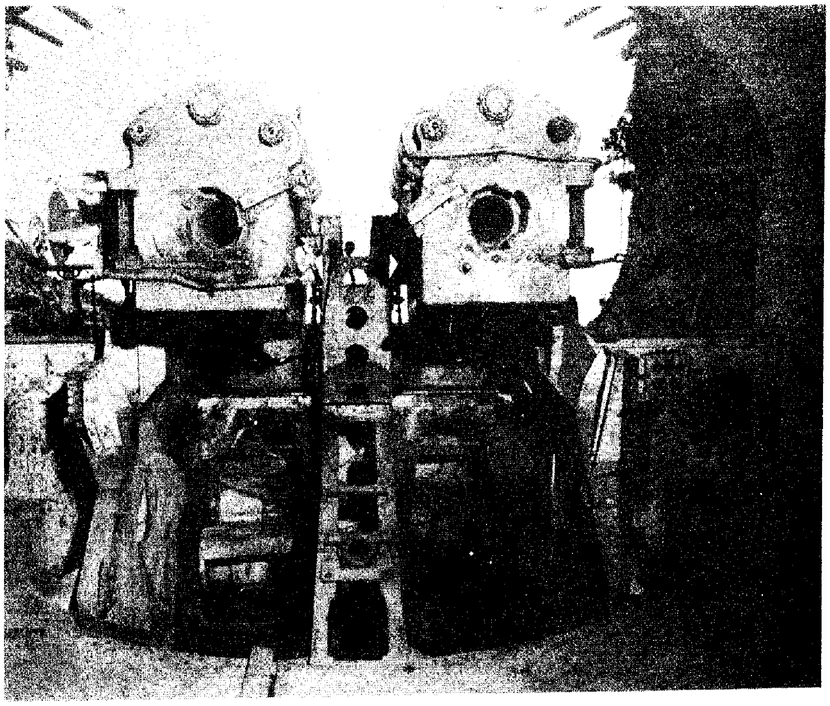

Fig. 6
12.7-cm Gun (Rear View)

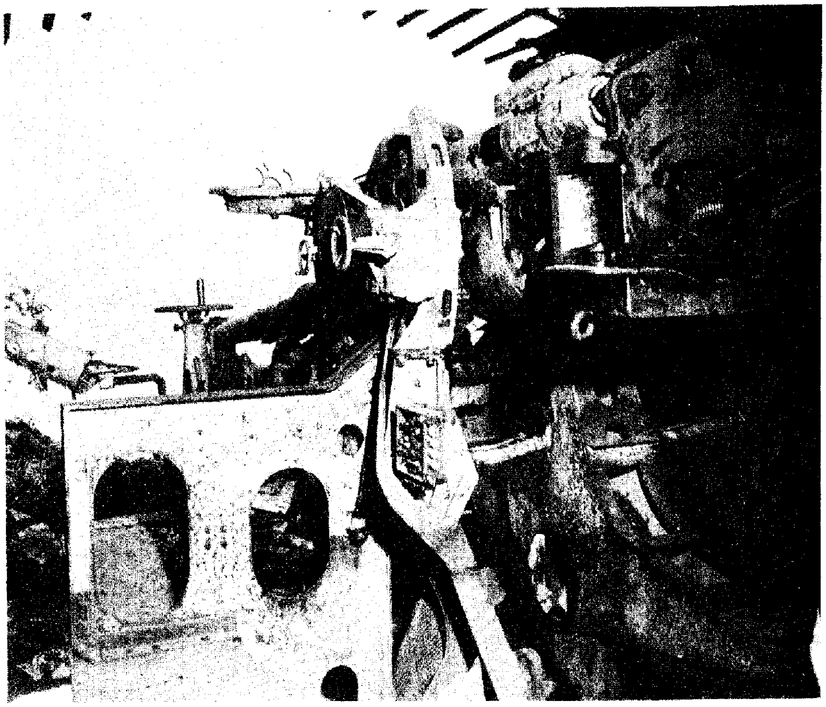

Fig. 7
12.7-cm Gun (Left-Rear View)

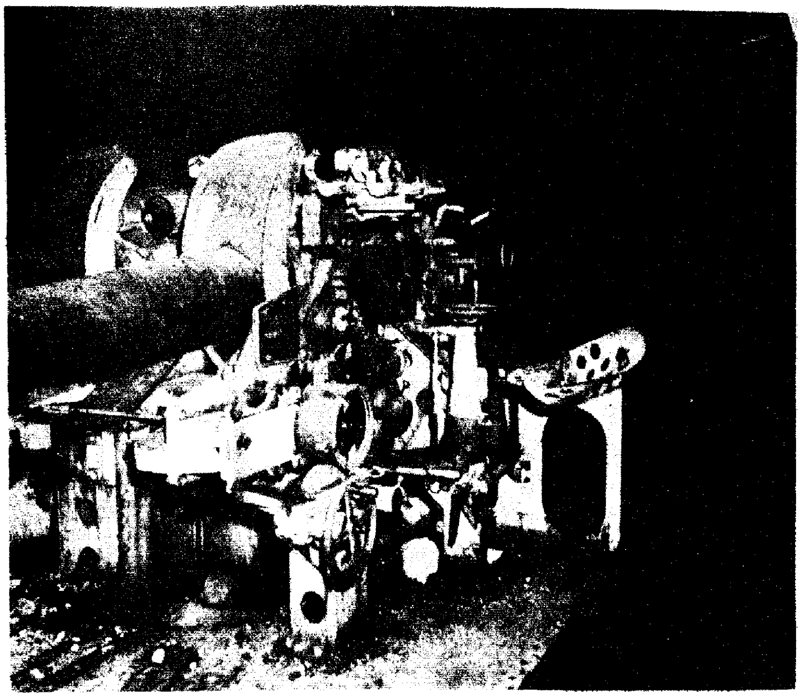

Fig. 8
12.7-cm Gun (Left-Front View)

Fig. 9
14-cm Gun (Right-Front View)

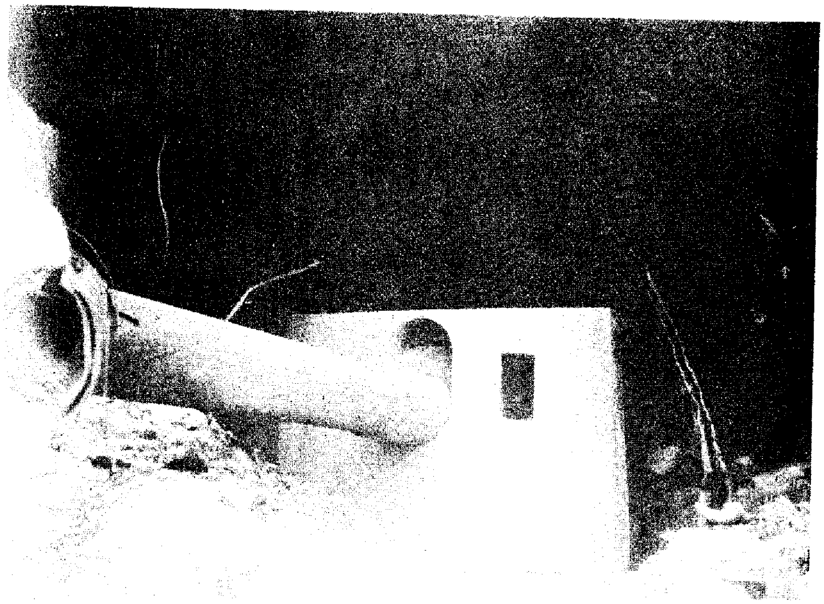

Fig. 10
14-cm Gun (Left-Front View)

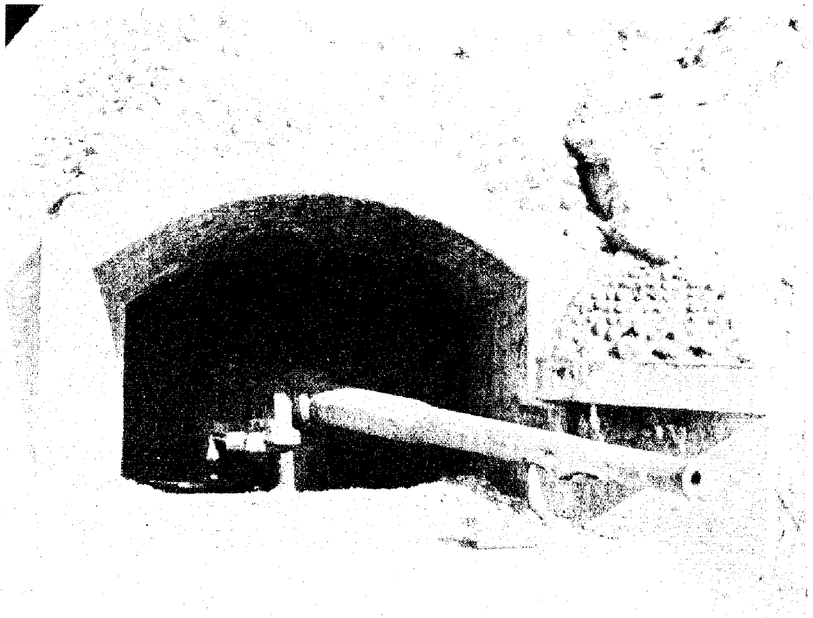

Fig. 11
15-cm Gun (Right-Front View)

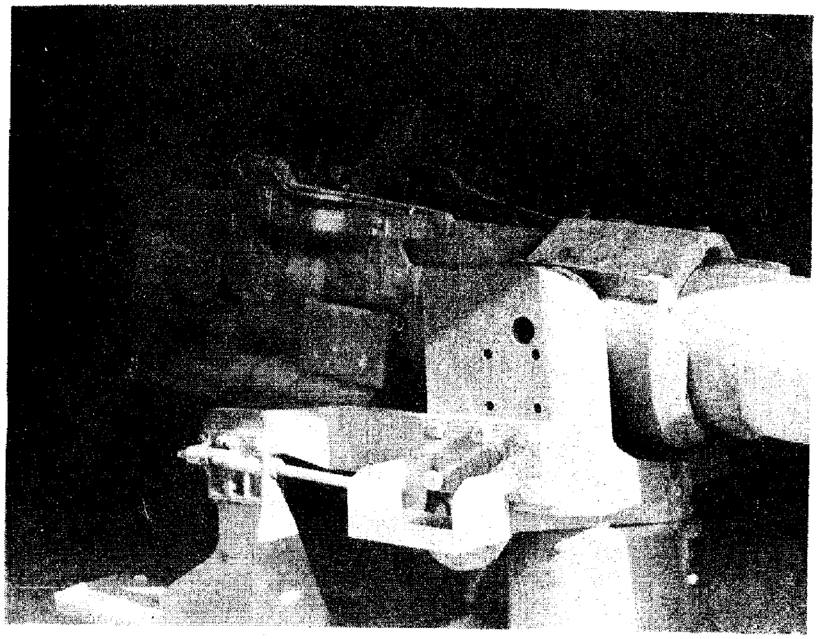

Fig. 12
15-cm Gun (Right-Side View)

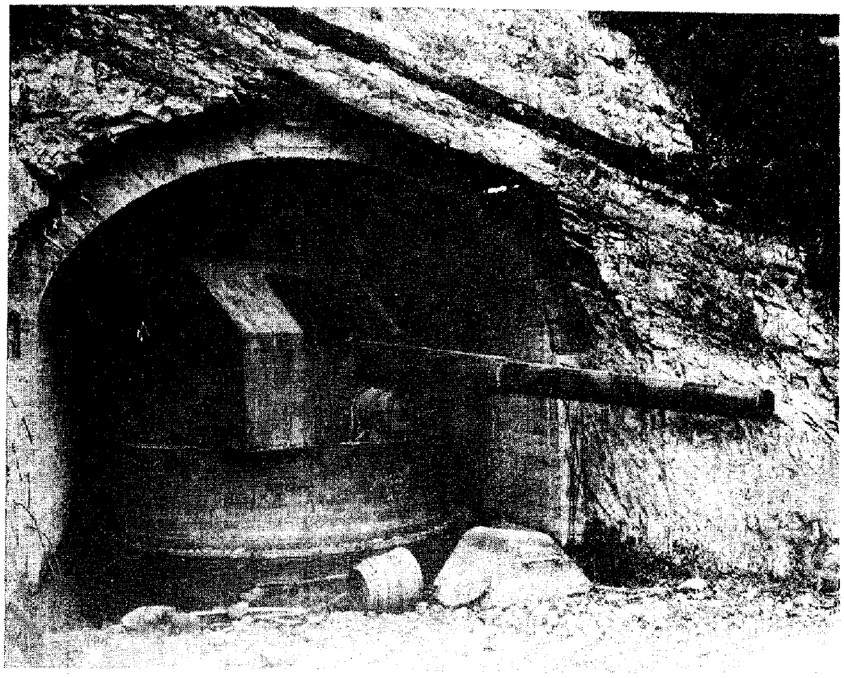

Fig. 13
15.5-cm Gun (Right-Side View)

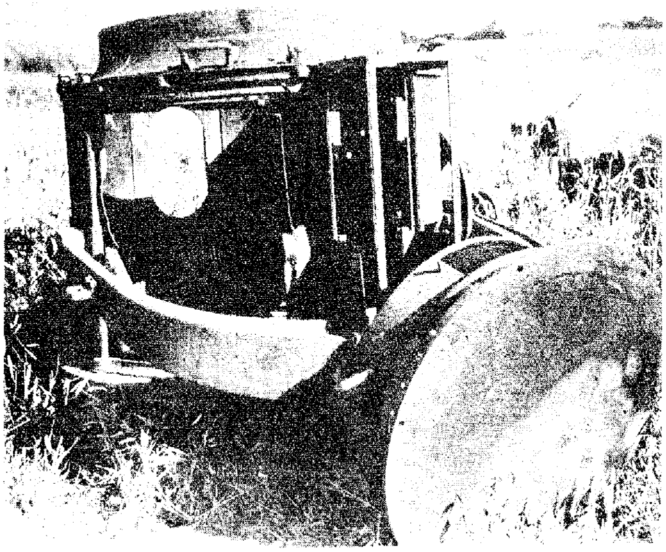

Fig. 14.
90-cm Searchlight

(3) Battery commander's telescopes.

(4) Firing tables and charts.

(5) Target speed and course angle calculators.

5. Technique. a. Emplacements. (1) Guns were fixed and were usually emplaced in reinforced concrete niches built into the sides of hills or embankments, as shown in Figs. 2-13, inclusive. These niches were constructed as small as possible, thus sacrificing fields of fire for protection. These considerations are brought out in the following statement of a witness: "If we do not give our batteries sufficient protection, we have found out by experience that your bombardments will destroy them. It is better to have our guns in operation even with small fields of fire than have them out of action due to your bombardment."

(2) Usually the searchlights of a battery were sited on high ground approximately 300 yards from the guns, with one light on each flank of the battery position. It had been intended to build permanent reinforced caves into the side of the high ground, in which searchlights could be given protection. However, the construction of these caves had not been completed by the end of the war.

(3) The battery command post, which contained the fire-control equipment, was usually a reinforced concrete room built into the side of a hill and located near the guns. An open slot was provided through which targets could be

observed and tracked with the battery commander's telescope and the range finder.

b. Methods of Fire. (1) In general, naval seacoast batteries were equipped to conduct Case I firing only. When the war ended, the Navy was in the process of installing electrical fire-control equipment at various batteries for Case III firing, but very little progress had been made.

(2) In Case I firing, the firing data were computed at the battery command post which was equipped with a range finder, battery commander's telescope, firing charts and tables, and in some cases a target speed and course angle calculator. No ballistic corrections were applied to this firing data. The initial range to the target was taken from the range finder, and the target speed and course were either estimated or determined by the target speed and course angle calculator. Having the target speed and course, the battery commander computed the lateral lead to be applied to the guns by use of a table listing ranges and angles of approach along its coordinate axis. The initial firing data were transmitted to the guns by telephone where they were applied to the sights. The guns were then traversed and elevated or depressed until the sights were on the target. No attempt was made to conduct trial fire. In fire adjustment, range corrections of one fork and one-half fork were made until a bracket was obtained. After the bracket was obtained, all salvos except those that were sensed as hits were given a correction of one-half fork, up or down, depending upon whether the mean deviation of the salvo was short or over. Also, a correction in azimuth, based upon sensings, was made after each salvo. All corrections were determined by the battery commander at the command post. Based upon these corrections new data were sent to the guns by telephone, and set on the sights. The above method of fire adjustment was used because of the crude manner in which it was necessary to compute firing data.

c. Rates of Fire. Rates of fire which it was expected would be obtained were considerably below the apparent capabilities of these weapons. Mounted on shore they were not equipped with the ammunition-handling equipment ordinarily provided aboard ship. Practically all guns were manned by skeleton crews.

6. Tactics. a. Dispositions. The strategic location of areas defended by naval seacoast artillery is shown in Fig. 15. The tactical dispositions, number and caliber of guns, and fields of fire within the various areas are shown in Figs. 16-22, inclusive.

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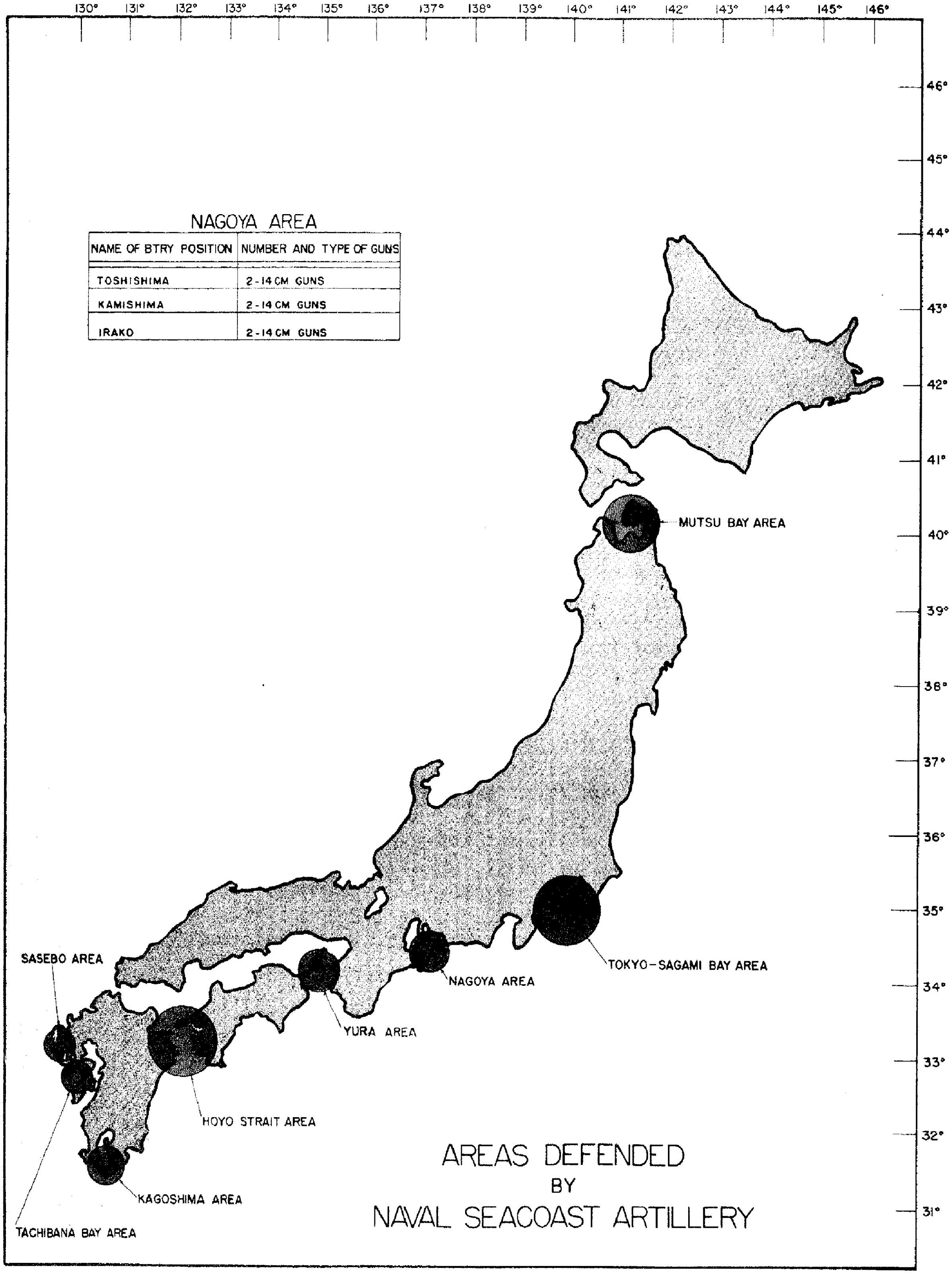

NAGOYA AREA

NAME OF BTRY POSITION	NUMBER AND TYPE OF GUNS
TOSHISHIMA	2-14 CM GUNS
KAMISHIMA	2-14 CM GUNS
IRAKO	2-14 CM GUNS

FIG. 15

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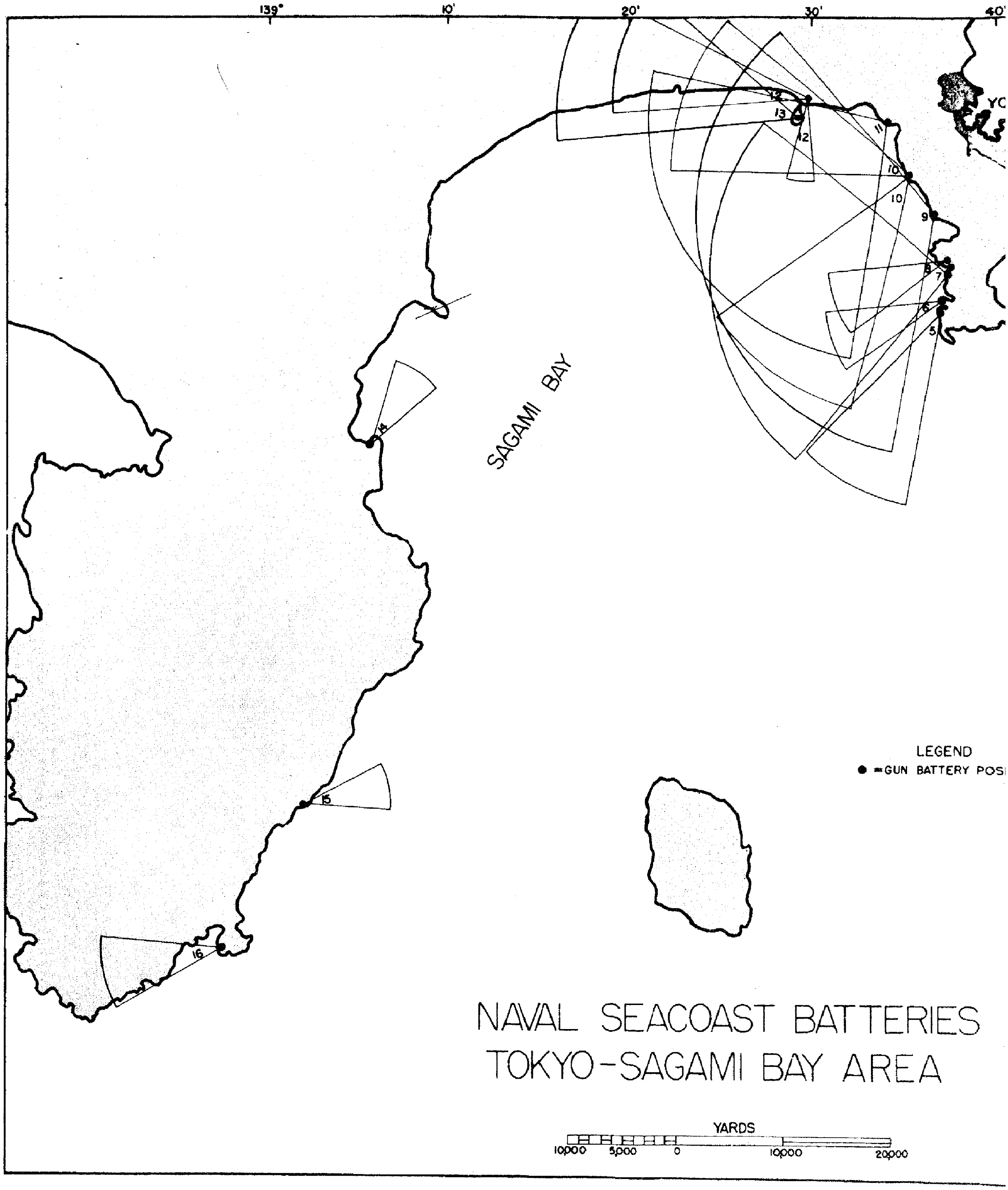
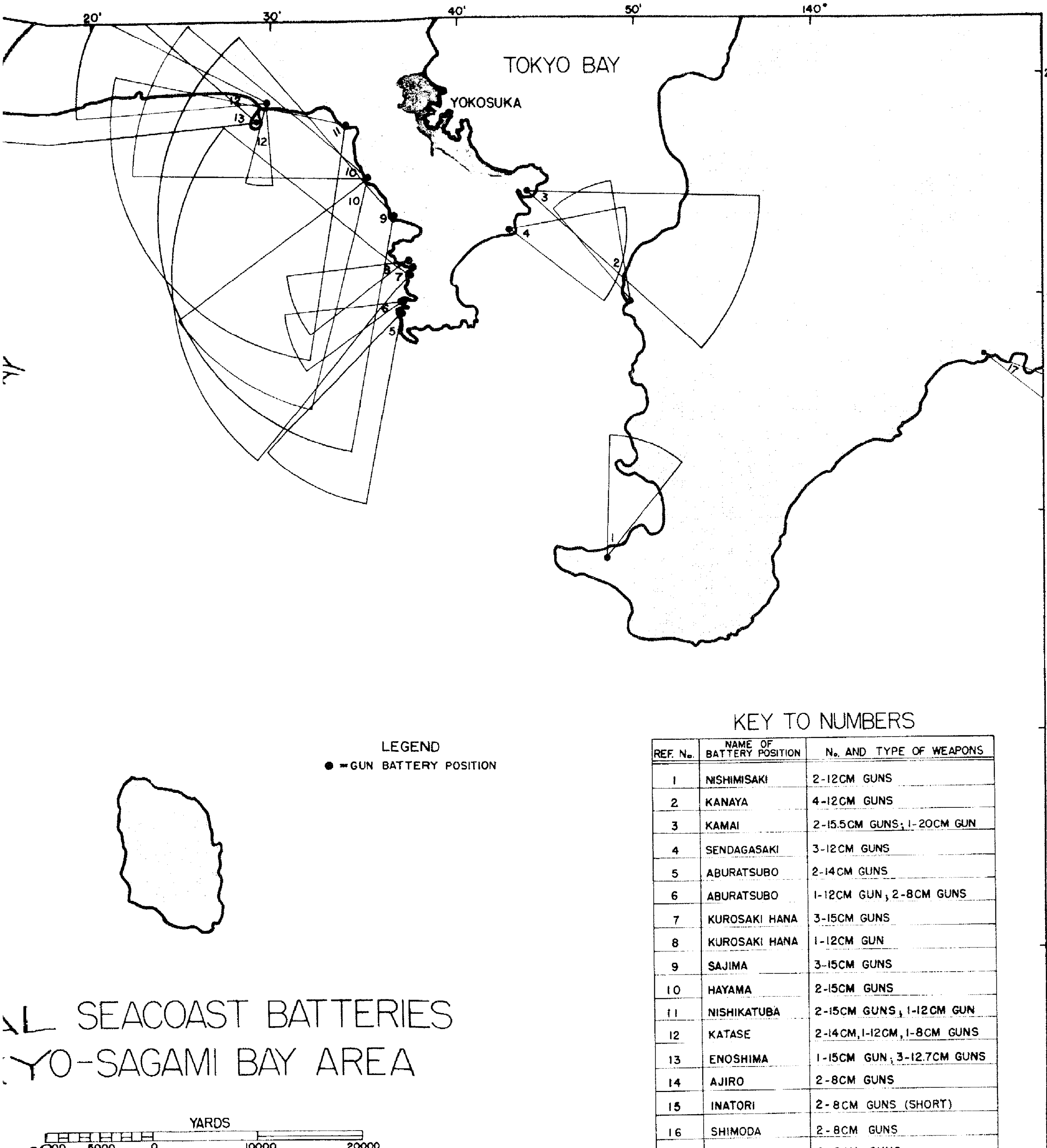

139°
10'
20'
30'
40'
SAGAMI BAY
YO
5
6
7
8
9
10
10
11
12
12
13
14
15
16
LEGEND
● = GUN BATTERY POSI
NAVAL SEACOAST BATTERIES
TOKYO-SAGAMI BAY AREA
YARDS
10,000
5,000
0
10,000
20,000

FIG. 16

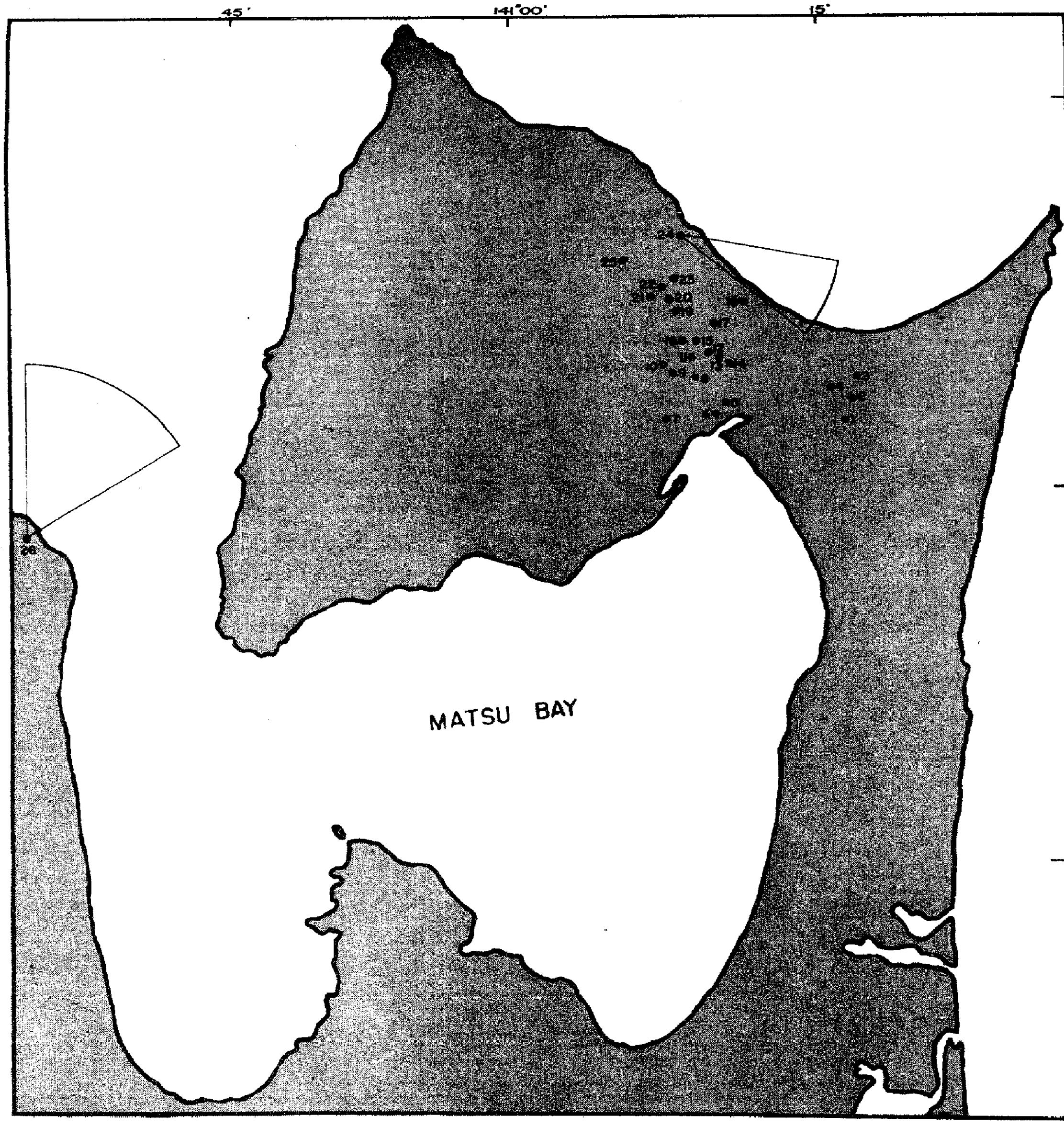


KEY TO NUMBERS

REF. No.	NAME OF BATTERY POSITION	No. AND TYPE OF WEAPONS
1	NISHIMISAKI	2-12CM GUNS
2	KANAYA	4-12CM GUNS
3	KAMAI	2-15.5CM GUNS; 1-20CM GUN
4	SENDAGASAKI	3-12CM GUNS
5	ABURATSUBO	2-14CM GUNS
6	ABURATSUBO	1-12CM GUN; 2-8CM GUNS
7	KUROSAKI HANA	3-15CM GUNS
8	KUROSAKI HANA	1-12CM GUN
9	SAJIMA	3-15CM GUNS
10	HAYAMA	2-15CM GUNS
11	NISHIKATUBA	2-15CM GUNS; 1-12CM GUN
12	KATASE	2-14CM, 1-12CM, 1-8CM GUNS
13	ENOSHIMA	1-15CM GUN; 3-12.7CM GUNS
14	AJIRO	2-8CM GUNS
15	INATORI	2-8CM GUNS (SHORT)
16	SHIMODA	2-8CM GUNS
17	OKITSU	2-8CM GUNS

AL SEACOAST BATTERIES
YO-SAGAMI BAY AREA

FIG.16



KEY TO NUMBERS

No.	NUMBER AND TYPE OF GUNS
1	2 - 20 CM GUNS
2	3 - 20 CM GUNS
3	2 - 12 CM GUNS (SB)
4	2 - 8 CM GUNS
5	1 - 20 CM GUNS
6	3 - 12 CM GUNS
7	2 - 12 CM GUNS (SB)
8	2 - 8 CM GUNS
9	2 - 12 CM GUNS
10	2 - 12.7 CM GUNS
11	1 - 12 CM GUNS
12	1 - 20 CM GUNS
13	2 - 8 CM GUNS (SB)
14	1 - 12 CM GUNS (SB)
15	1 - 12 CM GUNS
16	1 - 20 CM GUNS
17	1 - 20 CM GUNS
18	1 - 8 CM GUNS (SB)
19	1 - 20 CM GUNS
20	1 - 12 CM GUNS (SB)
21	2 - 12 CM GUNS (SB)
22	1 - 12 CM GUNS
23	2 - 12 CM GUNS (SB)
24	2 - 12 CM GUNS
25	1 - 12 CM GUNS (SB)
26	4 - 12 CM GUNS

FIG. 17

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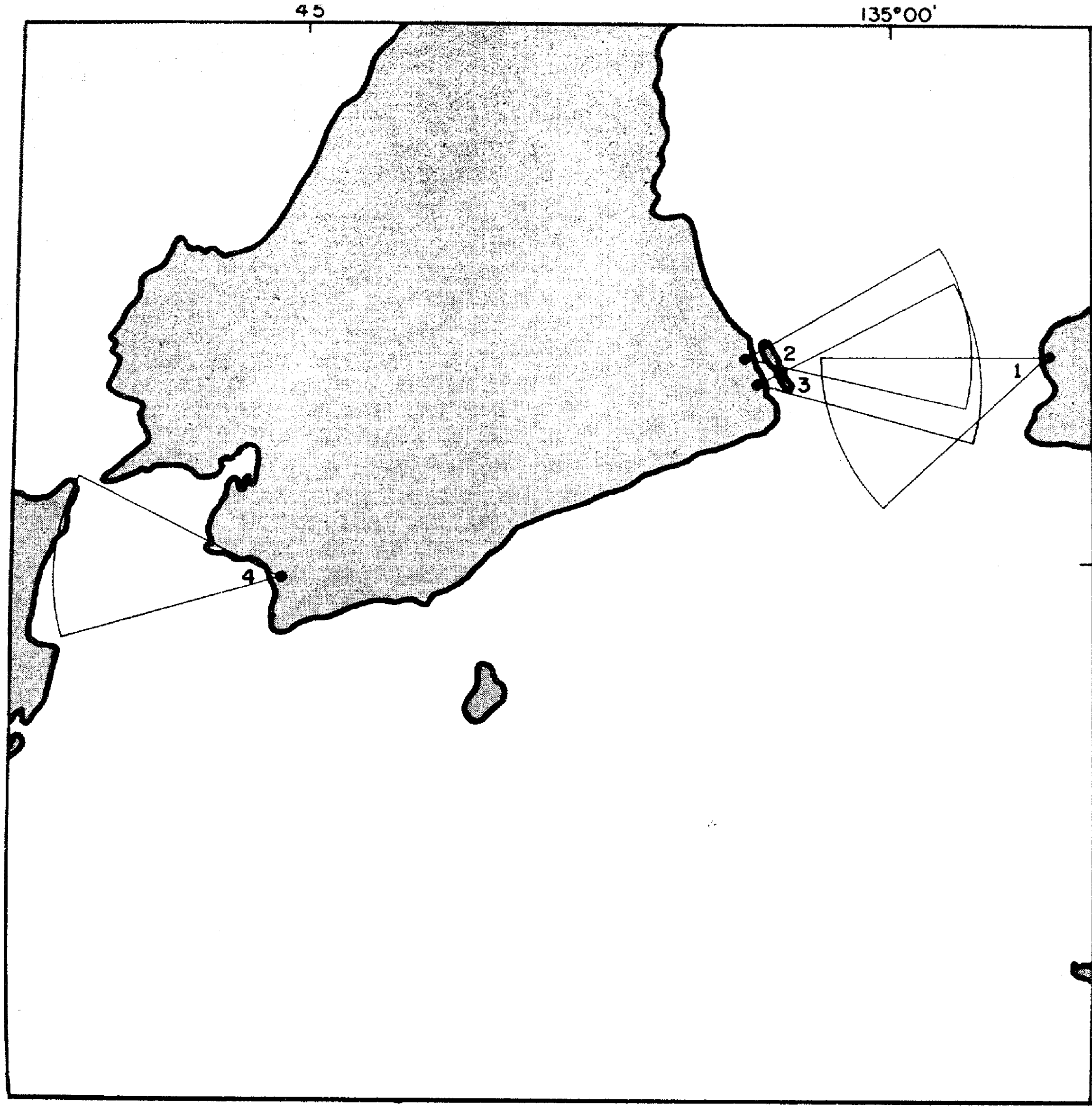

NAVAL SEACOAST BATTERIES YURA AREA

LEGEND

● = GUN BATTERY POSITION

YARDS

5000 0 5000 15000

No.	NAME OF BTRY POSITION	NUMBER AND TYPE WEAPON
1	KATAMIYAMA	2-15CM GUNS
2	AWAJI	1-14CM GUN
3	YURA	4-15CM GUNS
4	AMA	2-15CM GUNS

FIG. 18

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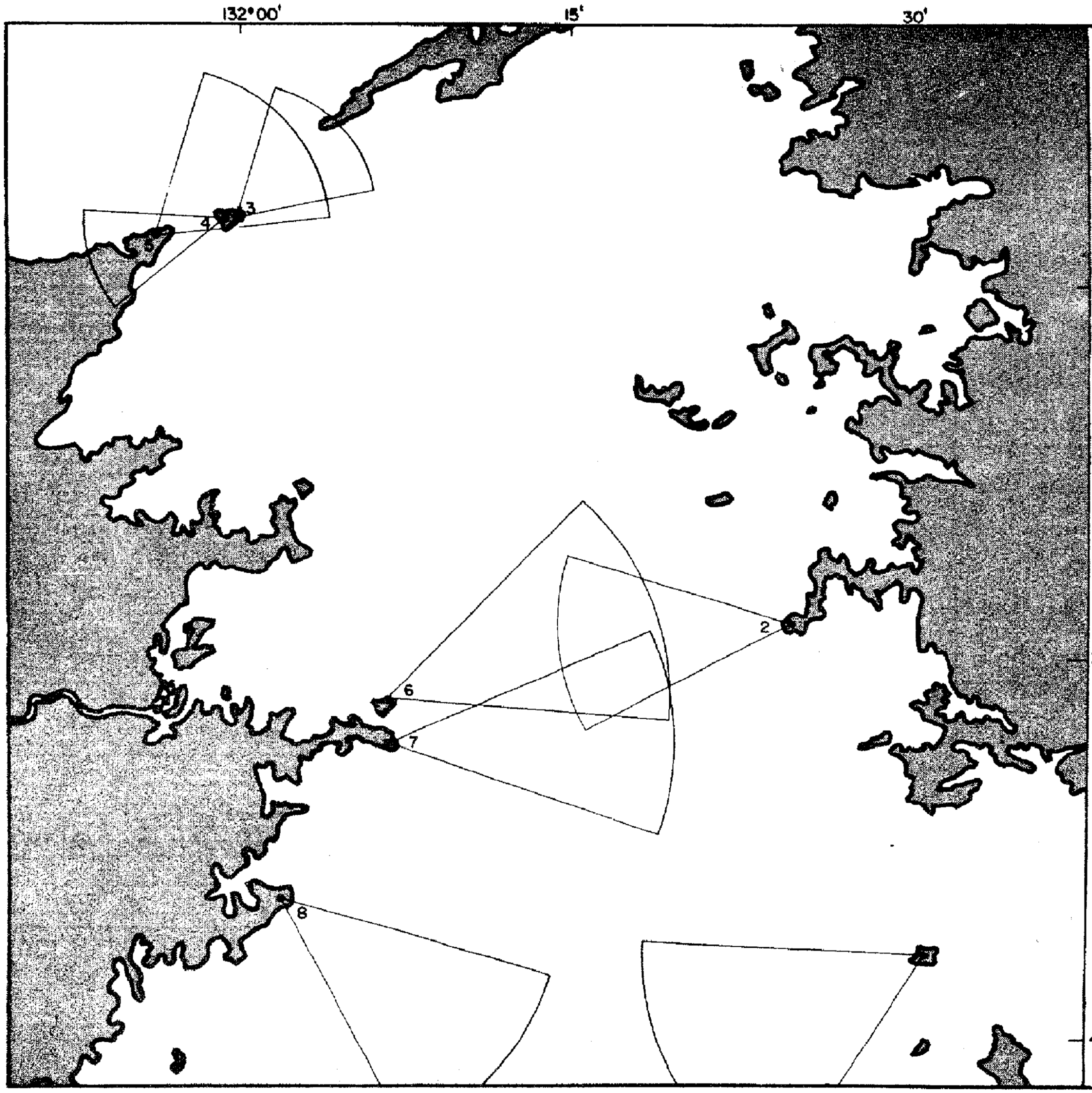


NAVAL SEACOAST BATTERIES HOYO STRAIT AREA

LEGEND

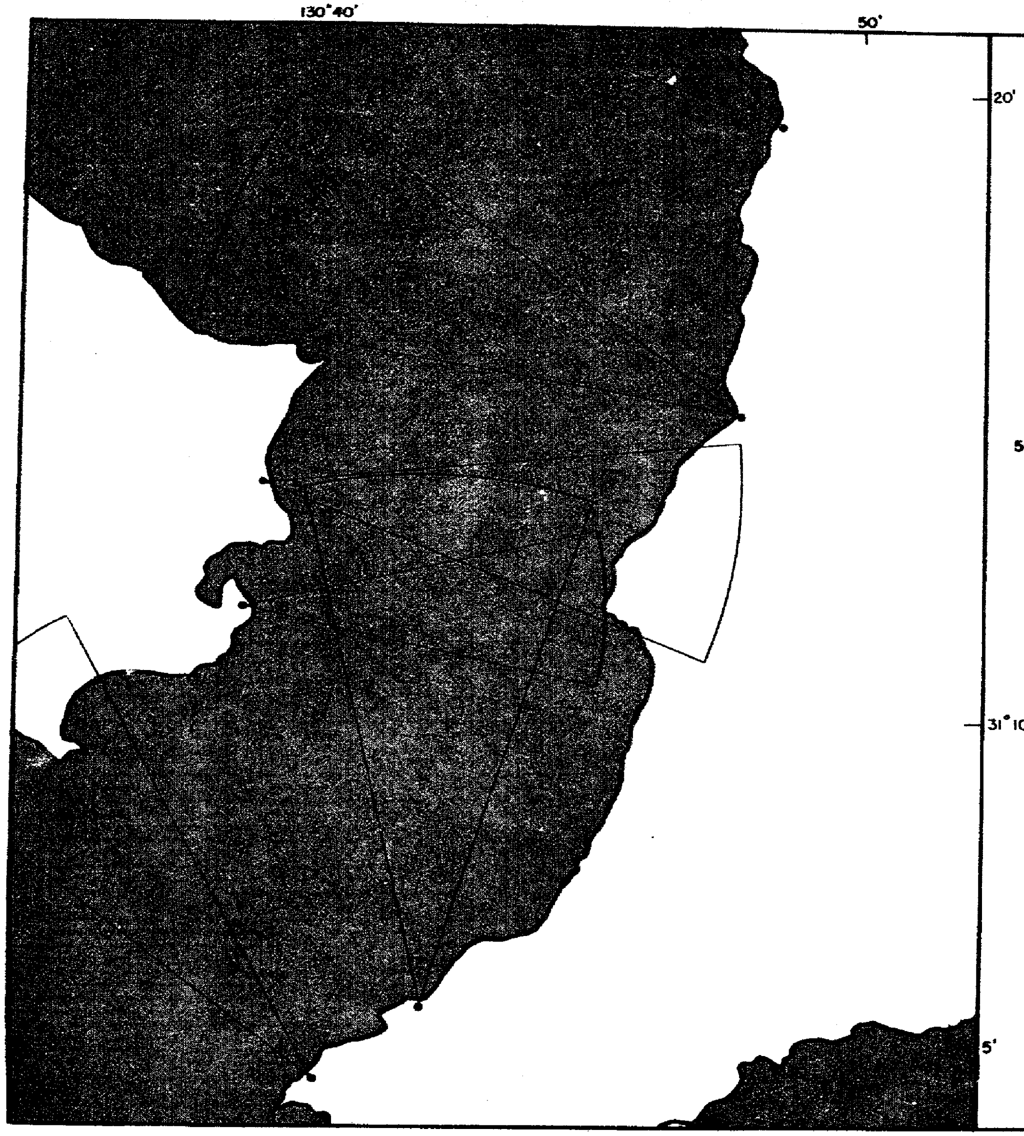
● = GUN BATTERY POSITION

YARDS
5000 0 5000 10000 15000 20000 25000

KEY TO NUMBERS

No.	NAME OF BTRY POSITION	NUMBER AND TYPE OF WEAPON
1	UKU-JIMA	3-15CM GUNS
2	YARA-HANA	4-14CM GUNS
3	TAKA-SHIMA	4-12CM GUNS
4	TAKA-SHIMA	2-12CM GUNS
5	JIZOGA-HANA	2-12CM GUNS
6	O-SHIMA	2-15CM GUNS
7	TSURUMI-ZAKI	4-15CM GUNS
8	SEN-ZAKI	3-15CM GUNS

FIG. 19



NAVAL SEACOAST BATTERIES KAGOSHIMA BAY AREA

SCALE

5000 0 5000 10000 YDS

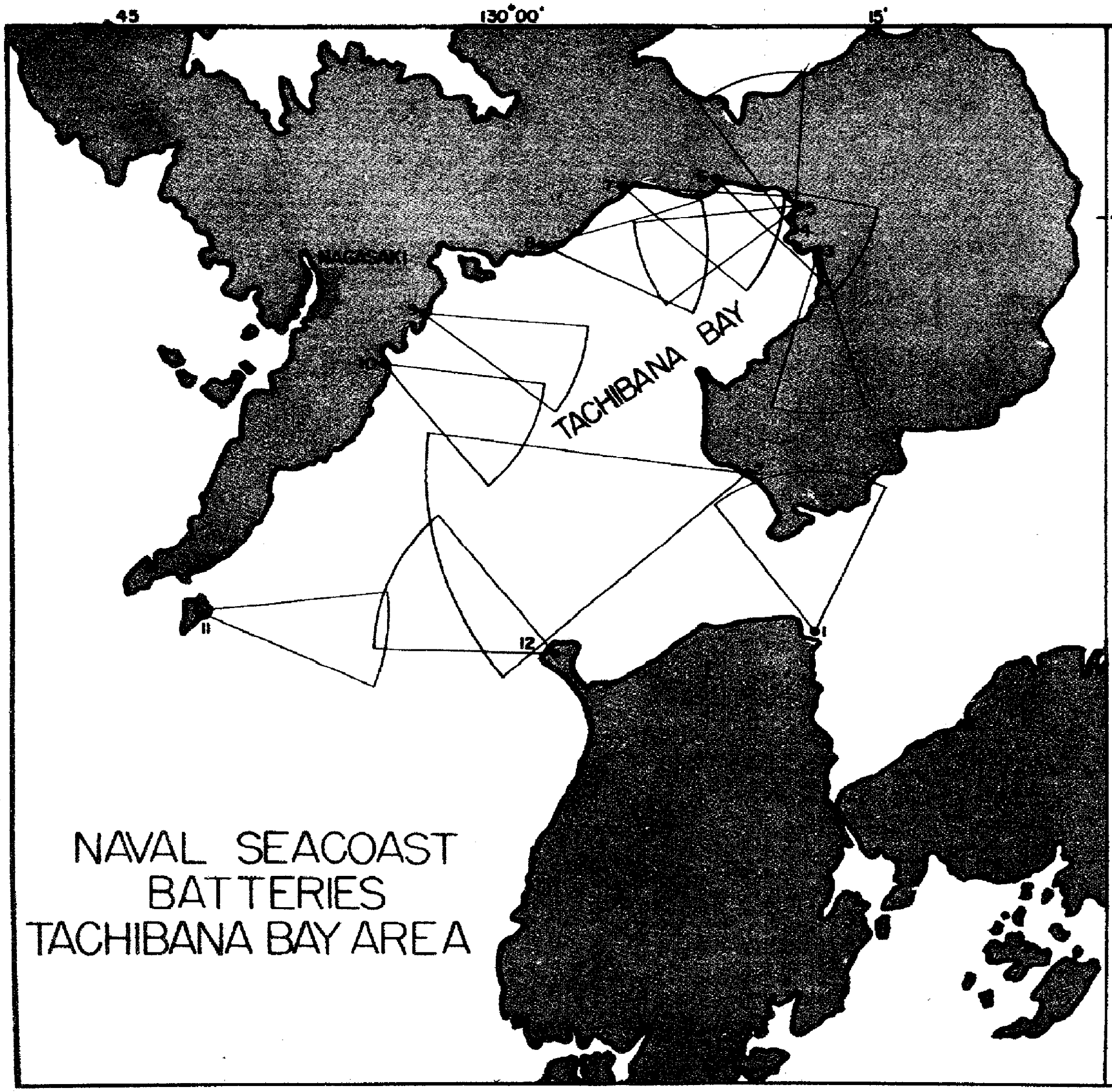
KEY TO NUMBERS

No.	NAME OF BATTERY POSITION	NUMBER AND TYPE OF WEAPONS
1	UEKI	2-15CM GUNS
2	IZASHIKI	2-14CM GUNS
3	NAGATAMI	2-14CM GUNS
4	SAKAMOTO	2-12CM GUNS
5	SURIGAHA	2-15CM GUNS
6	YAMAKAWA	2-12CM GUNS

LEGEND

● = GUN BATTERY POSITION

FIG. 20



KEY TO NUMBERS

No.	NAME OF BATTERY POSITION	NUMBER AND TYPE OF WEAPONS
1	KAMESIMA	2-12CM GUNS
2	AJATOYAMA	4-15CM GUNS
3	TOMISTU	1-12CM GUNS
4	KAMAGAMA	1-12CM GUNS
5	TOZIMA	1-12CM GUNS
6	AENO	1-12CM GUN
7	AUKI	1-12CM GUN
8	FUNATSU	1-12CM GUN
9	TUNA A	1-12CM GUN
10	MOGI	1-12CM GUN
11	KABASHIMA	2-12CM GUNS
12	TOMIOKA	2-12CM GUNS

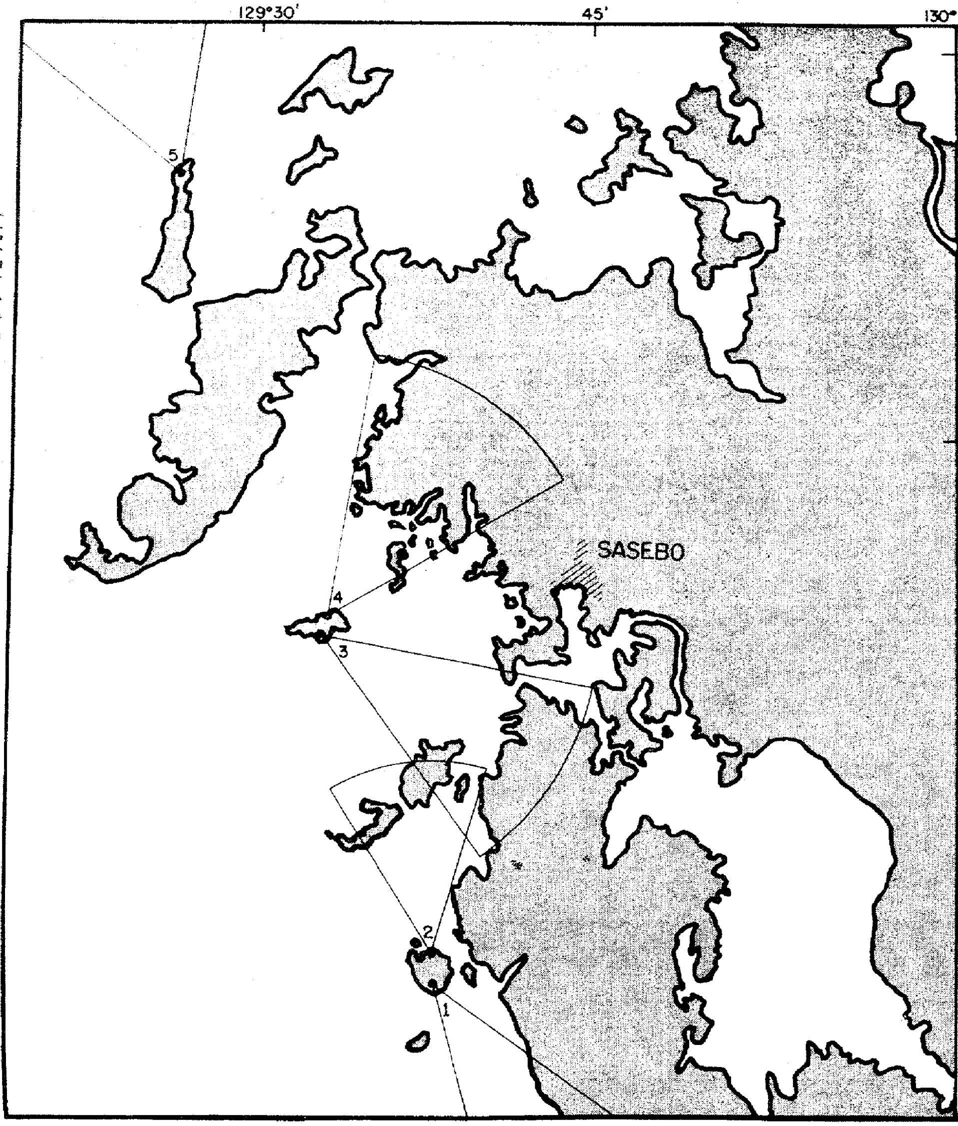
LEGEND

● = GUN BATTERY POSITION

YARDS

5000 0 5000 10000 15000

FIG.21



NAVAL SEACOAST BATTERIES SASEBO BAY AREA

LEGEND
● = GUN BATTERY POSITION

YARDS
5000 0 5000 10000 15000 20000 25000

KEY TO NUMBERS

No.	NAME OF BATTERY POSITIONS	NUMBER AND TYPE OF WEAPON
1	SETOHATA	1 - 12.7cm GUN
2	TAKESITA	1 - 12.7cm GUN
3	NAKIRI	1 - 15cm GUN
4	TASIRO	1 - 15cm GUN
5	IKEZUKI	1 - 14cm GUN

FIG.22

b. Fields of Fire. (1) Guns of 15-cm and larger caliber were emplaced so that the center of the field of fire was perpendicular to the shore-line. The usual field of fire did not exceed 60°. Smaller guns were ordinarily sited to fire approximately parallel to the shoreline with a field of fire of approximately 40°.

(2) Wherever possible, antiaircraft automatic weapons, used to provide antiaircraft protection for seacoast positions, were sited to permit ground fire on the beaches.

c. Missions of Weapons. (1) The 20-cm and 15.5-cm guns had the primary mission of engaging transports. The smaller caliber guns were to engage landing craft.

(2) Automatic weapons had the primary mission of antiaircraft defense.

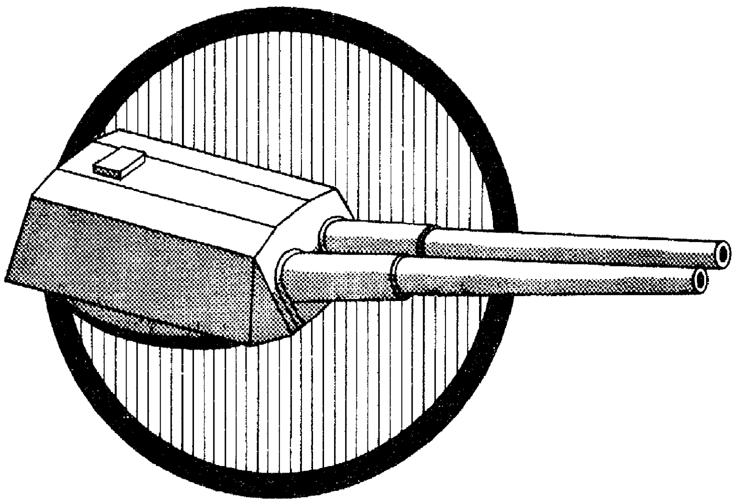
(3) Searchlights were used only for seacoast illumination.

7. Fire Direction. Fire direction was decentralized largely to battery commanders due to the fact that the fields of fire of all batteries were limited. This fire direction included the control of searchlights. In the engagement of targets, transports had first priority.

8. Intelligence. The commanders of the various naval seacoast artillery commands obtained intelligence on enemy targets from the nearest naval sector operations room, where targets, both air and water, were plotted on a large operations map. The sources of information for this operations room included Army and Navy visual OPs, radar stations, and air and water patrols. The location in polar coordinates, strength, and direction of targets were disseminated to the batteries by telephone.

PART THREE

CONTROLLED SUBMARINE MINES



Part Three - Controlled Submarine Mines

CHAPTER 1

GENERAL

1. General. a. The Japanese felt that the best method of furnishing a defense for the homeland was to conduct strong offensive operations. As a result, research, development and use of defensive weapons such as submarine mines was limited.

b. Such research as was done showed little originality, and when a new piece of mine materiel was produced it was usually traceable to a foreign-made original. Some equipment was copied with only insignificant changes.

2. History of Development of Contact Mines. a. The first recorded use of mines by the Japanese was in 1902, at Port Arthur, during the Russo-Japanese War. Even though the methods were crude and only a small number of mines were used, the Japanese claimed that a Russian battleship and some minor warships were sunk and others damaged by mines. In World War I the Japanese had no occasion to use mines either offensively or defensively.

b. The only mines used or developed up until 1928 were inertia-controlled, electric-firing contact mines. During the naval maneuvers in 1928, the warship Tokwia was sunk while laying a contact mine field. In this mishap, the casualties were heavy and it was decided that a safer means should be developed to arm and fire the contact mines. After five years of research and development a horned type of mine was produced. This mine was not considered satisfactory and development was discontinued. Having failed to develop their own contact mine, the Japanese imported the British "H" mine. A few minor changes were made, and in 1933, it was adopted as their Type 93 mine. This was the standard Japanese contact mine until the end of World War II.

c. In 1939 the Japanese started research and development of a contact mine that could be dropped from airplanes. In the development of this mine, they received some aid from the Germans. This was the only incident that came to the attention of the Board wherein Germany had furnished any assistance in the development of mine materiel. The mine was developed in 1944 and, according to witnesses, it was used off the shores of Leyte and Okinawa.

3. Development of Controlled Mines. a. In 1932, the Japanese became interested in controlled mines, primarily for use against submarines. After a year of research and development the Type 92 controlled mine was adopted as standard. This mine, in itself, was considered satisfactory. However, the accuracy of location of underwater targets was not satisfactory, and attempts at improvement continued until the end of the war.

b. In 1937 the Japanese adopted the Type 94 controlled mine, which was a copy of a mine used by the Chinese on the bed of the Yangtze River. In their mining operations it was intended that this mine be employed primarily on the beds of navigable rivers. In their use here, as well as in their use on beaches, these mines proved ineffective under actual combat conditions, and the Japanese abandoned them in the latter part of 1943.

4. Development of Detectors. a. In attempting to solve the problem of locating submerged submarines, the Japanese developed and used three different types of underwater detection equipment. The first type was an integral part of the Type 92 controlled mine, and relied for detection upon the sound emitted by the target. A microphone was placed in each mine and the target was located with respect to the mines. The second, called the Type 97 Detector, was developed in 1937 and also depended upon the sound emitted by the target for detection. The third type, designated the Type 2 Magnetic Detector, was copied from the British "Guard Loop" system in 1942. This detector depended upon the target's magnetism for detection. Both the Type 97 and the Type 2 detectors were used to warn the operators of the Type 92 controlled mine system on the approach of a target and also to give surface craft the general location of the target so that they could attack with depth charges. The operation of the detectors was the primary function of the Mine Command, whose activities were largely concentrated upon the development of detectors and the conduct of training in their operation. The underwater detectors were always maintained in their tactical positions and all of the important waterways in Japan were protected by detectors even though the defense plans did not include controlled mines.

b. Witnesses stated that the primary fault with their detection equipment was that it did not permit accurate location and tracking of under-water targets.

(1) The acoustic detector was subject to sound interference from aquatic animals. In the area around Kyushu, this interference was so serious as to make the equipment useless at times.

(2) The magnetic detector, due to the principles upon which it operated, could not pin-point the location of a target nor track it in motion. In addition, the detector was subject to interference from outside power sources, such as nearby power lines.

5. Suicide Mines. During the latter stages of the war, when the homeland was being threatened, the Japanese, in desperation, undertook the research and development of suicide mines as a means of stemming our progress. Although two types of suicide mines were developed, and a few mines produced, the war ended before these could be tested in combat.

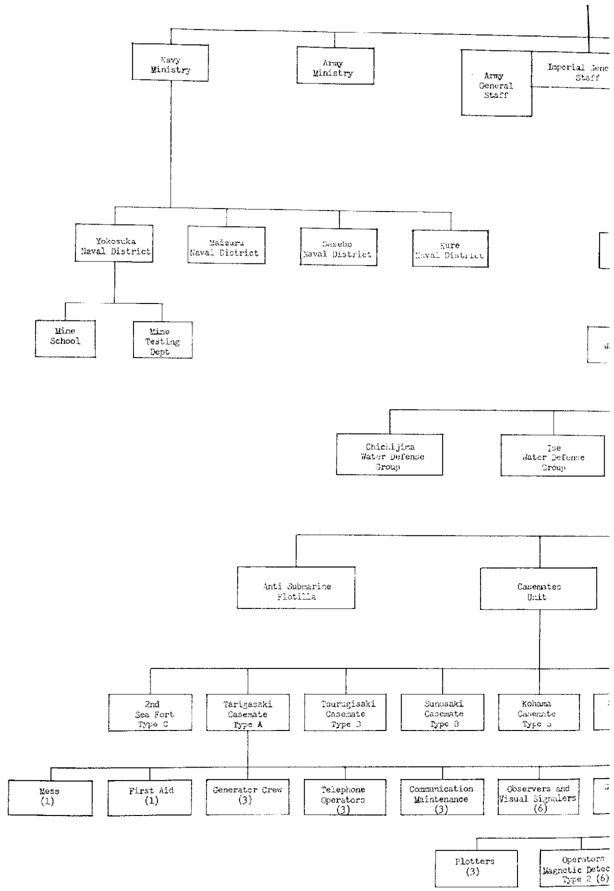


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FIG. I

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ORGANIZATION

JAPANESE MINE COMMAND

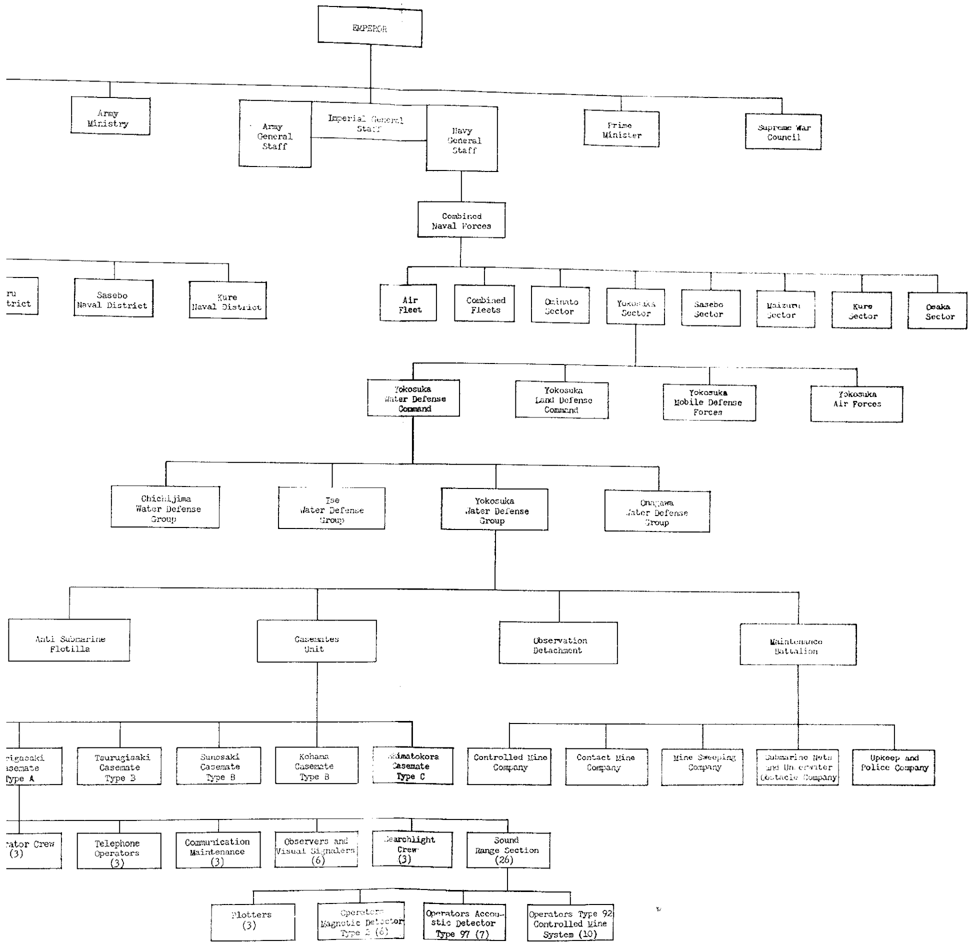

FIG. I

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CHAPTER 2

ORGANIZATION

6. General. All activities that pertained to underwater defense, including contact and controlled mines, submarine nets and underwater detection devices, were the responsibility of the Navy.

7. Naval Organization on the Higher Levels. Within the naval organization responsibility was divided between two top-level agencies.(See Fig. 1

a. Navy Ministry. This agency controlled all matters pertaining to administration, construction, hospitalization, intelligence, research, development, supply and training. The Navy Minister was always a senior naval officer and all of his key staff members were naval officers.

b. Navy General Staff. The Navy General Staff planned all long range projects, to include operations. Directly responsible to the Navy General Staff was the Commander-in-Chief of the Combined Naval Forces, who executed the operational plans.

8. Naval Districts. Japan proper was divided into four naval districts (Yokosuka, Kure, Maizuru, and Sasebo), whose functions were administrative and hence directly under the Navy Ministry. Since both the mine school and the mine-testing department were located within the Yokosuka District, the commanding officer of the district was responsible for their operation.

a. The mine school taught all subjects pertaining to mine warfare and underwater defense, including detectors, nets, and obstacles. Although the district commander was responsible for the operation of the school, the Navy Ministry appointed the faculty and assigned the students.

b. The mine-testing department was located originally at Nagaura Harbor, but was destroyed in 1944 by our bombers. New construction was started immediately at Kurihama and was almost completed when the war ended. The mine-testing department carried out work in research, experimental manufacture and testing of all mines, depth charges, obstacles, sweeps and related equipment.

9. Naval Sectors. Japan was divided into six naval sectors (Yokosuka, Kure, Maizuru, Sasebo, Osaka and Ominato). The sector was an operational command, the commander being charged with the responsibility for the defense of his sector. In the case of two of the sectors (Maizuru and Sasebo) the boundaries coincided with those of the districts having the same name. The areas that comprised the Yokosuka and the Kure districts were each divided into two separate and independent sectors. The area of the Yokosuka district included the areas of the Yokosuka and

Ominato sectors and the area of the Kure district included the Kure and Osaka sectors. The sector was not a subordinate command of the district; however, the commanders of the Maizuru, Sasebo, Yokosuka and Kure sectors also commanded the districts of the same name. These commanders occupied two offices and functioned in dual command capacities. They maintained two separate staffs, one tactical (sector) and the other administrative (district). The Ominato and Osaka sectors each had an independent commander. Each sector was divided tactically into a Water Defense Command, a Land Defense Command, a Mobile Defense Force and an Air Force.

10. Water Defense Group. a. A water defense command was divided into water defense groups. For example, the Yokosuka Water Defense Command was divided into the Chichijima, Ise, Yokosuka and Onajawa Water Defense Groups. The water defense group was the smallest independent command which could operate both tactically and administratively. The staff of the water defense group commander included the following sections:

Observation	Communication
Defense upkeep	Mine sweeping
Underwater detector	Gunnery
Anti-submarine net	Engineering
Mines, both contact and controlled	Medical
	Finance
Navigation	Supply

b. The water defense group contained four main units: Anti-submarine Flotilla, Casemate Unit, Observation Detachment, and Maintenance Battalion.

(1) Anti-Submarine Flotilla. The anti-submarine flotilla maintained and operated all of the patrol vessels, submarine chasers, mine layers and sweepers, and other small water craft. The flotilla commander was charged with the following responsibilities, within his group:

(a) Planting both controlled and contact mines,

(b) Laying underwater detectors,

(c) Installing and operating anti-submarine and anti-torpedo nets,

(d) Providing water transportation within the defense group,

(e) Mine sweeping,

(f) Attacking enemy submarines with depth charges,

(g) Attacking enemy landing craft,

(h) Furnishing harbor pilots,

(i) Providing convoy protection within his area.

(2) Casemate Unit. The casemate unit was charged with the operation of the controlled mine fields and the underwater detectors. It supervised the planting of controlled mines, installation of detector equipment and maintenance of equipment. The casemate units under the Yokosuka Water Defense Group operated the mine casemates at Tarigasaki, Tsurugisaki, Sumosaki, Kohama, Shimatokora, and 2nd Sea Fort. A casemate was classified as either Type "A", "B", or "C", depending upon the equipment used. The Type "A" casemate unit operated controlled mines, magnetic detectors (Type 2) and the acoustic detector (Type 97); the Type "B" unit operated only the acoustic detectors (Type 97); and the Type "C" unit operated only the magnetic detector (Type 2). The number of personnel assigned to any casemate depended upon the amount of equipment they were required to operate. For example, the casemate at Tarigasaki, a Type "A" unit, had 2 officers and 46 enlisted men to operate one Type 2 and two Type 97 detectors and 19 groups of controlled mines.

(3) Observation Detachment. The observation detachment manned the look-out posts which were located to provide warning to the water defense command of the approach of hostile aircraft or surface craft, and to report the location of mines dropped by aircraft. Each look-out post was equipped with observation, communication and housekeeping equipment to permit it to be self-sustaining. It had been planned to equip these units with radar detectors when they became available.

(4) Maintenance Battalion. The maintenance battalion consisted of five companies, each with 200 officers and enlisted men. The companies were classified as controlled-mine, contact-mine, mine-sweeping, submarine-net, and police and upkeep companies. As their names implied, they provided the necessary labor personnel to assist the flotilla and casemate units in establishing and maintaining the underwater defenses.

CHAPTER 3

TRAINING

11. General. a. The principal weakness in the system of training mine personnel was in the lack of centralized supervision. Although the overall training responsibility was a function of the Navy Ministry, this responsibility was decentralized to the naval district commanders. Insofar as the training of mine personnel was concerned, this was, in fact, left to the casemate commanders.

b. Higher headquarters did not attempt to set up clear-cut training schedules and standards nor did they conduct systematic training inspections and tests. Their primary concern was to furnish the casemate commander with individuals trained at the mine school. The responsibility of training the unit was left to the casemate commander.

12. Mine School. a. A separate mine school was established at Kurihama in April, 1941. Prior to that time the mine school was a part of the Navy Torpedo School at Taura. Since Kurihama was under the Yokosuka Naval District the commanding officer of the district was responsible to the Navy Ministry for the functioning of the school. The school conducted courses in controlled mines, including under-water detection, for officers and warrant officers, and for enlisted men. In addition, courses were conducted in contact mines, operation of small boats, mine sweeping and submarine nets. The school was well located and had facilities for accomodating 1,000 officers and 8,000 enlisted men. When our bombings began in force, a number of the buildings were dismantled and the housing facilities were moved into under-ground shelters dug back into the mountains.

b. The school conducted six courses on controlled mines, two for enlisted men and four for officers. All courses included the general subjects of controlled and contact mines, under-water detection, depth charges, mine sweeping and anti-submarine nets. The only difference in courses was in the amount of detail covered and the time allotted to practical work in comparison with theory. In addition, the officers' courses included tactics, command, national history, spiritual training and the Imperial mandate.

c. Courses for Enlisted Men. The two courses for enlisted men were a basic and an advanced course. An attempt was made to have all enlisted men attend the basic course immediately upon completion of their basic training. However, only selected individuals attended the advanced course, and these became noncommissioned officers upon graduation.

d. Courses for Officers. Information on officers courses follows.

(1) An officers' basic course was conducted for recent graduates of the Naval Academy to familiarize them with mine warfare. Originally, the course was of one year duration but after the war started it was reduced to six months.

(2) A shortened course of four months was conducted for officers and warrant officers who were newly commissioned from the ranks or who had transferred from other branches. The purpose of this course was to give the student a working knowledge of mine warfare.

(3) An advanced course of one year was conducted for both officers and warrant officers who had had at least one year of mine duty after completing either the basic or the shortened course.

(4) Specialized courses of six months duration, one in mines and the other in detectors, were conducted for officers and warrant officers. Selection of students was based upon demonstrated aptitude for the subject either during prior schooling or while performing regular duties in a mine unit. Graduates of these courses usually were assigned as instructors at the school or were given positions involving research and test of mine materiel.

e. The instruction equipment at the school was of high quality and training aids were used extensively. Concrete mock-ups of ships decks were constructed on the school ground for the purpose of training in loading of equipment, planting procedure and handling of ship s gear Wooden working models were used to show the operation of component parts of a piece of equipment. Charts, display boards and sectionalized equipment were used in instruction on nomenclature. Students were taken on tours to nearby mine installations and to local arsenals and manufacturing establishments to acquaint them with mine materiel. The school film library consisted of five training films which dealt only with depth charges and contact mines. This was the only place where training films were used within the mine command.

13. __Classification and Assignment__. a. Immediately upon entering the Navy the individual was sent to a "boo.t" camp for basic training. Initially, this was an eight month's course but was subsequently reduced to two months. Within three days the enlisted man was given a mental and a hearing test. The primary purpose of the hearing test was to select personnel to operate under-water sound-detection equipment. Prior to the outbreak of the war the passing mark for the mental examination was 60% but by the end of the war the grading had relaxed and a mark of 20% was considered passing. Those individuals who successfully passed the mental

and hearing tests were given 40 hours of musical training at the camp to improve the acuteness of their hearing and upon completion of their basic training were enrolled in the basic course at the mine school.

b. Graduates of the basic course who had attained the highest marks were assigned to the Fleet to operate the sonic detection equipment aboard ships. All other graduates were assigned to the mine command where they were placed on duty with mine vessels, submarine chasers, maintenance battalions and casemates.

c. Those individuals who were assigned to the casemates were given three months of training on the equipment in the casemate. This training was closely supervised by the members of the casemate crew who were considered experts. After a year's duty in a casemate individuals who showed promise of being noncommissioned officer material were sent to the mine school to pursue the advanced course. Graduates of the advanced course were considered specialists and were assigned either as instructors at the school or given responsible jobs in the mine command.

d. The personnel of the maintenance battalion consisted of the graduates of the basic course who had made the lowest grades in the school, students who had failed, and replacements received direct from the "boot" camp.

14. Basic, Unit and Combined Training. a. All training centered around the individual, who was considered a specialist in the casemate crew. The Japanese did not consider that the tactics of controlled mines warranted elaborate basic, unit and combined training, and consequently, their training doctrine stressed the specialized training of the individual.

b. Basic training which the individual received while attending grammar and middle schools and "boot" camp was considered sufficient for anyone entering the service of controlled mines. A review of basic subjects, and instruction in new developments which could be considered basic, was conducted in the units as the need arose.

c. Unit training was left to the casemate commander. Detection practices were held whenever a submarine was available, which was seldom, and mine planting practices were held once or twice a year. Other than this, most of the time was used in maintaining the under-water detectors in their tactical positions and supervising the care and preservation of materiel. In order to relieve monotony at the casemates the men were required to maintain vegetable gardens and to participate in athletics. Occasionally, the officers conducted local schools in mathematics, Japanese history, spiritual training and the Imperial mandate.

d. Combined training was conducted once a year. Every effort was made to make the problems realistic and all mine units in the sector participated.

15. Training Literature. The Navy Ministry was responsible for the publication and distribution of training literature. However, throughout the entire mine command there was a decided lack of training literature. According to witnesses, such literature as was published was not in sufficient detail to give the reader a complete understanding of the subject. These conditions were ascribed to two main reasons: first, practically all mine equipment was classified as secret and, secondly, there was a decided paper shortage during the war. All pamphlets pertaining to detectors, controllers and controlled mines were classified as secret and distribution did not include any units below sector and district headquarters. The only time the operating personnel had an opportunity to study these secret documents was at the mine school. The mine group headquarters maintained a library of unclassified publications for use primarily by the headquarters personnel.

CHAPTER 4

MATERIEL

16. General. a. In general, all of the Japanese mine equipment was made of the best materiel available and showed careful workmanship. Some of the equipment might even be considered as extravagant. There was a tendency to design equipment which would perform a single operation, with no consideration being given to other usages for which it might have been suitable. This was particularly noticeable in the case of small items, such as tools, and some of the larger components of the mine system, such as cables.

b. When new mine equipment was developed the Navy Technical Department, which acted in an advisory capacity, made recommendations on its acceptance to the Navy Ministry. When the Navy Ministry approved the equipment, it directed the naval Ordnance Department to have it produced and supplied to the Navy Supply Depots, from whence it was drawn by the mine casemate units.

c. In order to preserve secrecy in the development and production of new equipment, the component parts were made to specifications by different manufacturers. These parts were then shipped to a central supply point and assembled. This system was wasteful of time and effort and had a seriously retarding effect upon production rates.

d. A general description of the more important mine materiel is given in the paragraphs that follow.

17. Controlled Mines. Two types of controlled mines, Type 92, a buoyant mine (Figs 2-5), and Type 94, a mine which rested on the bottom (Fig. 6), were used by the Japanese. Both of these mines were produced (assembled) at the Mine Labratory at Yokosuka Navy Yard. Characteristics of these mines are given below.

	Type 92	Type 94
Trial production tests	July 1932	July 1934
Date of standardization	Sept 1933	July 1937
Maximum planting depth of water	400 ft	65 ft
Maximum submergence	200 ft	
Shape	Cylinder with spherical ends	Semiglobular
Diameter	3.5 ft	28 in
Length	4.8 ft	
Thickness of case	1/4 in	3/32 in
Volume of bursting charge	21 cu ft	3.3 cu ft
Maximum exterior pressure	200 lbs/sq in	175 lbs/sq in
Displacement	33 cu ft	4 cu ft
Gross weight	1700 lbs	520 lbs
Weight of explosive charge	1100 lbs	175 lbs
Type of explosive	Type 88	Type 88
Igniter	5 lbs (Shimose Powder)	.65 lbs (Shimose Powder)
Fuze	Electric	Electric

UNCLASSIFIED

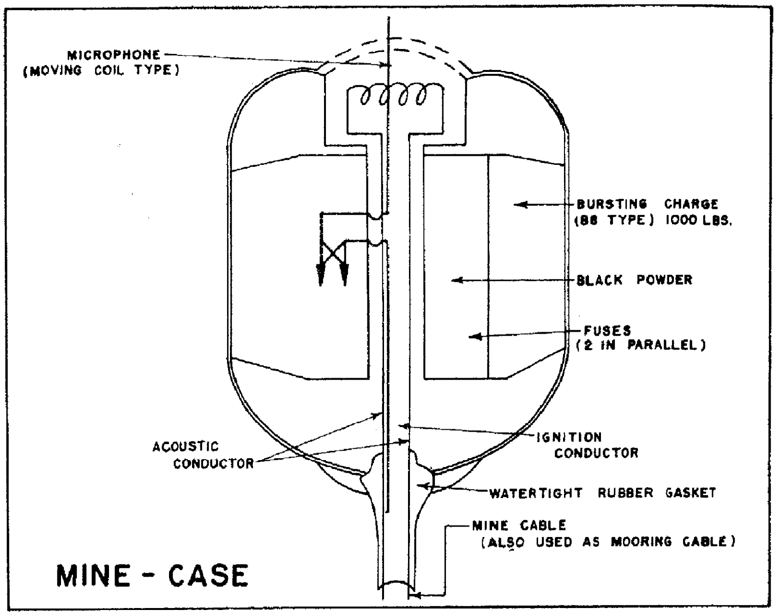

Fig. 2.
Schematic Sketch of Type 92 Controlled Mine

Fig. 3.
Sectionalized View
of Type 92 Mine Case

Fig. 4.
Fuze Can
for Type 92
Mine

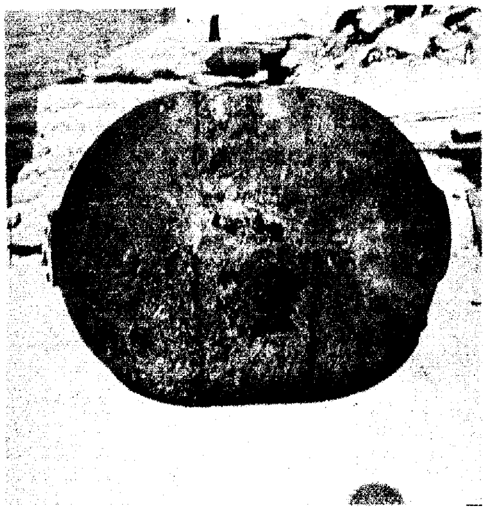

Fig. 5.
Type 92 Mine

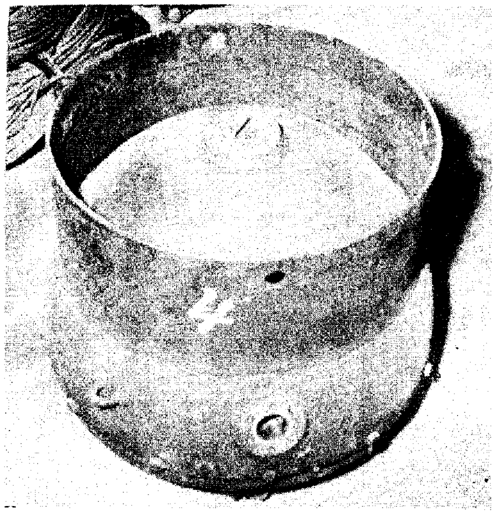

Fig. 6.
Type 94
Controlled Mine

18. Suicide Mines. a. The Japanese had two types of suicide mines (Type "A" and the Type 5) in production when the war ended. These mines were given high priority in development and production but were never used in combat.

b. Type "A" Mine. The Type "A" mine (Fig. 7) was to be used against anchored vessels. The mine was cylindrical in shape and contained about 100 pounds of explosive. It was equipped with two valves to permit sea water to enter a water-tight compartment in order to sink the mine. There was also a cap which was unscrewed to allow sea water to dissolve a soluble plug and then enter a battery to act as an electrolite. This battery furnished the current to fire the primers.

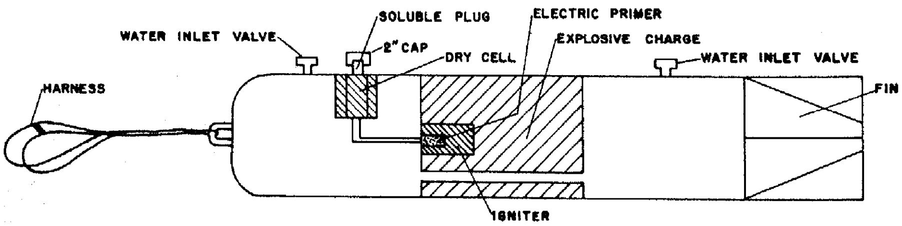

Fig. 7.
Type "A" Mine

c. Type 5 Mine. The Type 5 mine (Fig. 8) carried approximately 30 pounds of explosive and was to be used against landing craft. It was equipped with a horn type detonater similar to those used on contact mines. The parts for 10,000 of these mines had been manufactured but few of the mines had been assembled, and these only for test.

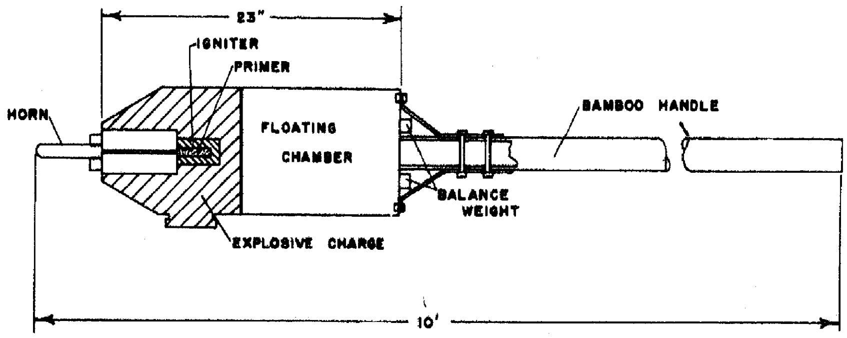

Fig. 8.
Suicide Attack Mine Type 5

19. Fire-Control Equipment. a. The fire-control equipment for the two types of controlled mines varied between wide extremes, the equipment for the Type 92 being extremely complicated and that for the Type 94 relatively simple.

b. Type 92 Fire-Control System. This system was composed of the following principal elements: acoustic controller, firing controller, terminal box and mine microphones. These elements are described and their functions outlined in the following subparagraphs.

(1) Acoustic Controller. The acoustic controller (Fig. 9) relied upon the mine microphones to pick up the sound emitted by the target and thus locate the target with respect to the mines. It could accomodate up to four groups of mines and by rotating the mechanical selector any three adjacent sets (6 mines) could be chosen to track the target. A group of six ammeters, called the "Approach Detector", was mounted on the panel of the controller. The variations in the volume of the sound emanating from each microphone that was being used to track the target was registered on one of these ammeters. In addition, the controller was equipped with two toggle switches, each with three positions, which corresponded to the microphones that were being used for detection. The toggle switch on the right was used for the front row of mines and was connected to the right earphone of

the operator's headset, and the one on the left was used for the rear row of mines and was connected to the left earphone. By operating the switches the operator could listen with any combination of two microphones, one in the front row of mines and one in the rear row. The operator could thus track the target visually by observing the approach detector, and aurally, by listening over the headset, or could use a combination of both. The panel also contained switches, warning lights meters and variable resistance controls for checking and adjusting the functioning of the controller and the operating condition of the equipment.

Fig. 9.
Acoustic Controller, Type 92 Mine System
(The following elements are shown by corresponding numerals on the photograph (1) Input selector indicating lights; (2) Ammeter approach detectors; (3) Sound receiving indicating light; (4) Testing switch; (5) Variable resistance control for zeroing ammeters; (6) #1 circuit indicating light; (7) Volume control; (8) #2 circuit indicating light; (9) #2 circuit power switch; (10) Adjusting tuner; (11) Voltmeter switch; (12) Firing signal light; (13) Headset selector switch for front line of microphones; (14) Headset selector switch for rear line of microphones; (15) Firing signal switch.)

(2) __Firing Controller__. The firing controller (Fig. 10) was used to fire the mines. It was built in three sections, each of which could accomodate up to four

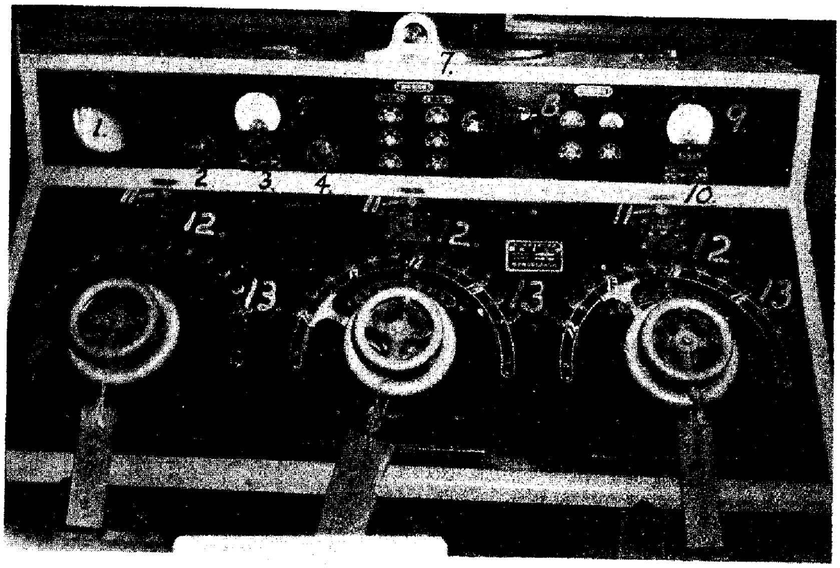

Fig. 10.
Firing Controller, Type 92 Mine System
(The following elements are shown by corresponding numerals on the photograph: (1) Warning buzzer receiver; (2) Low range variable resistance; (3) Range switch; (4) High range variable resistance; (5) Milli-ammeter to check firing circuit; (6) Lights to indicate which mines are being used for aural tracking; (7) Light to indicate that firing switch is closed; (3) Pilot lights that indicate that power circuits are either closed or open; (9) Power supply voltmeter; (10) Voltmeter range switch 6,100 and 500V; (11) Lights to indicate that acoustic controller switch is closed; (12) Acoustic controller switch; (13) Lights to indicate which phones are being used to track targets and also the mines to be fired.)

groups of mines. An acoustic controller was connected to each section, and the combination provided the means for tracking the target and firing the mines. A mechanical selector was mounted on the panel of the firing controller. Directly under the selector was a numbered dial, the numbers on which corresponded to the numbers of the mines in the field. Each number had a warning light mounted near it, which indicated the microphones that were being used by the acoustic controller in tracking the target and thus indicated the mines to be fired. For example, if the acoustic controller was in contact with mines 3, 4, and 5 the lights indicating 3, 4, and 5 would automatically light up on the firing controller. A wheel mounted on top of the selector was used to close the firing switch. A push-button switch mounted in the center of the firing wheel short circuited the acoustic controller and released the firing wheel so that it could be rotated to fire the mines. The firing controller was also equipped with warning lights, switches, variable resistance controls, meters and an audible warning receiver to assist the operator in adjusting, checking and using the controller.

(3) <u>Terminal Box</u>. The terminal box (Fig. 11) was enclosed in a metal container. It was equipped with terminal strips and individual switches for the acoustic circuit to each mine and a switch for the firing circuit to each set of mines.

(4) <u>Mine Microphone</u>. The mine microphones (Fig. 12) were of the moving-coil type and were housed in metal cylinders which were placed in the top of each mine. Sponge rubber was used between the microphone proper and the metal housing to act as a cushion. The range of the microphone was considered as 200 yards against submarines attempting to enter the mine field. However, during certain periods they were useless due principally to the noises made by aquatic animals.

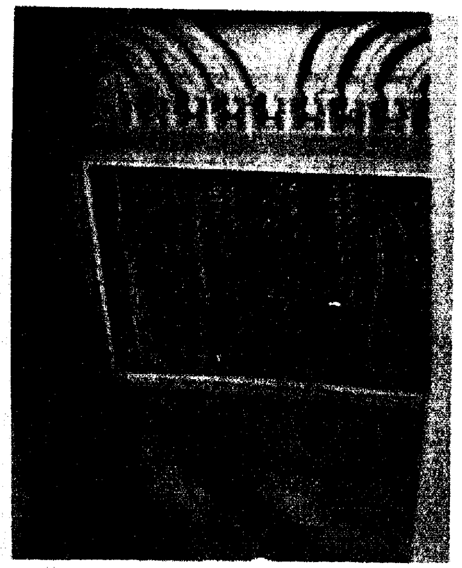

Fig. 11.
Terminal Box

Fig. 12.
Sectionalized View
of Microphone,
Type 92 Mine

c. Type 94 Fire-Control System. The only control equipment used in conjunction with the Type 94 controlled mines consisted of telephones, an observing instrument and a blasting magneto. The telephones were of the ordinary field type, using a local battery. The observing instrument had a movable open sight (See Fig. 39, page 147) mounted on a graduated base that was fixed to a tripod. The mechanism for firing the mines was a common commercial blasting magneto.

20. Underwater Detectors. a. The Type 97 acoustic detector and the Type 2 magnetic detector were the two standard underwater detectors used by the Japanese.

b. Type 97 Acoustic Detector. The Type 97 detector relied for detection upon the sound emitted by the target. It was composed of the following principal components: hydrophones, a hydrophone rack and a compensator.

(1) Hydrophone. The hydrophone had a telephone transmitter-button housed in a hollow, soft-rubber cylinder two inches in diameter and three inches long. The button contained granules of black crystals and operated on the same principle as a telephone transmitter.

(2) Hydrophone Rack. The hydrophone rack (Fig. 13) resembled a large bird cage, was three meters high and weighed three tons. The rack carried 13 hydrophones arranged on the circumference of a circle three yards in diameter.

Fig. 13.
Hydrophone Rack,
Type 97 Detector

(3) Compensator. The compensator unit (Figs. 14 and 15) consisted of the compensator itself, which adjusted the phase of electric current from the hydrophones, a filter and an amplifier.

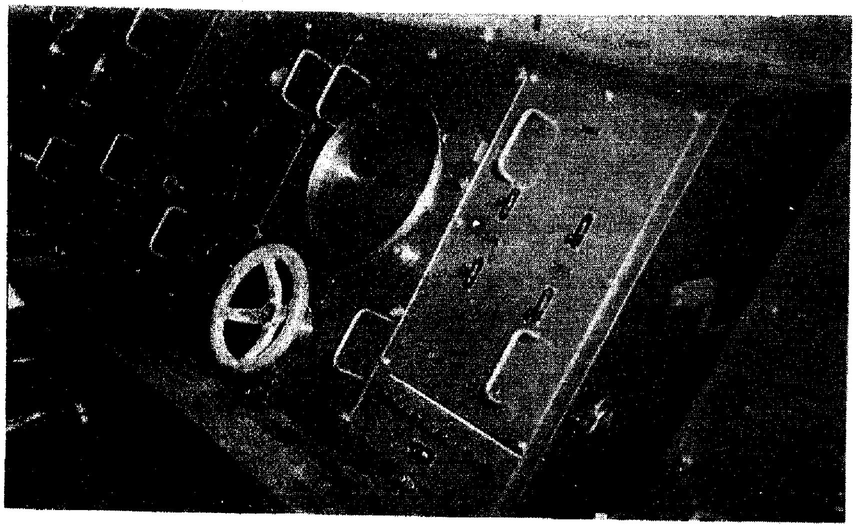

Fig. 14.
Compensator, Type 97 Detector

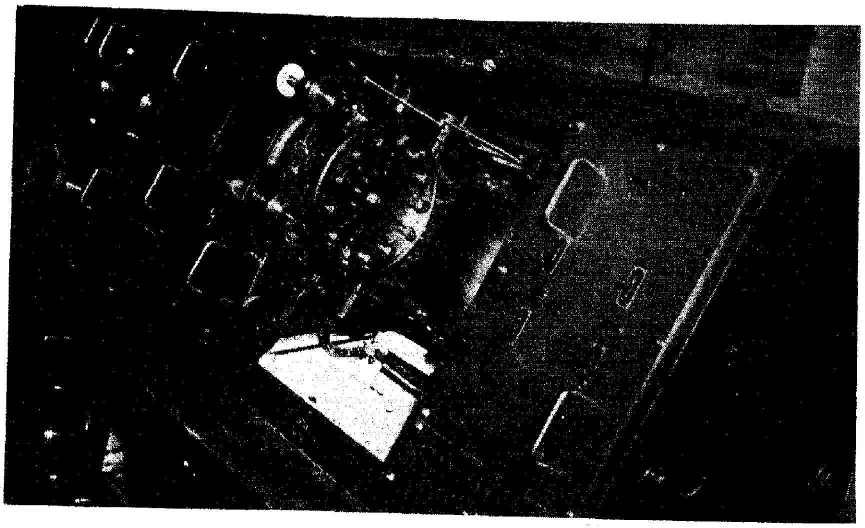

Fig. 15.
Compensator, Type 97 Detector
Showing Brush Board

c. Type 2 Magnetic Detector. The Type 2 magnetic detector (Fig. 16) was composed of a compensating resistance box, two sensitive galvanometers, a photo-cell amplifier, an automatic recorder and an alarm system. The various components of this equipment appeared to have been designed originally for commercial purposes and later modified to meet the military needs.

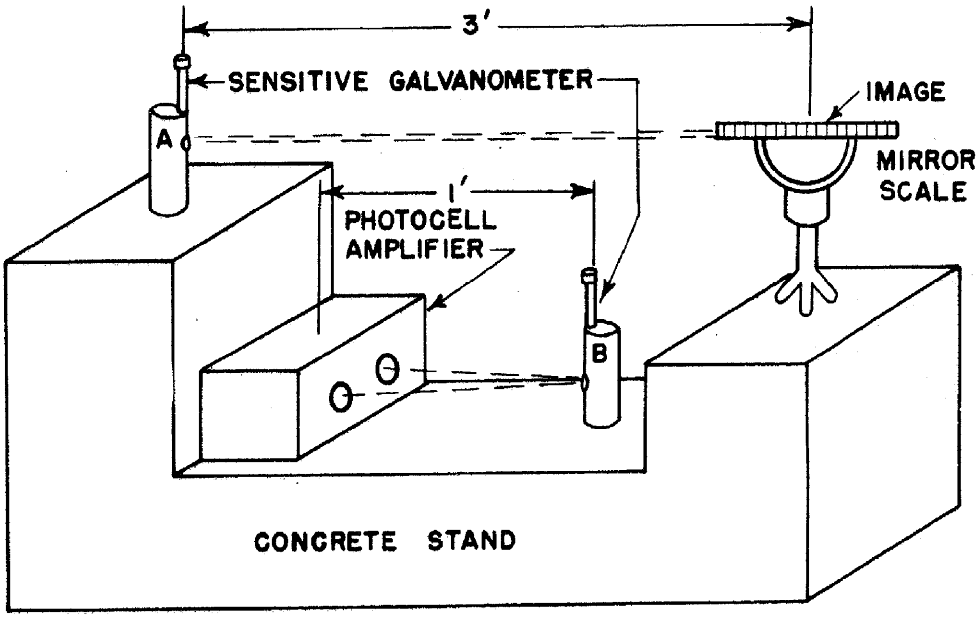

Fig. 16.
Principal Parts of the Type 2
Magnetic Detector

21. Anchors. a. A special anchor was used to moor the Type 92 mine, and mushroom anchors to moor the buoys, markers and the ends of cable. In the case of the Type 94 mine, the anchor was an integral part of the mine.

b. Anchor for Type 92 Mine. The anchor (Fig. 17) used to moor the Type 92 mine was a hollow cylinder weighing 1000 lbs. The mooring cable was coiled around a drum inside the anchor which had a capacity of 100 yards of cable. The anchor was equipped with four flanged wheels to facilitate handling and it was cut away so as to cradle a mine. (Fig. 18). In order to simplify maintenance, it was made up of various sections fastened together by bolts.

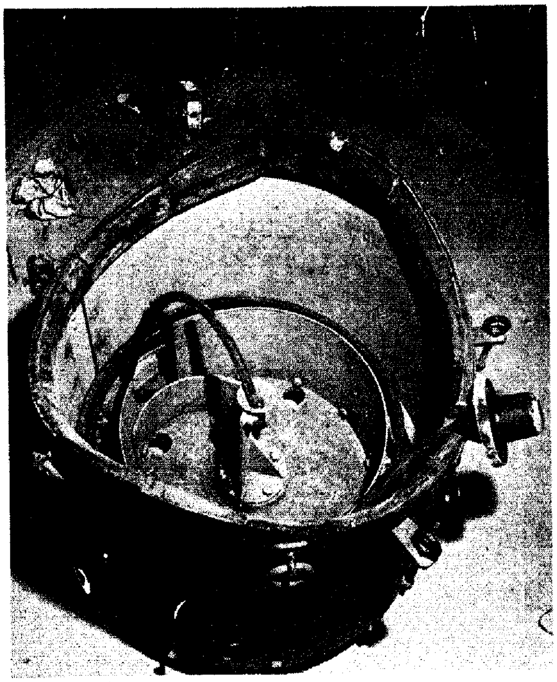

Fig. 17.
Anchor, Type 92 Mine System

Fig. 18.
Type 92 Mine Cradled on Anchor

22. Cables. a. In general, all of the cables used in the mine system were characterized by light armor and flexibility. Their expected life was about five plantings. The principal weakness with all of the cables was that the insulation did not adhere to the conductors, consequently, any break in the insulator would allow water to seep along the conductors. The cables were usually designed and made up to operate with a particular piece of equipment. The exception was in the case of the Type 2 magnetic detector, where any cable with four good conductors was used.

b. Shore Cable for Type 92 Mine System. The shore cable (Fig. 19) for the Type 92 mine system had 15 conductors and was 1 3/8 inches in diameter. The armor was built up of 38 strands, of 3-twisted steel wires to a strand, and the lay was 15 inches. The cable had a tensile strength of six tons, was fairly flexible, and was easy to work. It came in 1,000 and 1,650 yard lengths, wrapped on wooden reels, with one end fitted with a water-proof bell.

c. Cable for Type 92 Mine. The mine cable (Fig. 20) for the Type 92 mine system had three conductors and was one inch in diameter. The cable had a tensile strength of three tons and the armor was made up of 22 strands, of 4-twisted steel wires to a strand. The strands were imbedded in black rubber and the lay was 12 inches. Each cable came on a separate reel (Fig. 21), in lengths of 330 yards for the inside mines of a group and 425 yards for the outside mines.

SHORE CABLE

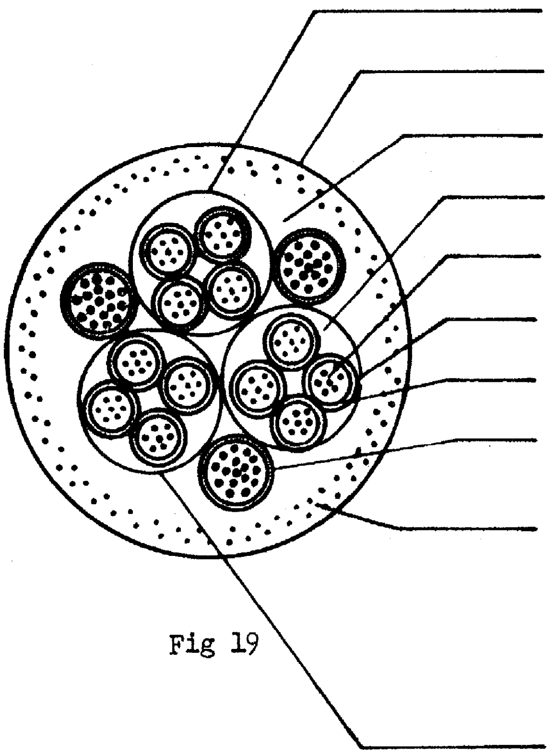

Fig 19

MINE CABLE

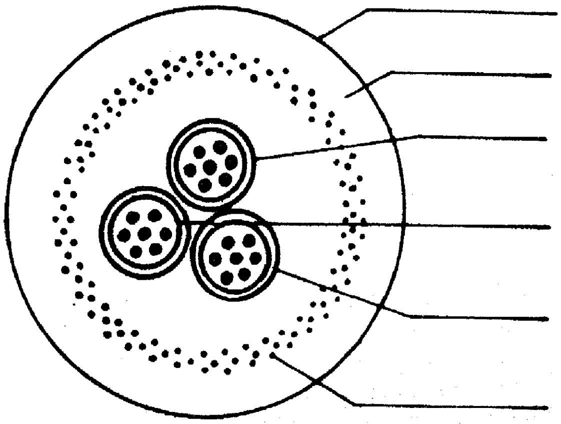

Fig 20

Fig. 21.

Cable for Type 92 Mine
As Received From Manufacturer
Note water-proof housing and
cover for gasket

d. Cable for Type 94 Mine. The cable used with the Type 94 mines (Fig. 22) was 3/4 inches in diameter and was covered with black rubber. It had two conductors, each consisting of 19 copper strands. Two strands of 37-twisted steel wires were laid with the conductors to give the cable a tensile strength of two tons.

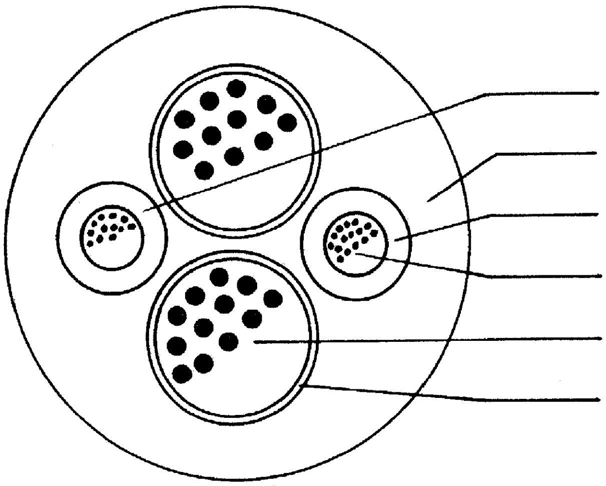

Fig. 22.
Cross Section of Cable, Type 94 Mine System

e. Cable for Type 97 Detector. The cable for the Type 97 acoustic detector. (Fig. 23) was two inches in diameter and had 30 conductors. The conductors were laid in two layers, each having a white and a red colored insulated conductor. These colored conductors were used as spares and to aid in connecting up the equipment. The cable was covered with heavy armor and had a tensile strength of 10 tons.

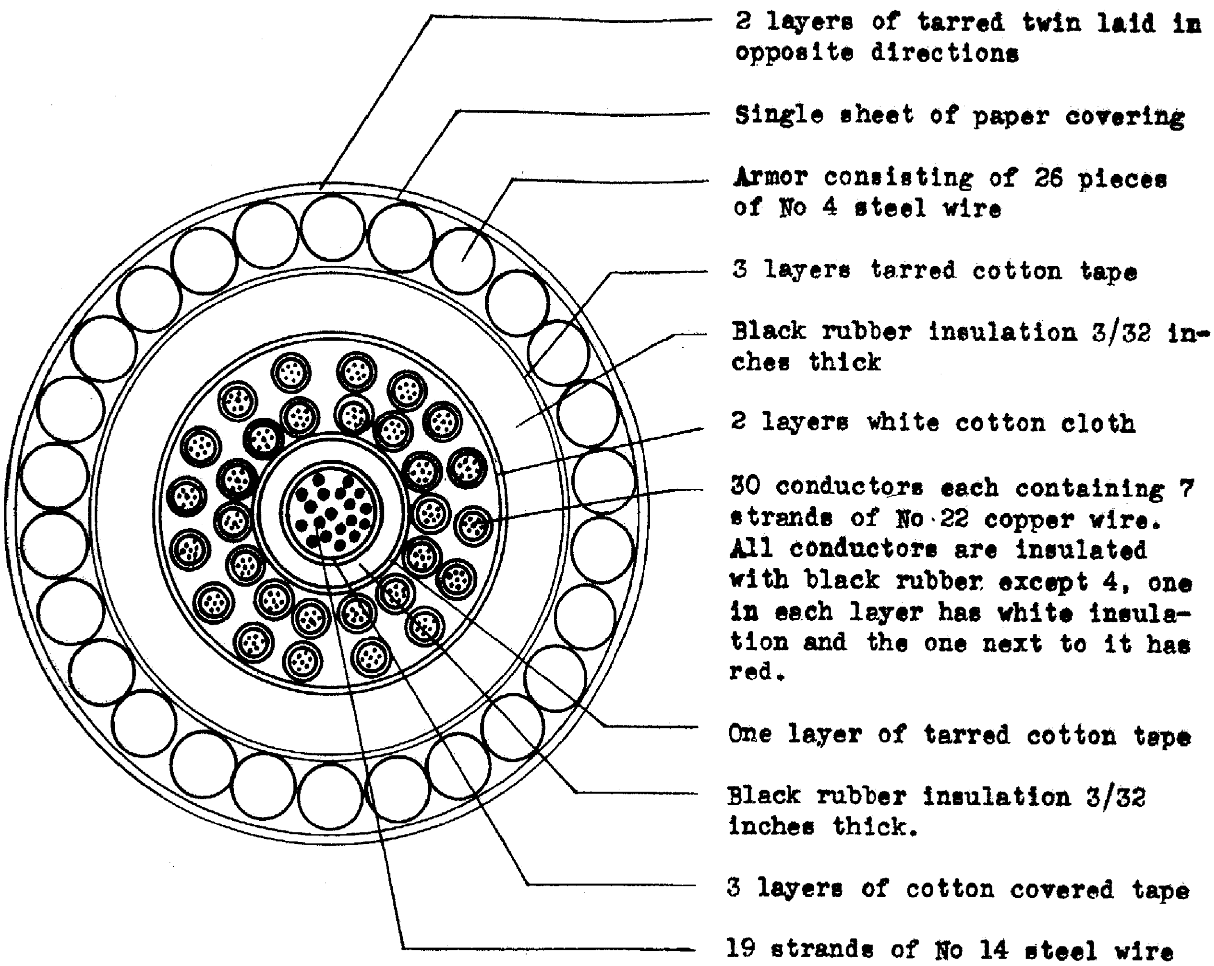

Fig. 23.
Cross Section of Cable, Type 97 Acoustic Detector

23. <u>Cable end fittings</u>. a. The distribution-box ends of both the shore cable and the mine cable were equipped with bronze water-proof fittings. Also, the mine ends of the cables for the Types 92 and 94 mines were equipped with black-rubber mushroom gaskets. These fittings were placed on the cables by the manufacturer.

b. <u>Bell Shaped Waterproof Housing</u>. The bell shaped housing (Fig. 24) for both the shore and mine cables were alike except that the shore cable housing was larger. They were made of bronze and showed good worksmanship.

c. <u>Mushroom gasket</u>. The black-rubber mushroom gaskets (Fig. 25) were made of fairly hard rubber, which made a water-proof seal around the cable.

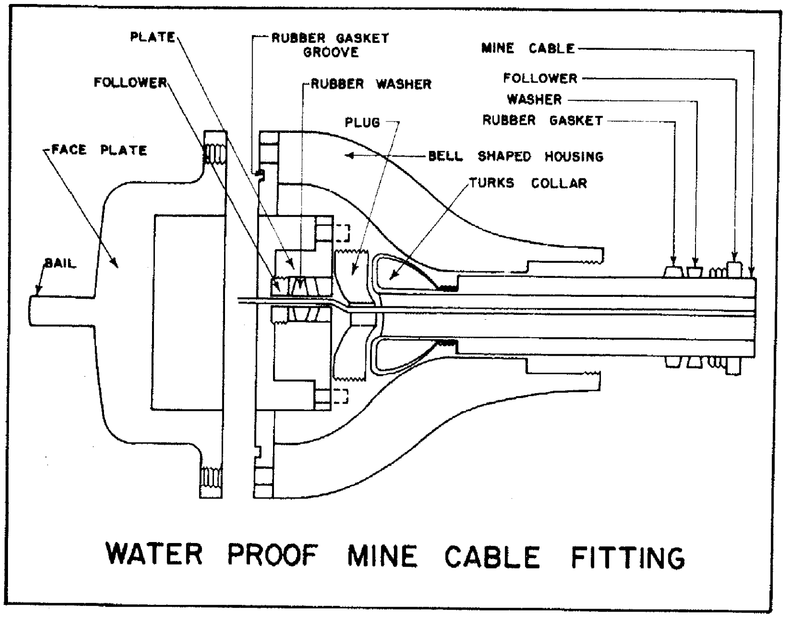
PLATE
RUBBER GASKET GROOVE
MINE CABLE
FOLLOWER
RUBBER WASHER
FOLLOWER
WASHER
PLUG
RUBBER GASKET
FACE PLATE
BELL SHAPED HOUSING
TURKS COLLAR
BAIL
WATER PROOF MINE CABLE FITTING

Fig. 24.

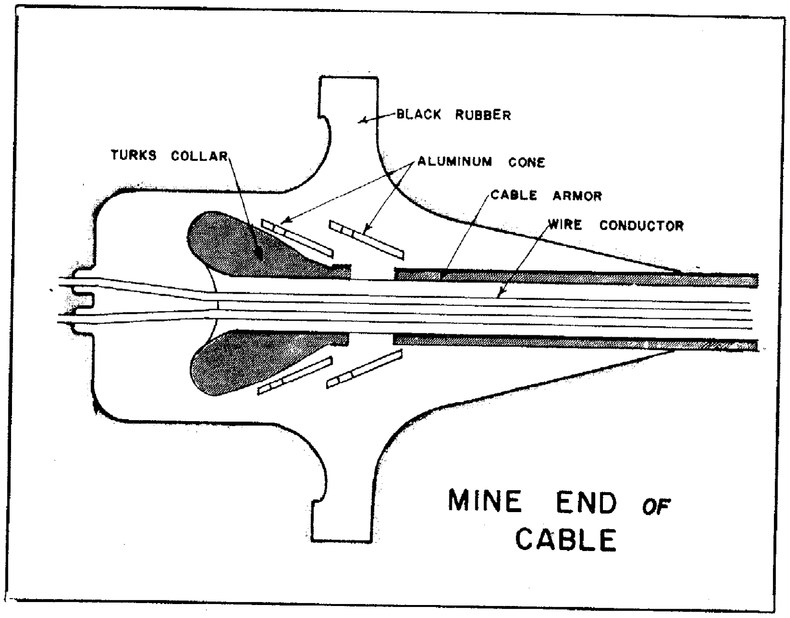
BLACK RUBBER
TURKS COLLAR
ALUMINUM CONE
CABLE ARMOR
WIRE CONDUCTOR
MINE END OF CABLE

Fig. 25.

24. Mine Vessels. a. The Japanese Navy was well supplied with boats which were suitable for planting controlled mines. Practically all of the boats in the flotilla could be used and most of the smaller commercial vessels could be readily altered to augment the flotilla.

b. Mine Layers. The mine layers varied in size from 150 to 600 tons. The larger ships ordinarily were used to plant contact mines well out to sea. All vessels were powered with diesel engines and their speeds varied up to a maximum of 16 knots. They were equipped with twin screws to facilitate handling and, in general, were well fitted to perform their mission. The average crew consisted of 50 men, and additional personnel were brought on board to assist in operations whenever the need arose.

c. DB Boat. The DB (distribution box) boat (Figs. 26 and 27) was a flat-bottomed landing craft of wooden construction, with a draught of three feet. It was 60 feet long, 10 feet wide and was powered with a diesel engine which gave it a top speed of six knots.

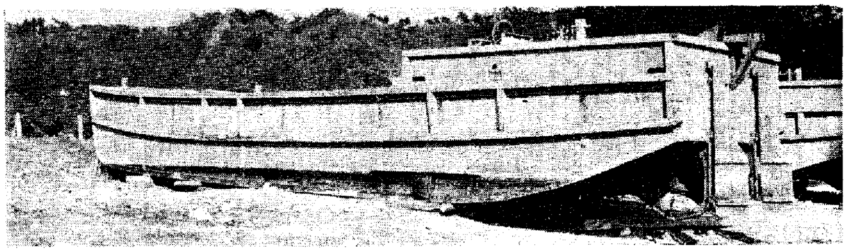

Fig. 26.
DB Boat

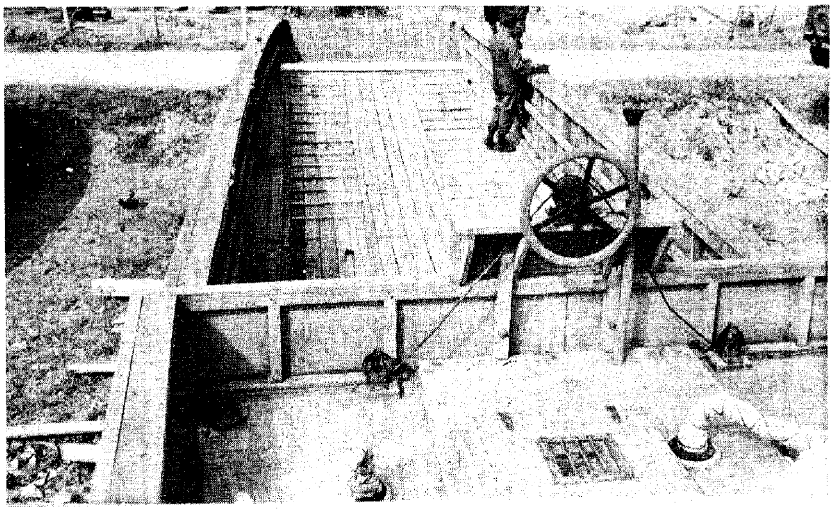

Fig. 27.
DB Boat. Note deck space

d. Mine Yawl. The mine yawl (Fig. 28) was a wooden row boat 36 feet long, 5 feet wide, with a draught of 1 1/2 feet, and usually carried a crew of 9 men.

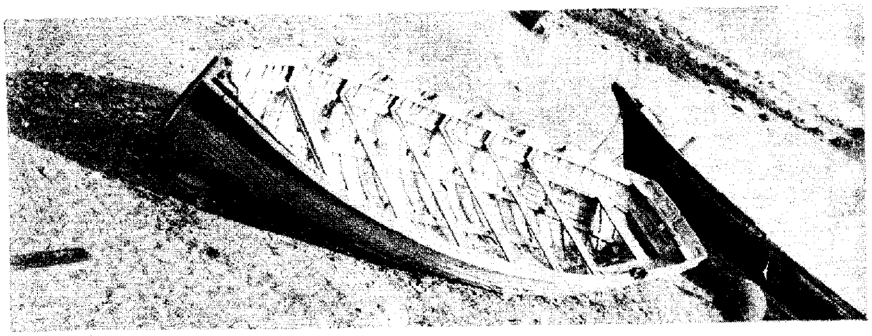

Fig. 28.
Mine Yawl

25. Miscellaneous Equipment. a. On shore, the Japanese had sufficient equipment to handle efficiently the mine gear. Large moving cranes were available on the mine wharfs to load and unload the vessels. Narrow gauged tracks ran from the docks to the storerooms to facilitate handling of the heavy gear. There was a decided absence of wire rope around the storerooms, since the Japanese used very little of it when planting controlled mines.

b. Cable Reel Jacks. Two screw types of cable reel jacks were used, one which was similar to that used by our Army, and the other which was operated by a crank and worm gear. The jacks were of different sizes but all were equipped with strong foot plates.

c. Smoke Pot. The smoke pot (Fig. 29), which was used to indicate that the mine and anchor had parted, was a hollow sphere eight inches in diameter. Two plugs, soluble in sea water, were located diametrically opposite each other. As the plugs dissolved, springs were permitted to expand, thereby uncovering two openings. Sea water entered through one opening and smoke was emitted from the other. A small cylinder running through the sphere contained carbide, which upon contact with the water, generated smoke.

d. Distribution Box. The distribution box (Fig. 30) was a bronze casting 9" X 12" X 24" in size, and contained three holes on each side and a hole at one end. These holes were six inches in diameter and the surface around the holes was ground, tapped for bolts, and grooved to receive a rubber gasket.

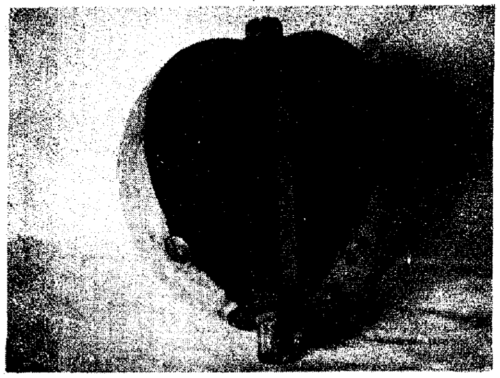

Fig. 29.
Sectionalized View of Smoke Pot

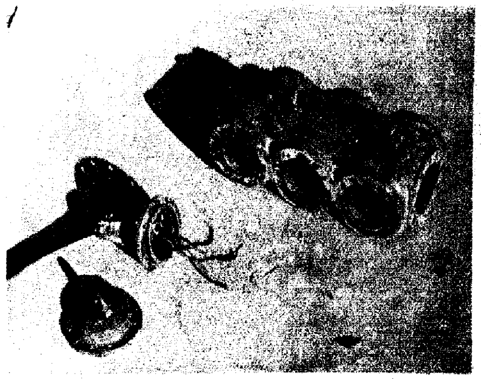

Fig. 30.
Distribution box. Note bell-housing

e. Flotation Reel. An iron cylinder (Fig. 31), called a flotation reel, was used to carry the mine cable for the Type 92 system during planting operations. It was 3.4 feet in diameter, 5 feet high and weighed 500 lbs. It was equipped with four wheels in order to facilitate handling.

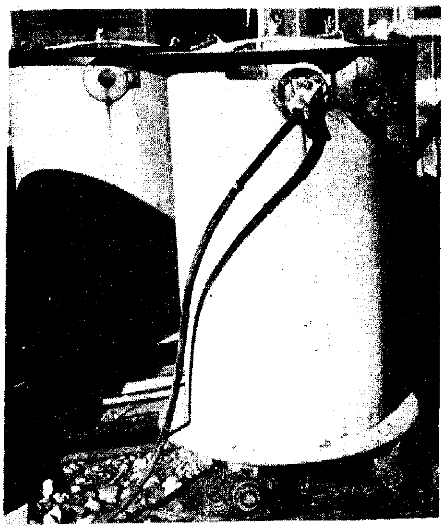

Fig. 31.
Flotation Reel

f. Automatic Clamp. The automatic clamp (Fig. 32) was 10 inches long and weighed one pound. It was equipped with a set screw to keep the jaws closed when handling the mines and anchors before planting.

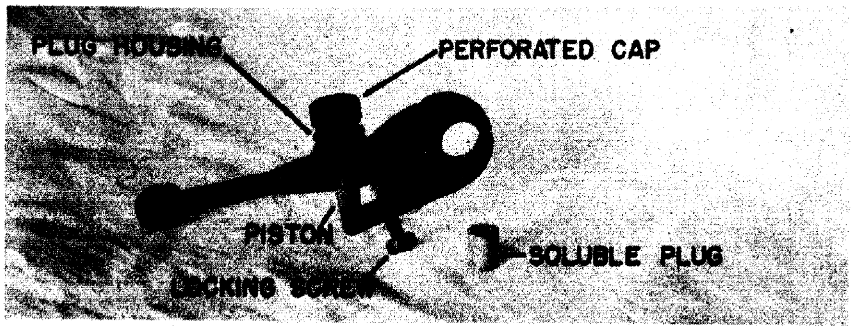

Fig. 32.
Automatic Clamp

g. Tools. Each particular piece of materiel was equipped with all of the necessary tools, which were neatly packed in compact tool kits. Most of the tools were of a special design to perform a single operation, and very few common tools such as screw drivers, monkey wrenches, pliers and ball pien hammers were found.

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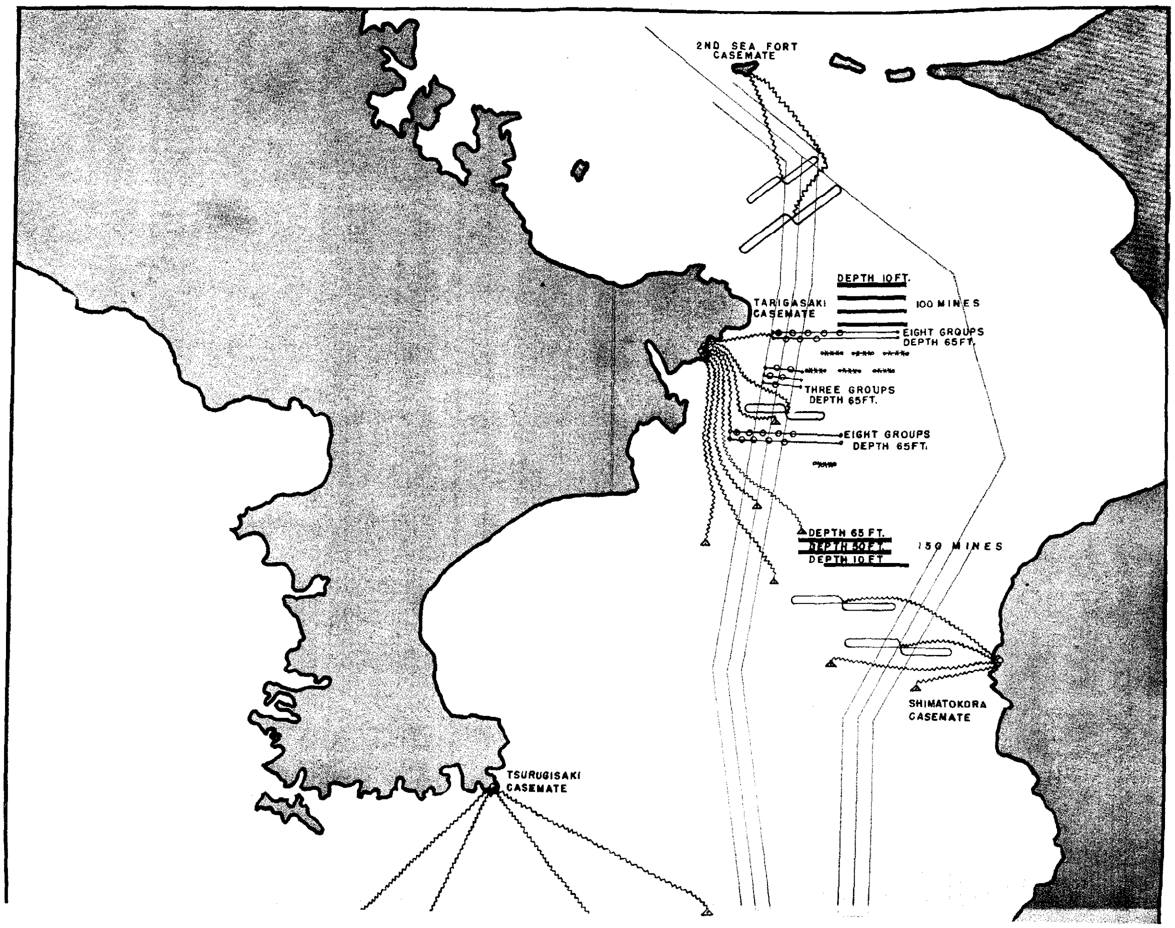

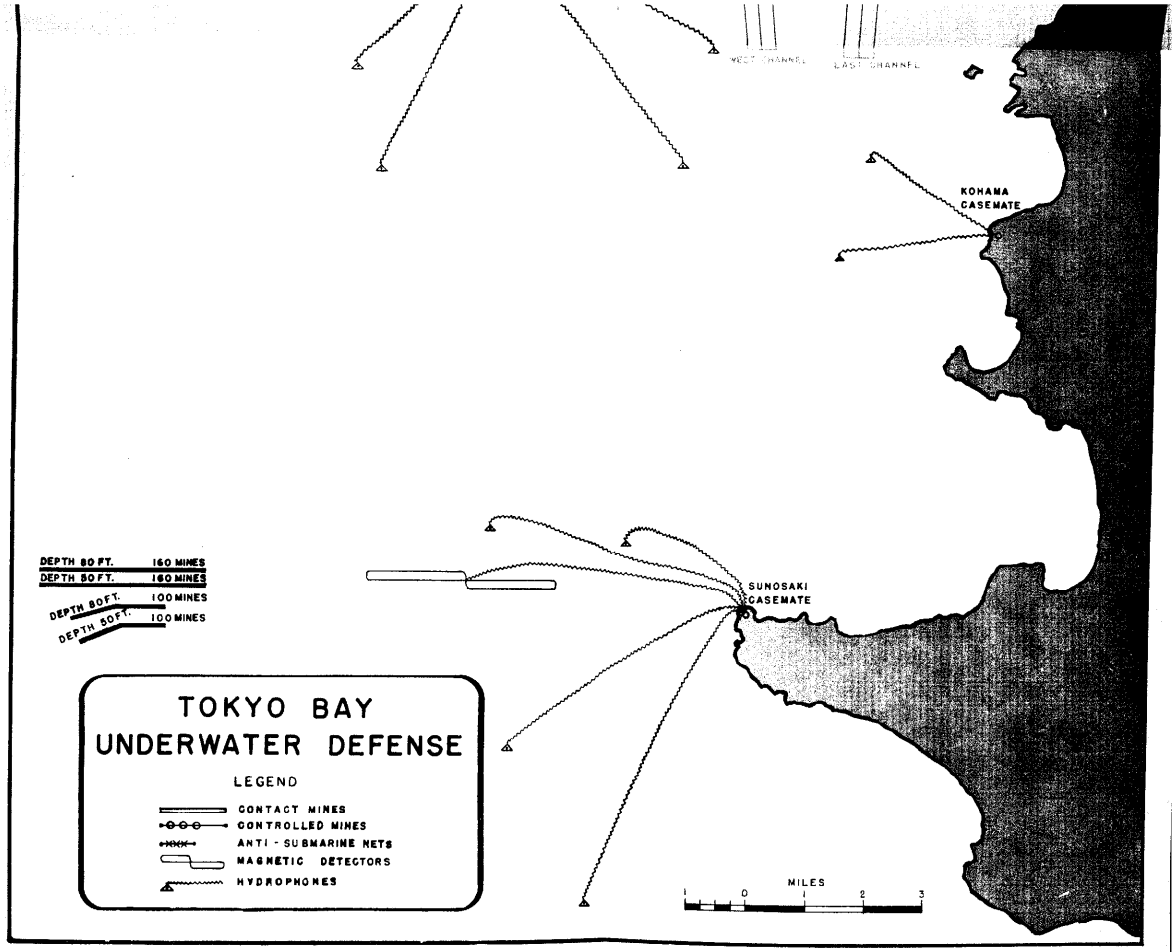

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FIG.33

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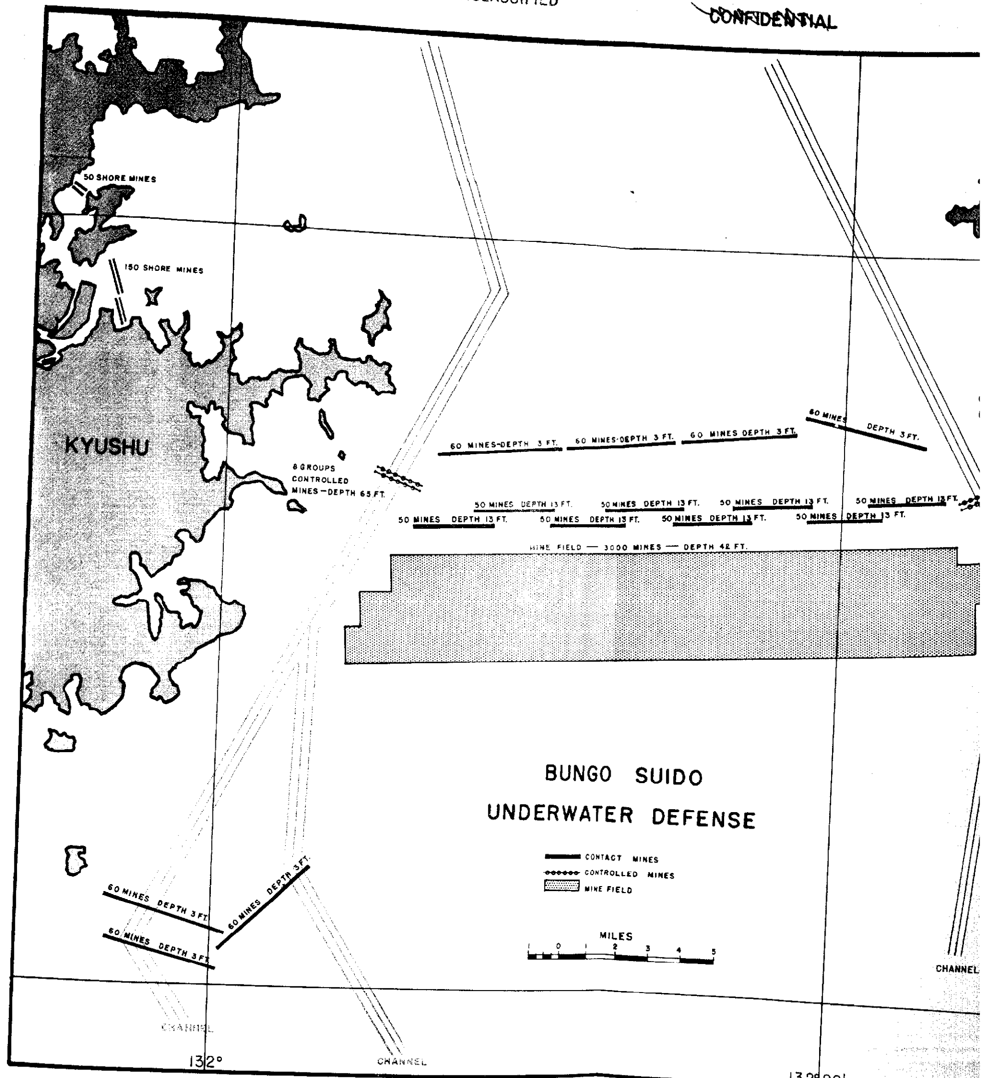

FIG. 34

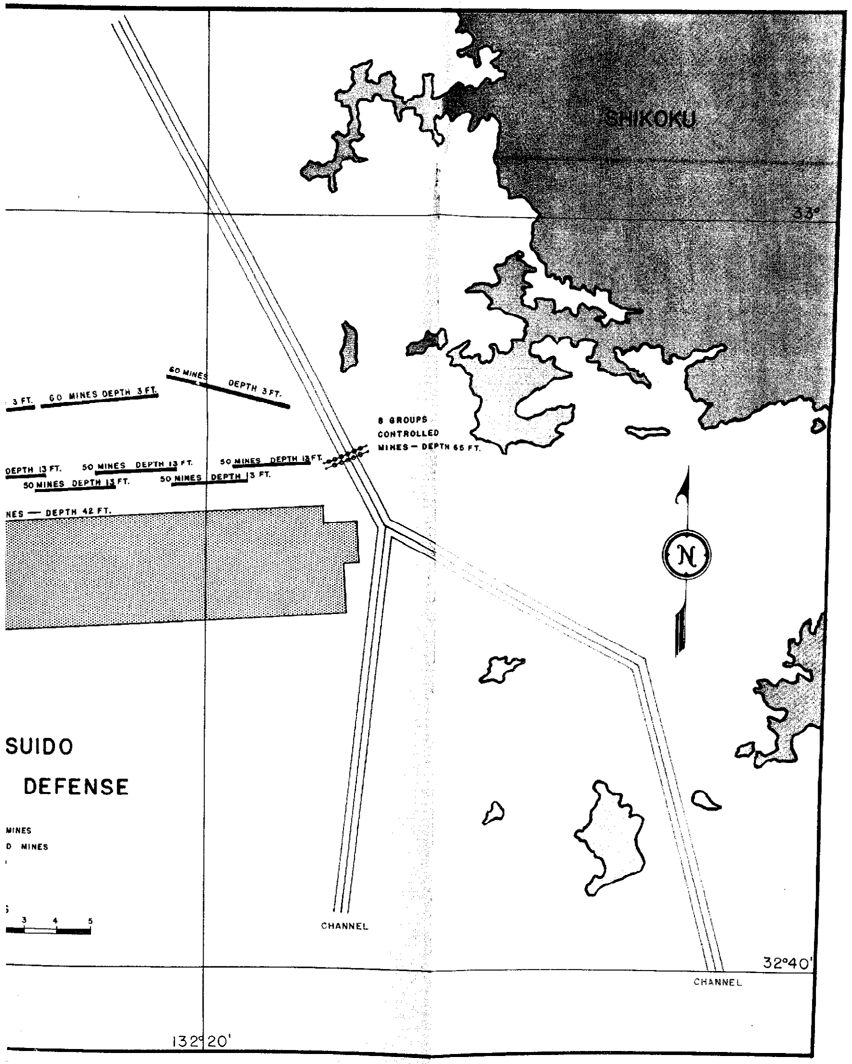
SHIKOKU
33°
3 FT.
60 MINES DEPTH 3 FT.
60 MINES DEPTH 3 FT.
8 GROUPS
CONTROLLED
MINES — DEPTH 65 FT.
DEPTH 13 FT.
50 MINES DEPTH 13 FT.
50 MINES DEPTH 13 FT.
50 MINES DEPTH 13 FT.
50 MINES DEPTH 13 FT.
NES — DEPTH 42 FT.
N
SUIDO
DEFENSE
MINES
D MINES
3 4 5
CHANNEL
CHANNEL
32°40'
132°20'

FIG. 34

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CON[redacted]

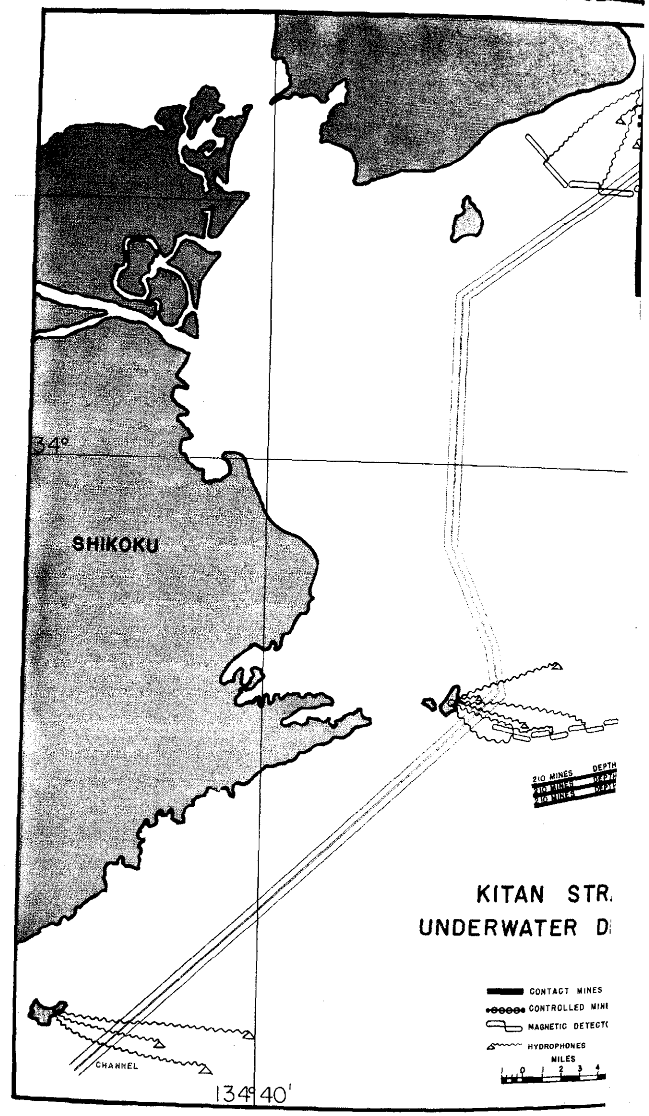

FIG. 35

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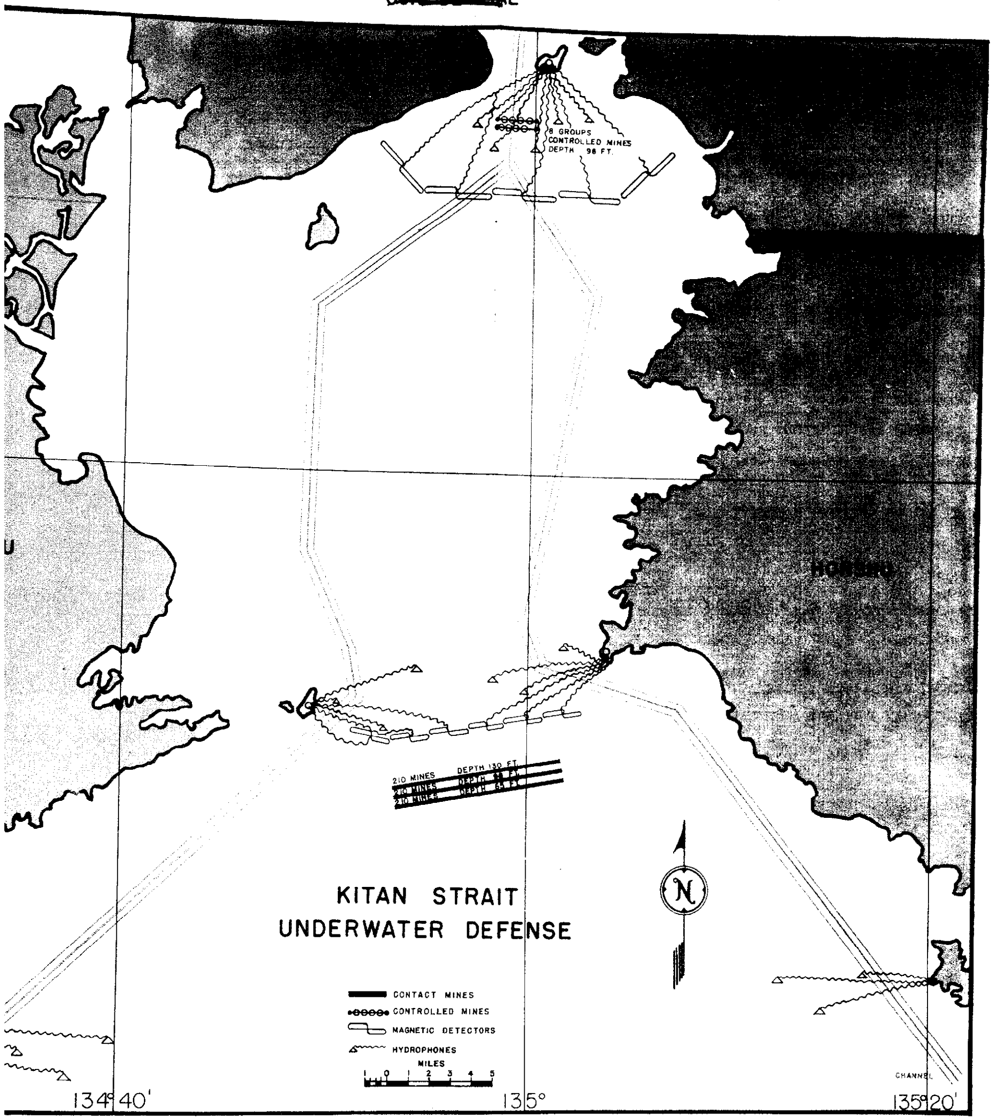
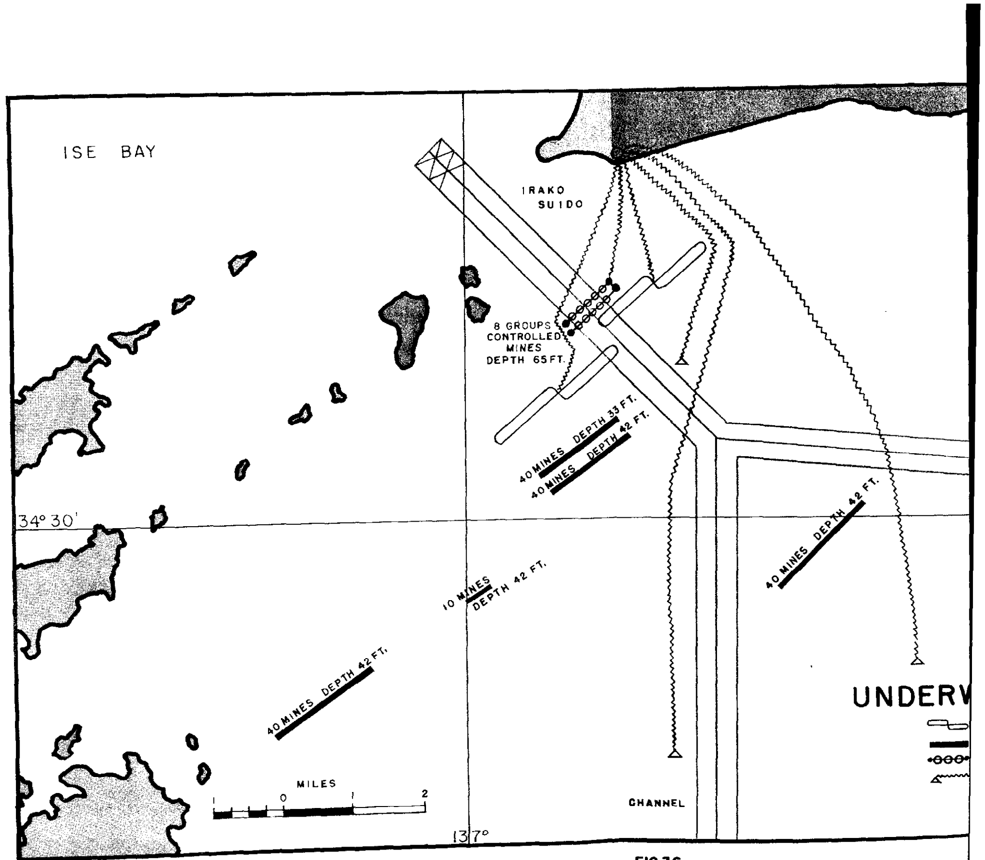
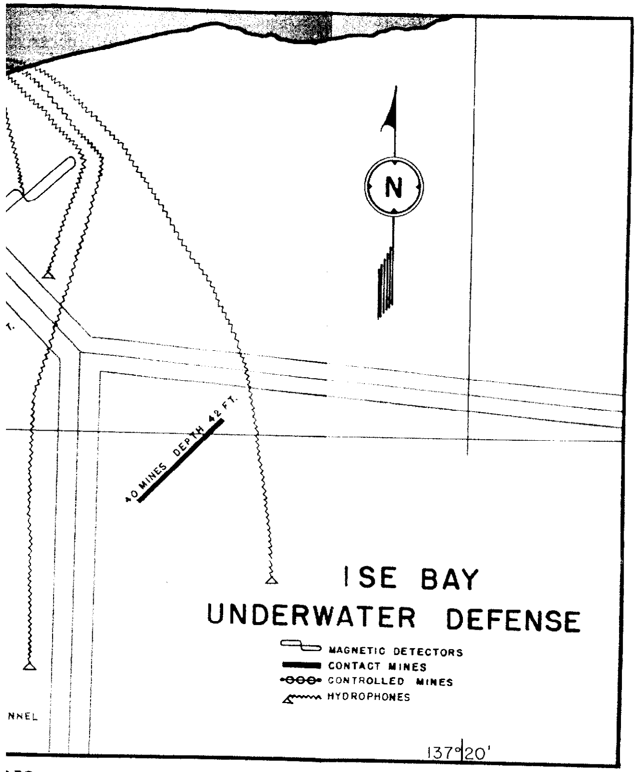

8 GROUPS
CONTROLLED MINES
DEPTH 98 FT.
210 MINES DEPTH 130 FT.
KITAN STRAIT
UNDERWATER DEFENSE
CONTACT MINES
CONTROLLED MINES
MAGNETIC DETECTORS
HYDROPHONES
MILES
1 0 1 2 3 4 5
CHANNEL
134°40'
135°
135°20'

FIG. 35



ISE BAY
IRAKO SUIDO
8 GROUPS CONTROLLED MINES DEPTH 65 FT.
40 MINES DEPTH 33 FT.
40 MINES DEPTH 42 FT.
40 MINES DEPTH 42 FT.
10 MINES DEPTH 42 FT.
40 MINES DEPTH 42 FT.
34° 30'
137°
MILES
1 0 1 2
CHANNEL
UNDERW

FIG.36


40 MINES DEPTH 42 FT.
ISE BAY
UNDERWATER DEFENSE
MAGNETIC DETECTORS
CONTACT MINES
CONTROLLED MINES
HYDROPHONES
137°20'

.36

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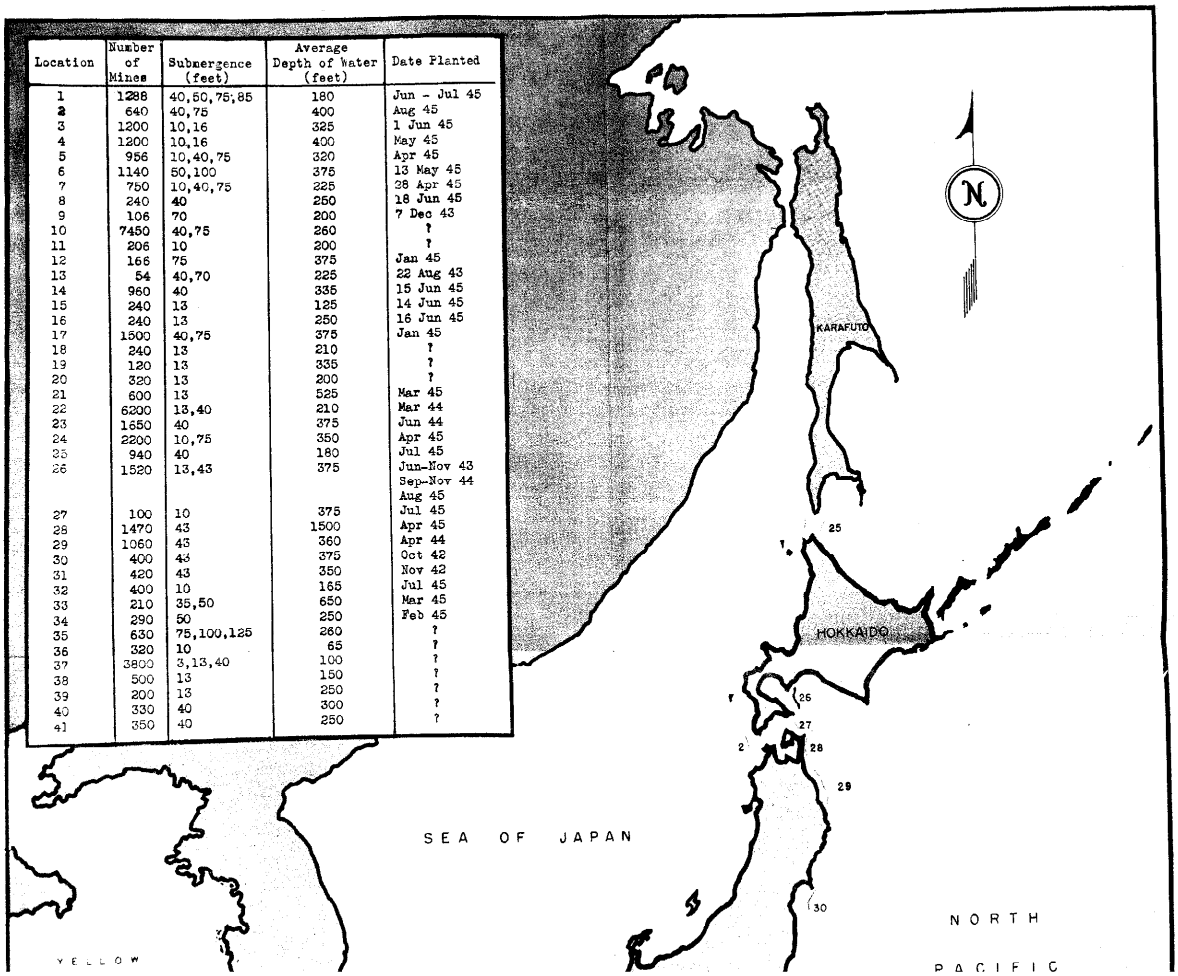
Location	Number of Mines	Submergence (feet)	Average Depth of Water (feet)	Date Planted
1	1288	40,50,75,85	180	Jun - Jul 45
2	640	40,75	400	Aug 45
3	1200	10,16	325	1 Jun 45
4	1200	10,16	400	May 45
5	956	10,40,75	320	Apr 45
6	1140	50,100	375	13 May 45
7	750	10,40,75	225	28 Apr 45
8	240	40	250	18 Jun 45
9	106	70	200	7 Dec 43
10	7450	40,75	260	?
11	206	10	200	?
12	166	75	375	Jan 45
13	54	40,70	225	22 Aug 43
14	960	40	335	15 Jun 45
15	240	13	125	14 Jun 45
16	240	13	250	16 Jun 45
17	1500	40,75	375	Jan 45
18	240	13	210	?
19	120	13	335	?
20	320	13	200	?
21	600	13	525	Mar 45
22	6200	13,40	210	Mar 44
23	1650	40	375	Jun 44
24	2200	10,75	350	Apr 45
25	940	40	180	Jul 45
26	1520	13,43	375	Jun-Nov 43 Sep-Nov 44 Aug 45
27	100	10	375	Jul 45
28	1470	43	1500	Apr 45
29	1060	43	360	Apr 44
30	400	43	375	Oct 42
31	420	43	350	Nov 42
32	400	10	165	Jul 45
33	210	35,50	650	Mar 45
34	290	50	250	Feb 45
35	630	75,100,125	260	?
36	320	10	65	?
37	3800	3,13,40	100	?
38	500	13	150	?
39	200	13	250	?
40	330	40	300	?
41	350	40	250	?



37	3800	3,13,40	100	?
38	500	13	150	?
39	200	13	250	?
40	330	40	300	?
41	350	40	250	?

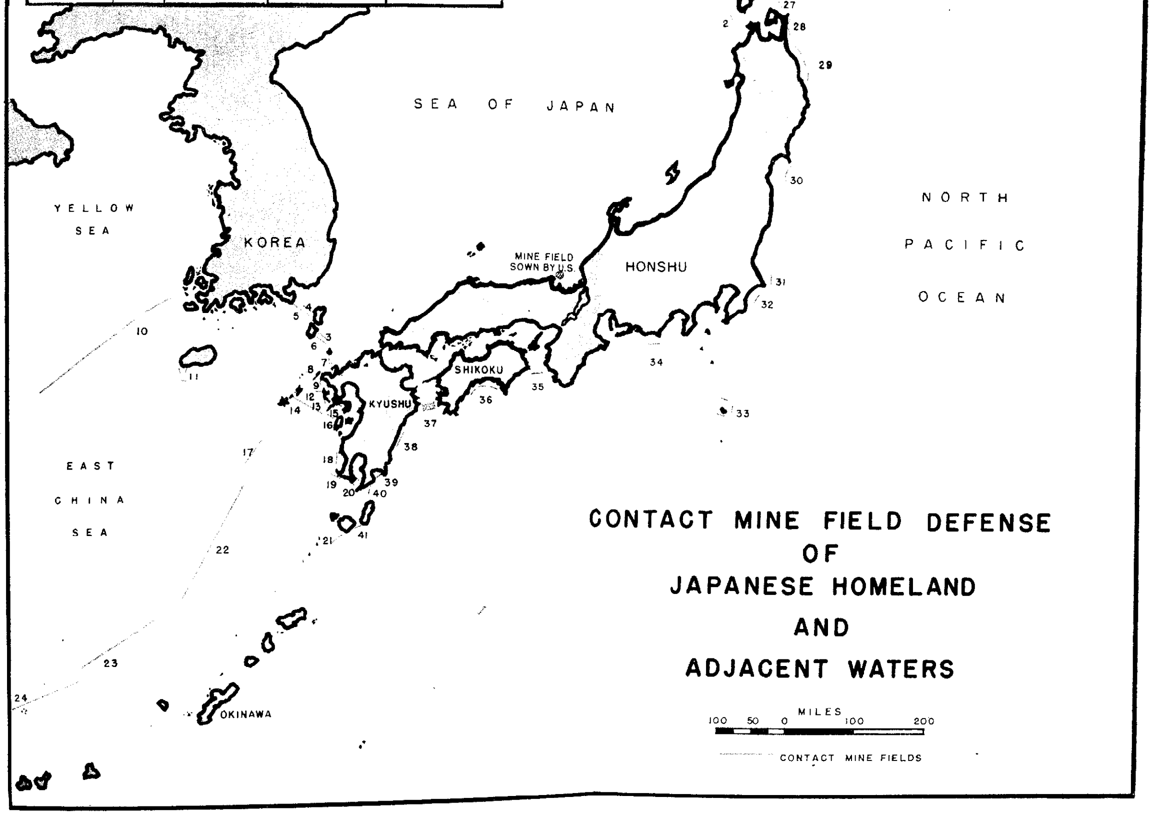


FIG.37

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CHAPTER 5

TACTICS AND TECHNIQUE OF CONTROLLED MINES

26. General. a. The Japanese placed little importance on the employment of underwater defenses such as mines, nets and obstacles. Reliance was placed upon an aggressive Navy and an Air Force for keeping surface ships away from their shores. However, they did believe that submerged enemy submarines might enter their harbors and it was as a defense against this that controlled mines were used. Contact mines were used for defense against both submarines and surface vessels.

b. In the Japanese homeland, mine warfare operations were conducted primarily on the naval sector level, with each sector operating independently. The Navy General Staff planned the underwater defense of a particular area. The plans included number and types of mines, submarine nets, and detectors, and the general location of channels. The detailed layout of the defenses, to include the exact location of the channels, was determined by the local sector commander. The actual planting of the underwater defenses was carried out under the supervision of the local flotilla commander. Charts of the defenses were kept by the Water Defense Group for their own area and copies were forwarded to Naval Sector Headquarters, the Navy General Staff and the Navy Ministry.

c. For the underwater defenses of important areas in overseas possessions and occupied territory the Navy General Staff made the general overall plans. The details of these plans and the plans for defenses of minor areas were prepared by the Fleet Commander for approval by the Navy General Staff. The Fleet Commander was responsible for the planting and operation of all of the underwater defenses outside the Japanese homeland.

27. Areas Defended by Mines. a. Controlled Mines. The following areas in the Japanese homeland were defended by controlled mines:

(1) Tokyo Bay (see Fig. 33).

(2) Bungo Channel, between the islands of Kyushu and Shikoku (see Fig. 34).

(3) Kitan Strait, between Shikoku and Honshu (see Fig. 35).

(4) Entrance to Ise Bay, which contains the main port of Nagoya (see Fig. 36).

b. Contact Mines. As the war progressed, and the Japanese were thrown more and more on the defensive, the use of contact mines became more general. (For areas in which contact mines were used, see Fig. 37). The mine fields were usually planted across the middle of a harbor, strait or channel. The areas between the ends of the fields and the shore were used for ship channels, thus allowing shore batteries to bring any entering hostile craft under fire.

Inasmuch as in our service contact mines are not used by the Army, these mines will not be discussed further in this chapter.

28. Types and Missions of Controlled Mines. a. The Japanese had two types of controlled mines: Type 92 and Type 94. The mission of the Type 92, a buoyant mine, was to deny enemy submarines the use of charted channels in a harbor, and that of the Type 94, a mine which rested on the bottom, was to deny enemy river craft the use of navigable rivers whose shallow depth and whose currents precluded the use of the Type 92 mines. Actually, the only controlled mines used in the Japanese homeland were the Type 92's.

b. Emergency plans called for the use of the Type 92 mines against surface craft but this was never done. One argument advanced against such a use was that the mines would have to be submerged only 2 to 5 yards and therefore could be spotted easily from the air and destroyed.

29. Employment. a. Type 92 Controlled Mine. (See Fig. 38).

(1) The Type 92 mines were planted in groups of six with the mines arranged in two rows of three each. The groups were planted in line and a line consisted of any number of groups. However, eight groups to a line was preferred. The interval between mines in a group and between end mines of contiguous groups was 140 yards and the distance between rows was 175 yards.

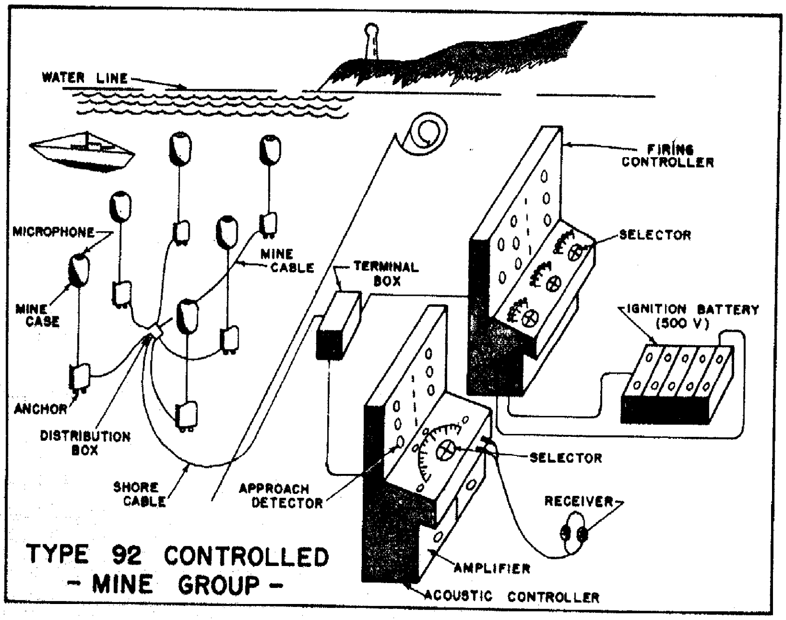


Fig. 38.

(2) All of the mines in the forward row were numbered consecutively from right to left, looking seaward. The corresponding mines in the rear row were also numbered in the same manner except that a prime was added to the number. The numbers were painted on the mines, anchors and the cable flotation reels. The mine groups were numbered from right to left, looking seaward, and their numbers appeared on the casemate apparatus only.

(3) All mines in a field were planted with the same submergence (normally 20 to 45 yards), the maximum submergence being 65 yards. The maximum depth of water in which the mines could be planted was 130 yards since the buoyancy of the mine was not sufficient to support a longer mooring cable.

b. Type 94 Controlled Mine ("Bottom Mine"). (See Fig. 39).

(1) The Type 94 mine was developed and produced for use in navigable rivers. However, these mines were also used experimentally in the Marshall and Gilbert Islands, along beaches, for defense against landing craft.

(2) The mines were planted in groups of four to a line, the distance between mines depending upon the depth of the river, in accordance with the following table:

Depth 9 yards------distance between mines 50 yards.
Depth 11 yards-----distance between mines 47 yards.
Depth 13 yards-----distance between mines 43 yards.

TYPE 94 CONTROLLED MINE SYSTEM

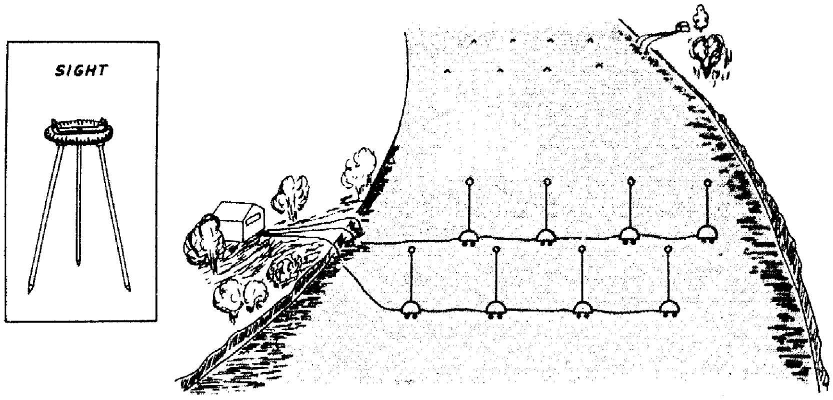


Fig. 39.

(3) The number of groups of mines used in a single line across a river depended upon the width of the river. The number of lines of mines planted along the river depended upon the depth and course of the river, and the importance placed upon the particular area through which the river flowed.

30. Detection. a. Type 97 Acoustic Detector. (See Fig. 40).

(1) The Type 97 acoustic detector was ordinarily used in conjunction with the Type 92 controlled mines, and when so used, the hydrophones were placed well out in front of the mines. The detector indicated the presence of a target in sufficient time to enable the casemate section to put the mine system in operation.

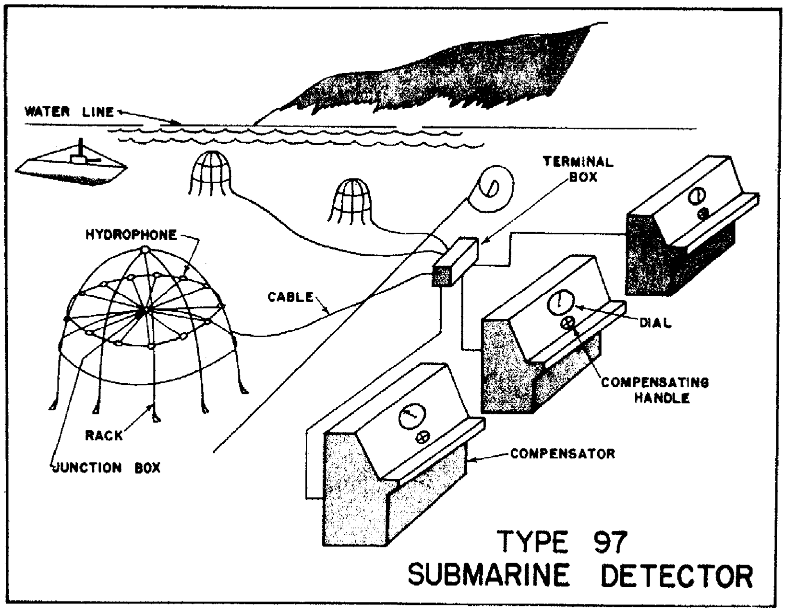
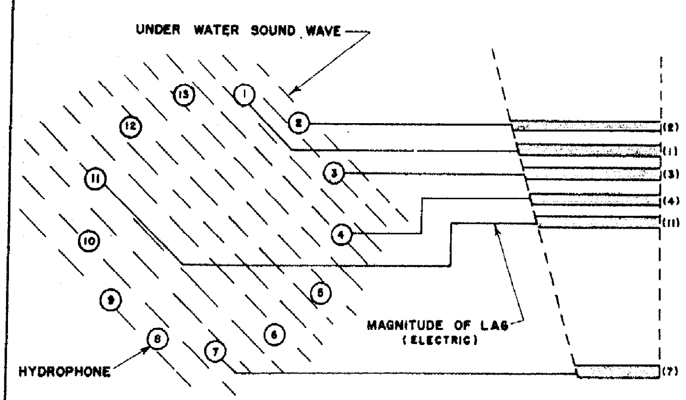


Fig. 40.

(2) The detector consisted of three bell-shaped racks placed on the bottom of the harbor 1,650 to 2,200 yards apart. Each rack had 13 hydrophones spaced equally around its circumference and connected to a compensator by means of a 30-conductor cable and a terminal box.

(3) For detection, the detector relied upon the sound emitted by the target. In general, it operated on the principle that in order to pick up the underwater sound wave at the maximum sensitivity, the phase of electric current transferred in each hydrophone must be balanced.

In Fig. 41, for instance, the maximum lag must be given to the transformed current of (2) in order for it to coincide with that of (7). The maximum sensitivity was thus secured. Futhermore, the phase difference of respective hydrophones was caused by the combination of induction coils and condensers which were fitted inside the compensator and operated both mechanically and electrically. When these two factors worked in perfect accord, the incident angle of the sound wave could be measured by the maximum sensitivity. The compensator had a brush board containing 13 brushes, each connected to a hydrophone on the rack. The rotation of this board produced an effect as though the rack were being rotated under water.



PRINCIPLE OF SOUND DETECTION

Fig. 41.

(4) In addition to furnishing information for the mine personnel, the acoustic detector also furnished data for the local submarine chasers. The direction of the sound source as determined from each of the three racks was plotted on a chart, thus locating the position of the target. This position was plotted every 3 to 5 minutes, and from the plots the course and speed of the target were computed, and transmitted to the submarine chasers, which would attack with depth charges.

b. Magnetic Detector Type 2. (See Fig. 42).

(1) The magnetic detector Type 2 was an anti-submarine warning device, which was very similar to the British "Guard Loop". The detector was primarily a warning device since it did not locate the exact position of the target.

(2) Conductor loops were laid across the entrance of a harbor or channel, well in front of the mine field. The approach of a submarine, which acted as a magnet, induced a weak electric current in the loops (Fleming's right hand rule), thus activating the magnetic detector. Two loops were used in order to cancel the effect of disturbing magnetism. The following table gives the relation between depth of water and length of loop:

Depth of Water	Transversal	Longitudinal	Length of Lead in Conductor
0-90 yards	5500 yards	165 yards	Within 16,500 yards
90-130 yards	4350 yards	110 yards	Within 16,500 yards
130-165 yards	3300 yards	55 yards	Within 16,500 yards

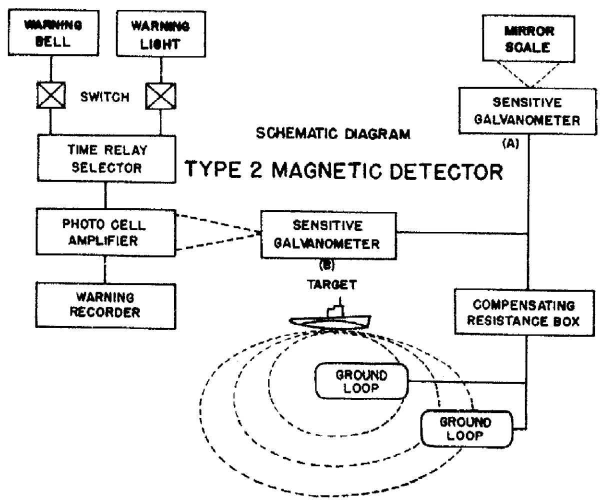


Fig. 42.

(3) The feeble electric current induced in the ground loops passed through a compensating resistance box. The best results were obtained when the resistance was adjusted at 1,000 ohms. After passing through the resistance box the current divided, part going to the visual warning system and part to the automatic warning system. The visual warning current actuated a sensitive

galvanometer. An electric bulb inside the photo-cell amplifier produced a light beam which was aimed at this mirror, struck the plate of the photo-cell and thereby excited a plate current. After being amplified, the current was divided, part going to the automatic recorder and the other part going to the bell and light alarms. The automatic recorder consisted of a clock mechanism which rotated a drum of graph paper. The amplified plate current operated the recording pen which produced a curve on the graph paper. Thus, a permanent record was produced showing the approach of targets. The amplified plate current for the alarm system passed a time relay, which could be adjusted for intervals of 15 or 30 seconds. After the elapse of the adjusted interval of time, the warning lights were lighted and an alarm bell was rung. This indicated that a target was approaching.

c. Visual Observation. No visual observation was used in conjunction with the Type 92 controlled mines. However, with the Type 94, it was used both for alerting the casemate crews and for tracking the target and firing the mines.

31. Identification. a. All surface craft were identified either visually, by prearranged signals, or by requiring a vessel to follow a prescribed course when entering an area defended by mines.

b. All friendly submarines were required to surface before entering a harbor or passing through a channel, and to remain on the surface while passing through the defenses.

32. Control. a. Type 92 Controlled Mine.

(1) The fire-control system for the Type 92 mines consisted of an acoustic and a firing controller. Each mine contained a microphone which was connected to the acoustic controller through a terminal box. The mine detonators were connected to the firing controller through the acoustic conductors and the firing conductor. The function of the acoustic and firing controllers and of the terminal box are described below.

(2) Acoustic Controller. After the casemate had been alerted by either the Type 97 or the Type 2 detector, the mine system was manned. The operator of the acoustic controller rotated the mechanical selector to pick up the mine microphones which gave the greatest volume of sound. The mechanical selector made contact with any three sets of adjacent mines (a set of mines was composed of a mine in the front row and the corresponding mine in the rear row). The maximum volume of sound would emanate from the three sets of mines towards which the target was approaching. The operator continued to

rotate his selector back and forth to be sure that he was observing with the correct sets of mine microphones. As the target approached, the volume of sound increased, which fact was indicated on the ammeters and was heard through the headset. When the volume of sound started to diminish the operator knew that the target had passed over the forward row of mines. He then closed the warning switch, actuating an audible buzzer. The officer in charge of the casemate, after assuring himself that the field of fire was clear of friendly vessels, ordered the firing control operator to fire the mines.

(3) Firing Controller. The firing controller had a selector similar to that of the acoustic controller, which also made contact with three sets of mines. The firing controller operator kept his selector in contact with the mines as indicated by the lights on the panel, and fired the mines when directed.

(4) Terminal Box. The terminal box had switches to open and close all acoustic circuits to individual mines, and also provided switches to open or close the firing circuit to any set of mines. As a safety precaution the switches were closed only when the casemate was alerted or when the circuits were being tested. By using the acoustic switches in conjunction with the firing controller any single mine could be fired. However, this was never done because it would only complicate the fire-control system and it was the standard operating procedure to fire three sets (6 mines) at one time.

(5) Before the war, the detectors and fire-control equipment for the underwater defenses were housed in outdoor concrete buildings. Soon after the war started, all of this equipment was transferred to casemates dug into the sides of the mountains.

b. Type 94 Controlled Mines.

(1) The fire control of the Type 94 mine was very simple. The open sight operator and the casemate operator were alerted by observers upon the approach of an enemy target. As a target approached, it was tracked by means of the open sight set up in prolongation of the mine field. As the target crossed the line of mines, the order to fire was transmitted by telephone to the casemate and all four mines of a group were exploded by means of a blasting magneto.

(2) A small buoy was attached to each mine to mark its location. This enabled the sight operator to determine the position of the line of mines and also aided him in selecting the group of mines to be fired when more than one group was planted in a line.

c. Fire Direction. Fire direction was under the control of the senior member present in the casemate, and it was standard operating procedure to fire the mines whenever a target came within range.

33. Suicide Mines. Two suicide mines were developed, the Type "A" and the Type 5.

a. Type "A" Mine.

(1) The Type "A" mine, sometimes referred to as a suicide mine, was developed during the latter stages of the war, for use against anchored vessels.

(2) It was intended that a good swimmer, by means of a harness, would tow the mine out to a vessel during the hours of darkness. The first experimental mines were equipped with a magnet, which was intended to hold the mine against the side of the vessel. However, the magnets were not strong enough to accomplish this purpose, and in the final version of the mine the harness was used to attach the mine to the propeller shaft.

(3) After the mine was attached to the vessel the swimmer released two caps: one allowed water to enter a water tight compartment and sink the mine, while the other allowed the sea water to act on a soluble plug. After one hour the plug was dissolved, and sea water entered a dry cell and acted as an electrolite. The dry cell produced 4 to 5 volts and the current detonated an electric primer which exploded the mine. The one hour delay of the explosion allowed the swimmer sufficient time to swim to safety. 100 of these mines were manufactured and sent to Okinawa aboard a transport. However, as the transport was sunk by a submarine, no use was made of the mines.

b. Type 5 Mine.

(1) The Type 5 suicide mine was the result of several months of experimentation with suicide devices. Original experiments were conducted with the idea of having a man equipped with a diving apparatus walk on the harbor bottom and carry large mines and 18-inch torpedoes to attack ships well out to sea. These tests proved that a diver could stay under water for four hours, which would allow him to travel 6000 yards while carrying an 18-inch torpedo. It was also found that if the diver's load were reduced, his movements restricted, and he did not descend more than 18 feet, he could stay under water for 10 hours. As a result of these experiments, the original idea of attacking ships well out to sea was discarded, and a plan of using the divers to attack landing craft approaching the shore was adopted.

(2) Divers were organized into special attack battalions, each consisting of approximately 600 officers and enlisted men. The battalion was organized into three companies,

each of six platoons. Each platoon contained five squads with six men to a squad. In combat, each man was to be equipped with a diving suit and carried a Type 5 mine.

(3) Although these units were never used in combat, specific plans had been drawn up for their employment. The divers were to have entered the water along the shore, through an underwater tunnel, moved out under water to a depth of 12 to 20 feet, and positioned themselves in three lines parallel to the shore and with a distance of 50 yards between lines. An interval of 60 yards between divers was to have been maintained and the positions of the diver in the second and third lines staggered with respect to those in the line ahead. Besides being able to maneuver on the bottom of the bay, the diver could also have moved either up or down by manipulating an air valve in his helmet. Communications contemplated the use of sound made by striking two pieces of metal together, and of runners. As a landing craft approached, the diver nearest the line of approach would maneuver into position and thrust the horn of the mine against the bottom of the craft, thus exploding the mine and destroying himself along with the landing craft.

(4) Approximately 1000 diving suits and all of the parts for approximately 10,000 mines had been manufactured by the end of the war. No mines had been assembled, nor had any underwater construction been done. However, plans had been drawn up to construct concrete caissons and sink them in the bays as rendezvous points for the divers to await attacks.

(5) Although the employment of the Type 5 mine had never been tested in combat, the Japanese believed that it would be successful. Up to the end of the war they had trained or had in training 10,000 troops for use in this role.

34. Protection of Mine Fields. No specific organization was charged with protecting the under-water defenses, and neither guns nor searchlights were sited primarily for this purpose. Reliance was placed upon the general protection of all shore defenses within the areas and on the air corps and fleet which operated in the general area.

35. Conclusions on Performance of Mines. a. The Japanese never had occasion to use the Type 92 controlled mine against any allied craft. The only mine casualties encountered were among Japanese small vessels which ventured out among the contact mine fields. It was claimed that the Tokyo

mine fields (Type 92 controlled mines), which had been laid in November 1941, and on which no repairs or replacements had been made during the war, were exploded by the regular firing system immediately after the surrender, with no failures in detonation.

b. The use of the Type 94 controlled mines had not been successful for two reasons:

(1) In our air attacks on river outlets, we had destroyed the mine casemates and ruptured the cable systems.

(2) Where the mines had been used on beaches, wave action had ruptured the cable system.

CHAPTER 6

PLANTING AND PICKING UP OF CONTROLLED MINE FIELDS

36. General. The planting and picking up of a mine field involved three different organizations, namely, the anti-submarine flotilla which furnished the boats, the maintenance battalion which furnished the planting crews, and the casemate unit which furnished the supervising personnel. The flotilla commander was responsible for planting and maintaining the field whereas the casemate commander was responsible for its operation. Before any practice or operation, mine equipment was checked and laid out several days in advance to insure that all equipment was serviceable. Ordinarily, the shore cable was laid a day prior to planting of the mines, in order to allow time for making cable splices. The flotilla commander usually had an ample number of vessels to conduct mine operations since all craft, including mine sweepers, mine layers, patrol vessels and smaller craft were at his disposal.

37. Planting of Type 92 Controlled Mines. a. The mine field was marked at least a day prior to planting operations. The field was laid out in its normal tactical position regardless of whether the mines were to be planted permanently or for practice. Buoys and flags were used to mark the mine field (see Fig. 43), their positions being located by sextant

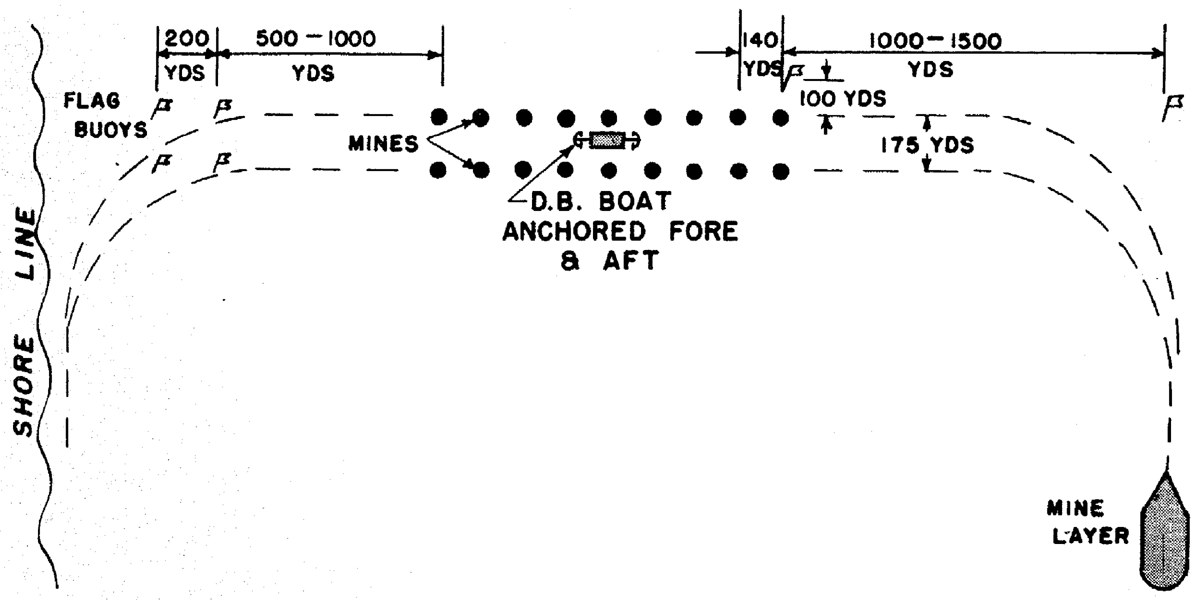


Fig. 43.
Marking a Type 92 Mine Field

readings on three or four points. There was no attempt to position either markers or mines by plotting from shore observation stations. After a field was marked, soundings were taken in order that the mooring height for each mine could be computed. Since the project called for planting a field in an exact location, no attempt was made to alter the layout of the field even though the bottom might be rugged and uneven.

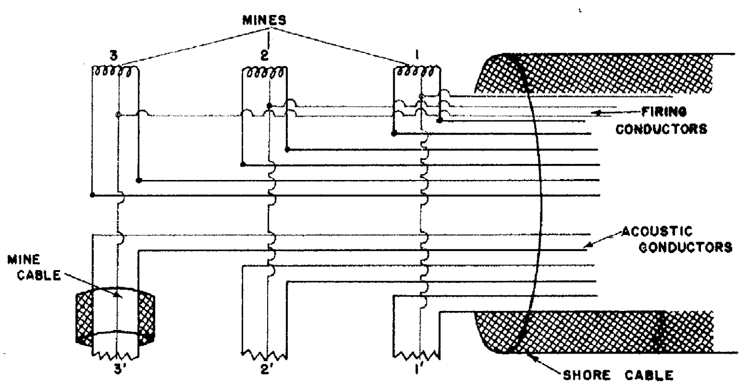
b. The shore cable was laid from shore to the distribution box by the shortest route, and approached the mine group from the rear. The end of the cable was marked by being anchored and buoyed. A mine layer was used for laying the cable when the total length of cable to the group was greater than 1,500 yards. A DB boat was used for shorter distances. The cable was coiled on the after part of the deck in figure 8's and was payed out by hand rather than being run off the reel. When the cable was picked up it was again coiled in figure 8's on the deck, and when transferred to shore it was laid out in large circular coils on the ground. When more than one length of cable was required to reach the distribution box the cable was spliced. The Japanese did not use junction boxes because they had experienced trouble with the cable breaking due to the action of currents and the weight of the box.

c. The DB boat, a flat-bottomed landing craft, was anchored fore and aft in the center of the group during planting. It maintained communication with the shore by means of telephones connected through the shore cable. During plantings, every effort was made to have as many DB boats available as possible in order to expedite the operation.

d. The mine layer, usually of 150 tons, was loaded with 12 mines on a side, or a total of 24 mines. The mines, anchors, mine cable and flotation reels were all connected together after being placed on board. The boat was equipped with iron rails along either side of the boat and the anchors and flotation reels were fitted with flanged wheels to run along these rails. When loaded, the mine layer presented a shipshape appearance and was not cluttered with mines, anchors, raising ropes, tools and cables. This greatly increased the safety of both the planting crew and the vessel and, in addition, permitted planting with a minimum sized crew.

e. Ordinarily, two mine layers were used in planting a controlled mine field. Guided by the marking flags, the leading layer moved down the front row of mines at a speed of six knots, dropping a mine every 42 seconds in order to get the desired interval between mines. The second mine layer followed in the path of the leading vessel and started dropping mines beginning where the first planter had left off. After dropping the front row of mines the layers made a sweeping turn and planted the rear row in the same manner. When each mine was dropped, a reading was taken from the fathometer to get the depth of water, and the position of each mine was charted. Planting of the individual mines was facilitated by the iron rails, since the flotation reel and the anchor, with the mine attached to it, were pushed along the rails and off the stern of the mine layer.

f. When the flotation reel struck the water, the mine cable unwound as the mine and anchor sank to the bottom. A yawl boat then came alongside the flotation reel, unfastened the end of the mine cable and hauled it over to the DB boat. The distribution-box end of the mine cable had a waterproof bell housing which kept the cable conductors dry. Aboard the DB boat, the face plate of the bell housing was removed and the conductors were run through the shore cable opening. The bell housing was then bolted to the distribution box. When all six mine cables were brought aboard, they were connected (Fig. 44) to the shore cable. These joints were made outside of the distribution box and were not necessarily made water-tight. After all the joints had been made, they were stuffed back into the distribution box and the bell housing of the shore cable was then bolted in place. This made the distribution box water-tight. The box was then lowered over the side and a wet test was made which included a continuity test of acoustic circuits.



CABLE CONNECTIONS IN DISTRIBUTION BOX

Fig. 44.

g. Mines and anchors were planted together and were fastened by means of two open hooks and an automatic clamp placed at opposite ends of the mine. The clamp was kept closed during planting by a soluble plug, which dissolved after about 40 minutes exposure to the sea water. The buoyancy of the mine then opened the automatic clamp and as the mine raised to a vertical position, it released itself from the two open hooks. The mine floated toward the surface and was stopped by the mine cable when it reached its predetermined mooring height.

h. Before the mine was placed on the anchor, a smoke pot was placed in the anchor and it could not be released until the mine and anchor parted. The smoke pot was a sphere which had soluble plugs in either end similar to the plug used in the automatic clamp. When these plugs dissolved, water entered one end of the smoke pot and smoke, which was produced by the action of water on carbide, was emitted from the other end. When the mine and anchor parted the smoke pot was freed and came to the surface. This indicated that the two had separated and also that the mine was free to ascend to the proper mooring height. Each smoke pot was given a number corresponding to the mine it represented, and before the distribution box was lowered, a check was made to insure that all of the mines and anchors had separated. Where a failure to separate was noted the mine cable was underrun and the condition corrected ordinarily by means of yanking on the cable.

i. After all mines had been planted and the distribution box lowered, all tell-tale objects including buoys, markers, smoke pots and flotation reels were removed to prevent disclosure of the location of the mine field.

j. The Japanese maintained that it took from 3 to 4 hours to plant a single group of mines after the shore cable had been laid and the mine field marked. This time appears excessive as it is believed that a well trained crew could plant a Japanese mine field in less time than it would take us to plant one of our fields. They also stated they they fastened the mine and anchor together for safety reasons. A more reasonable explanation would be that since the mine cable was used as a mooring rope, it was subjected to a smaller strain when the mine was allowed to float toward the surface than when allowed to take up the sudden strain of a sinking anchor.

38. Picking-up of Type 92 Mine Field. a. Since the distribution box was neither anchored nor marked, the mine field was picked up by starting with the casemate end of the shore cable. Ordinarily, the same type of vessel that laid the shore cable picked it up. When the distribution box was raised aboard ship the waterproof housings were unbolted and the individual conductors were cut at the joints. The face plates were replaced and a buoy attached to the waterproof housing of each cable. The distribution-box end of the cable, with buoy attached, was thrown overboard and usually a mine layer of approximately 150 tons came alongside and picked up the buoy. The cable was hauled in by hand until the mine case came to the surface. The case was then hooked and raised aboard by means of a block and tackle, as the crew continued to haul in the cable. When the anchor was awash it was hooked and raised aboard by means of a winch and a wire rope. The cable was hauled in by manpower as much as possible in order to keep from kinking and breaking it. Barring mishaps, it took from 5 to 6 hours to pick up a group of mines.

b. Witnesses stated that they had not developed any method of repairing a single mine in a field since they had never had occasion to make such repairs. As an example, they referred to the mine fields in the Tokyo Bay area which had been planted in November, 1941, and had functioned perfectly when fired in August of 1945.

39. Type 94 Controlled Mine Field. a. The Type 94 mines were planted in groups of four mines which, when planted, rested on the bottom. Neither elaborate equipment nor preparations were required in planting the field. The lines of mines were marked by setting up ranges on land which also served as guides for the planter. Any vessel that was available and large enough to carry the equipment was used as a planter.

b. The planter was loaded and the mines, with buoys attached, were connected in parallel to the shore cable on board ship. The planter moved down the line of mines at a uniform speed, in order that the desired distance between mines could be obtained by dropping a mine after the lapse of a computed time interval. The mines were dropped off the stern of the boat and the cable between mines was payed out by hand. Sufficient slack was allowed in the cable between mines to keep it from fouling or breaking. After the four mines were dropped the planter continued toward the casemate by the shortest route, paying out the shore cable. Upon nearing the shore, the cable end was transferred ashore by the most expeditious means.

c. The operation was reversed in picking up a mine field. All operations were done by hand and the mines were raised aboard ship by means of the connecting cables.