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DEFENSIVE AND OFFENSIVE TACTICS OF SUBMARINES.

Lecture delivered by

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Commanding Atlantic Submarine Flotilla,

at

U.S. Naval War College,

Newport, R.I.

June 20, 1912.

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DEFENSIVE AND OFFENSIVE TACTICS OF SUBMARINES.

1. Before entering into a discussion of the tactics of submarines it will first be necessary to consider the various means of communication between submarines and scouts or shore stations before sighting the enemy, and between submarines themselves after sighting the enemy.

2. On the surface the submarine has the following means of signalling, the order of their value being given:-

Radio, day or night.

Searchlight, (day).

Searchlight, (night).

Shape signals, (day).

Flag signals, (day).

Wig wag or semaphore, (day).

Very's start, (night).

Wig Wag torch, (night).

3. Submerged the submarine has the submarine bell signal apparatus.

4. Submarines E-1 and E-2 have been fitted with small low power radio outfits and have actually read messages at a distance of ninety (90) miles and have sent messages at a distance of fifty (50) miles. These results were obtained by using expert operators, and until the electricians of the submarines become expert operators, good results cannot be expected. The aerial is stretched between two masts which fold down on the deck when preparing to work submerged.

5. Of the means of surface signalling nothing need be said as everyone is familiar with their uses and capabilities.

6. The submarine bell can be used between submarines or between submarines and tenders or shore stations at distances varying with the attending circumstances. Under the most favorable conditions, i.e., all machinery stopped, signals may be

exchanged at distances up to eight (8) miles, with fair success. With machinery running, and under the most unfavorable conditions, i.e., boats running in opposite directions, signals may be exchanged at distances up to one-half of one mile.

7. Of the various means of signalling employed above, except the radio, it must be remembered that none can be used in the face of the enemy without betraying the presence of the submarine group. As the submarine has a submerged speed probably inferior to the surface speed of the enemy, and as the enemy can easily keep out of torpedo range, it is highly important that no signals be sent that might give the enemy warning of the presence of submarines and cause the enemy to retreat. It will be noted therefore that in the following paragraphs on tactics, signals are not used after the smoke of the enemy is sighted.

8. Definitions are here given to the terms, "light conditions, awash condition, and submerged condition".

A submarine in the "light" condition has all of its water ballast tanks empty and has its cruising bridge rigged. With the present form of cruising bridges, it is estimated that at least twenty (20) minutes will be required to trim down to the "submerged" condition. In the new boats, however, folding bridges are under consideration which will require a much less time to strike down.

A submarine in the "awash" condition has only those water ballast tanks empty which are habitually kept full when running submerged. The fore and aft trimming tanks and two smaller tanks called the auxiliary tank and adjusting tank, are filled with just enough ballast so that when the main ballast tanks are filled, the boat will be immediately ready for running submerged without further adjustment of ballast. The quantity of water in the trimming tanks and in the auxiliary and adjusting tanks, in the "awash" condition is so small in comparison with the total ballast, that for all practicable purposes the submarine has the same stability and safety as when running "light". In the

"awash" condition a small section of bridge may be kept up for the lookout, and the conning tower hatch may be kept open and the radio rigged. It is estimated that five (5) minutes will be required to trim down to the "submerged" condition from the "awash" condition. If any fuel is used while in the "awash" condition, the additional necessary weight can easily be computed and added to the trimming tanks. In time of war, all submarines on station should habitually remain in the "awash" condition.

A submarine in the "submerged" condition has its ballast tanks and other tanks so filled that there still remains a small reserve of buoyancy (0 to 800 pounds) and is all ready to run submerged.

T A C T I C S.

1. For the purpose of tactics submarines may be divided according to their capabilities into three classes, viz; harbor defense, coast defense, and sea keeping offensive submarines. Of the submarines now built or building in this country, the boats of the "A", "B", and "C" classes may be considered as harbor defense boats. Boats of the "D", "E", "F", "G", "H", and "K" classes may be considered as coast defense boats. There are at present, no sea keeping offensive submarines building or contracted for in our country.

2. Of the harbor defense submarines there are seven (7) "A" class, three (3) "B" class, and five (5) "C" class, making a total of fifteen (15) harbor defense submarines.

Of the coast submarines built or building there are three (3) "D" class, two (2) "E" class, four (4) "F" class, four (4) "G" class, three (3) "H" class, and eight (8) "K" class, making a total of twenty-four (24) coast defense submarines.

3. Taking into consideration the capabilities of the harbor defense boats, the "A" and "B" classes should be sent to the Philippines, where the areas of defense around such strategical points as the entrances to Manila or Subig Bays are comparatively

small. Four (4) of the "A" class are now in commission in Manila Bay, two (2) "A" class are in commission on the west coast; one (1) "A" class and three (3) "B" class are in reserve in Charleston, S. C. The five (5) boats of the "C" class are admirably adapted for the defense of either end of the Panama Canal. For the protection of the harbors on the East and West Coasts of the United States, there should be a group of five (5) coast defense submarines and one suitable tender stationed at each of the harbors and places which are considered worthy of protection for strategical reasons. There are now only twenty-four (24) coast defense submarines available for this purpose and it is estimated that for the proper protection for the East and West Coasts of the United States, there should be a total of fifty-five (55) coast defense submarines on the East Coast and a total of forty-five (45) coast defense submarines on the West Coast. These submarines should be based on mobile tenders located as follows, one group of five (5) boats operating from each base:-

E A S T C O A S T.

Bar Harbor, Me.
 Portsmouth, N. H.
 Gloucester, Mass.
 Provincetown, Mass.
 Point Judith Breakwater.
 New York, N. Y.
 Delaware Breakwater.
 Norfolk, Va.
 Charleston, S. C.
 Key West, Fla.
 Pensacola, Fla.

W E S T C O A S T.

Port Townsend, Wash., two groups.

Columbia River, Ore., two groups.

San Francisco, Cal., two groups.

Santa Barbara, Cal., one group.

San Pedro, Cal., one group.

San Diego, Cal., one group.

4. As stated before, there are now twenty-four (24) coast defense submarines built or building and a total of one hundred (100) are required to form a complete chain of defense about the great harbors and cities of our country. No mention has been made of the submarines for the defense of our over-sea possessions, such as Guam, Hawaiian Islands, etc., but it is believed that a mobile tender with a group of five (5) coast defense submarines will most effectually prevent the operations of a hostile fleet in these waters.

5. The tactics of a group of harbor defense submarines are extremely simple. Their limited submerged radius and speed will not enable them to operate far from the entrance of the harbor which they are protecting. The lack of reliable under-water communication makes it impossible to change plans of action once the group is submerged, without giving the enemy a clue as to the submarine's whereabouts. The argument might here be made that the enemy must know that certain harbors have submarines for their protection, and that a prudent enemy would not venture to attack such a place, and that the submarines would thus accomplish their object without further effort. That might be true enough, but there are always enough Commanders of the "Damn the torpedoes and submarines" type who would take the risk, and it is for such kinds that arrangements must be made. Any form of under-water signalling device at use in the present time can be accurately located in direction by the enemy. This apparatus for locating the direction of submarine signals is installed on practically every modern ship. So, for this reason alone, must

the detailed plans for a group of harbor defense submarines be made explicit enough to cover every phase of an attack by a determined enemy.

6. Each boat of a group must be assigned a certain area outside of the harbor, which will be its zone of defense, these zones to be so selected that all approaches to the harbor are protected and to be at such a distance from the point of defense that the enemy will never come within gun range. Most of our harbors lend themselves naturally to such a method of defense by the form of the channels leading to them or by the presence of islands in the vicinity. A harbor defense group, having received warning from scouts or shore stations, of the movements of the enemy off the coast, immediately proceeds to the entrance, leaving the tenders inside the harbor. Submarines anchor, in the "awash" condition, radio up, in the centers of their zones and keep a lookout for the enemy. By subdividing the total area outside each harbor into numerous small squares and using short code words to designate squares and directions, our scouts in touch with the enemy can easily keep the waiting group of submarines informed as to the enemy's movements. This method was successfully used last summer in the combined maneuvers off Block Island, and had the waiting submarines been equipped with radio, the results would have been better than they were. As it happened last year, the submarines were dependent on a fast scout to come from an inner scouting line and give information by signal or megaphone to the submarines in their zones. The waiting submarines having ascertained definitely or in all probability that the enemy will pass close to their harbor, immediately get up their anchors, lay down their radio masts and submerge as soon as smoke appears on the horizon, with a moderate amount of their periscopes exposed, a submarine can easily see a large in clear weather for a distance of seven (7) or eight (8) miles. During maneuvers in Long Island Sound with the U.S.S. DIXIE, her masts and smoke were easily seen--

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from the SNAPPER'S (C-5) periscopes at a distance of nine (9) miles, with about four (4) feet of periscopes exposed. The submerged group, each boat in its zone, remain stationary until the movements of the hostile fleet is definitely ascertained. By the arrangement of the zones, the enemy must pass close to one submarine; the other boats must then move over toward the enemy, at such speeds and with just enough periscope exposure to enable them to get within torpedo range without detection. Once within torpedo range they keep their periscopes exposed and make all speed possible to get within easy torpedo range to fire their torpedoes at that part of the enemy's formation previously assigned to them. In this last maneuver they must act regardless of their other boats and must take the risk of collision. On this final charge, the submarine bells may be rung continuously to assist the submarines to keep clear of each other. Having fired their torpedoes, the boats submerge totally, and reload their tubes if they have spare torpedoes. During the period of reloading they may run at such depths as would enable them to pass under the enemy's vessel, or if the depth of water permits, they can rest on the bottom until the reload is finished, when they should return to the surface to inflict such further attack as is possible. A submarine having exhausted her supply of torpedoes has still a most formidable weapon in her ram. That this weapon is most efficacious and without much danger to the crew of the boat was proven in the fall of 1910, when the C-4, at a comparatively low submerged speed, rammed the tender CASTINE, causing her to settle immediately. There can be no doubt that the torpedo properly adjusted, and used with the short ranges possible in harbor defense, will be effective. There are even instances on record where torpedoes with exercise heads have seriously damaged the hulls of vessels by the force of impact.

7. The harbor defense group, having exhausted its means of offense should return to the tender, submerged, if necessary, or under cover of darkness, to replenish torpedoes and storage

batteries.

8. For the night defense of the harbor, submarines remain on the surface in their zones, being used in this manner most effectively as surface torpedo boats. The tactics on the surface as torpedo boats are similar to the tactics employed in surface torpedo craft, and as they are well known to the service, they need not be described here.

COAST DEFENSE SUBMARINES.

1. The distinction between a coast defense and a harbor defense submarine lies in the greater submerged and surface endurance, the greater submerged and surface speed, and the better habitability conditions of the coast defense boat. Taking boats of the "D" class as the most inferior of our present coast defense submarines, we find that boats of the "D" class have been making cruises up and down the coast as far south as Norfolk, Va., and as far north as Gloucester, Mass. They have had engine troubles that have made them more or less unreliable but recent changes in the propellers and in the correction of weak points in the engines, have made them practically self sustaining for periods for ten (10) days at least with a surface radius of about one thousand (1000) miles. Their submerged radius is about thirty-five (35) miles at a speed of about eight (8) knots, and about seventy five (75) miles at a speed of about five (5) knots. These boats have made all their cruises up and down the coast in various conditions of weather and with a fair amount of habitability, all without convoy. They may well be considered as "Coast Defense" submarines. As regards armament, these boats have a nest of four (4) 18" torpedo tubes in the bow, capable of taking any 18" torpedo now in service. (NOTE.- The tubes of the "D" class are still five (5) meter tubes but job orders and plans are now issued to lengthen the tubes during the next overhaul period.)

2. It will be noted that in the defense scheme for East

and West coasts, submarines of the "coast defense" type have been used. Our Government, on account of the general topography of its coast should not build any more strictly "harbor defense" boats. A "coast defense" group will accomplish with greater effect the same duties that are now accomplished by the harbor defense group. Countries in Europe are so close together that smaller submarine craft and more of them are of greater military value than fewer and larger submarines. Our general policy of submarine construction should not be too greatly influenced by the building programs of European nations. Our's is a separate and distinct problem.

3. In considering the tactics of a group of "coast defense" boats, it is assumed that information has been received from reliable sources, scouts or shore stations, that the enemy's fleet is approaching our coast with the evident intention of seizing a base or of landing a force. The group proceeds at its highest reliable surface speed (ten knots for the "D" class, and about eleven knots for the "E" class) in column in the "awash" condition with radio up, to intercept or to come in contact with the enemy. The submarine with its low hull can easily distinguish the masts and other characteristics of a vessel when the submarine cannot be seen at all. On sighting the smoke or masts of the hostile fleet, and having approximately determined his course, the entire group immediately submerges, after rigging down the radio, and proceeds submerged at about one-half ($1/2$) mile distances in the general direction of the enemy at such speeds and under such general instructions as may have been previously issued by the group commander. The submarine group, submerged at one-half ($1/2$) mile distances, can easily keep clear of each other. They must then maneuver to keep a position on either bow of the enemy's column in order to insure their getting within torpedo range before being sighted. By "torpedo range" is meant two thousand (2000) yards. This approach must be made totally submerged with an occasional "porpoise" or periscope exposure of short duration. When within

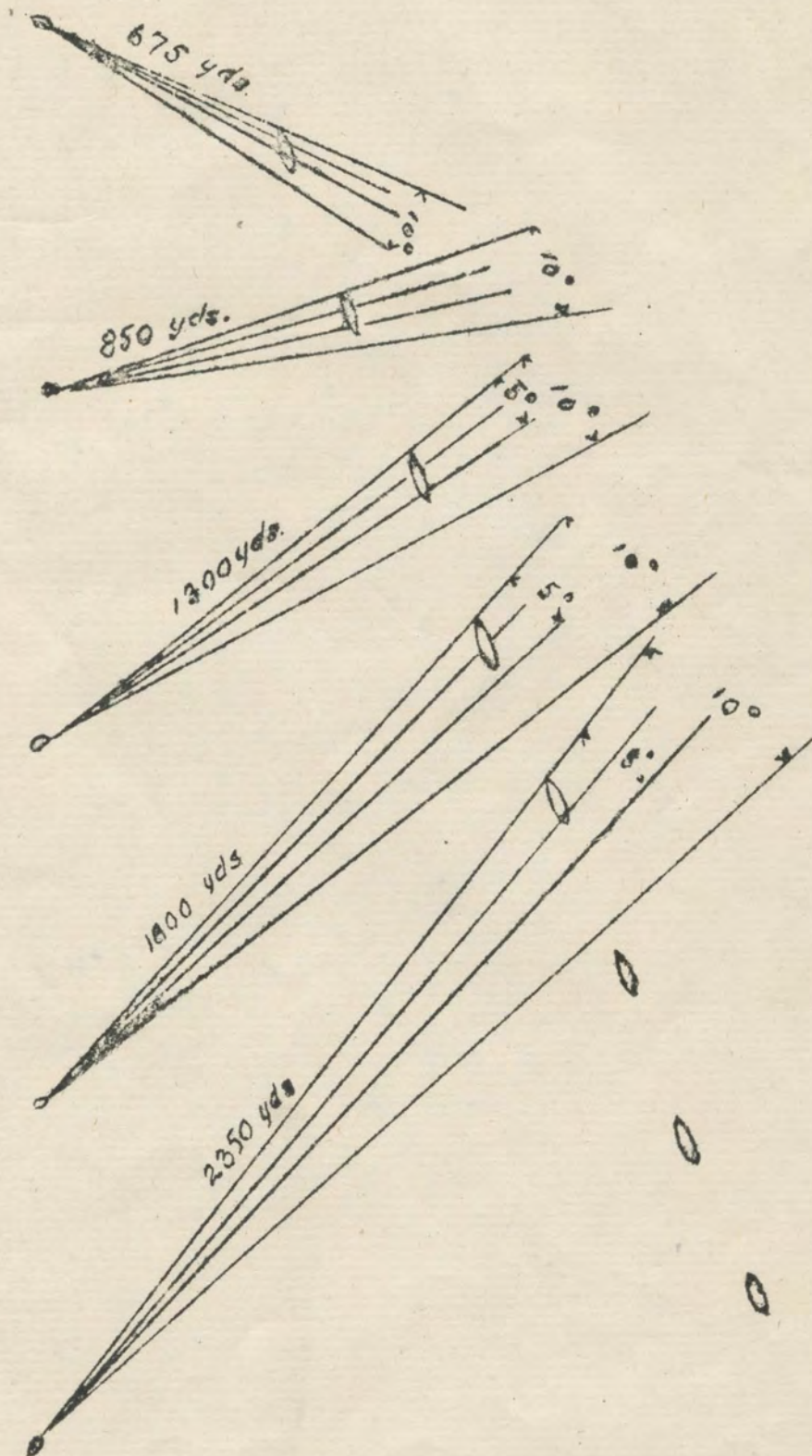
~~torpedo range~~ periscopes should be exposed enough to keep an easy bearing on the enemy and the speed increased as much as possible to arrive within "easy" torpedo range, (between 500 and 1000 yards) before the enemy has time for a concerted maneuver. Each submarine fires its torpedoes at the parts of the formation previously agreed upon, totally submerges, reloads as soon as possible, and returns to the attack. The following sketch to scale shows the most favorable conditions under which a group of submarines in contact with the enemy can fire their torpedoes. Using the Mark VII, 18" torpedoes capable of angle fire, a four (4) tube boat should set one (1) torpedo to run five degrees to port of her keel, two (2) to run straight ahead, and one (1) to run five degrees to starboard of her keel. See sketch on following page.

4. The movements of each individual boat in contact with the enemy will be dependent on the enemy's formation. Table showing the proper bearings on which to fire torpedoes with maximum chances of hits, have been compiled for every possible formation and are readily understood by submarine officers. It is not hoped that every shot will be a hit nor that every ship of the enemy's force will be disabled. It is hoped that, however, with the above method of firing enough damage will result from the discharge of twenty (20) torpedoes to prevent the enemy from accomplishing his purpose. Attention is also invited to the fact that with accurate knowledge of the enemy's whereabouts off the coast, two or more coast defense groups may be despatched to the probable destination of the enemy to deliver an attack as shown above.

Distance between ships -- 500 yds.

Distance between submarines -- 1000 yds.

Length of ships -- 450 feet.



Under such a condition the other group should attack other parts of the formation. Submarine groups, having exhausted every means of offense, including the torpedoes and ram, should withdraw submerged at low speed or lie on the bottom if that is possible, until night fall and then return to the base of supplies under cover of darkness, charging their storage batteries on their way in to the base. All attacks so far have been assumed at a moving enemy. Should the attacking group discover the enemy at anchor, landing troops or establishing a base, they should continue as above outlined, totally submerged with only an occasional "porpoise" of short duration until well within torpedo range, when the periscopes should be kept exposed until the torpedoes are fired at easy range at prearranged parts of the enemy's formation. No special difficulty is anticipated in passing the line of enemy's scouts or pickets with the submarines running totally submerged with occasional "porpoises". This point, however, must be determined this summer during attacks on a fleet which is protected by a picket line of scouts or torpedo boat destroyers.

5. It must be understood that after the reload of torpedoes, the submarines must act absolutely independently and that it is impossible with the present lack of underwater signal facilities to communicate. In all cases the chief duty and aim of the group commander must be to bring all of his group into contact with the enemy and within torpedo range at the same time. Having done this, it is up to the individual commanding officers to produce the desired results.

TACTICS OF AN OFFENSIVE SEA-KEEPING GROUP OF SUBMARINES.

1. It is not within the province of this discussion to determine the exact tonnage and horse-power of a "sea-keeping" submarine. That information can only be obtained by actual experience in running a group of submarines with a fleet en-

gaged in active war maneuvers. No amount of computation of the number of cubic feet of space necessary for each person on board will suffice. A "sea-keeping offensive" submarine may be defined as a submarine which can keep the sea, ready for duty under all possible conditions of weather for indefinite periods. Such a submarine group could obtain its supplies from vessels of the fleet which it accompanies and be in every respect as mobile as any unit of the fleet.

2. The tactics of such a submarine group after contact with the enemy will be the same as the tactics already described for harbor defense and coast defense submarines in contact with the enemy. The problem of maneuvering such a group into contact with the enemy or, to more accurately state the case, the problem of maneuvering the enemy's fleet into the "submarine danger area" must be solved by the Commander-in-Chief.

3. As an illustration of the use of one or more offensive submarine groups accompanying a fleet, let it be assumed that the submarines have a surface speed capable of cruising with the fleet at any speed that may be required to keep up with the fleet. Let it also be assumed that the submerged speed and the radius of the submarines is about twelve knots for one hour, or about eight and one-half knots for four hours, or about five knots for fifteen hours. These assumptions are not excessive, and as a matter of fact, are now attainable in our "E" class of boats with the exception of the surface speed necessary for cruising with the fleet. Suppose also that in the cruising formation submarine groups take position on either flank of the fleet. The submarine groups are in the "awash" condition ready for instant use. The Commander-in-Chief having received information from his scouts of the presence of the enemy, or having sighted the enemy, should immediately send his submarine groups "awash" off on a bearing previously decided upon, and then endeavor to maneuver his opponent into the area occupied by the submarines. The submarines may remain "awash"

until the enemy's smoke or masts are sighted. If our Commander-in-Chief possesses a superior speed, he can choose his own situation and having patience, can eventually bring the enemy into the submarine area. If our Commander-in-Chief possesses the inferior speed, he may be forced into action before bringing the enemy into the submarine area. In this case submarine groups should maneuver "awash" or "submerged", as is necessary to keep out of the enemy's sight and endeavor to attack the enemy's formation as soon as possible without interfering with the movements of the Commander-in-Chief. If our Commander-in-Chief has the inferior speed and inferior force, and if the enemy is determined to bring about an action, the problem of making him cross a submarine danger zone is greatly simplified. The appearance of several groups of submarines within or very close to his formation just before a general gun action, would undoubtedly cause the enemy to so alter his plans and formation that he would be at a temporary disadvantage and at the mercy of our fleet. Even if all the torpedo shots missed, the effect on the morale of the enemy would be sufficient to give our Commander-in-Chief a temporary advantage. Most of the important fleet actions have been fought in sight of land or close enough to shoals to cause the movements of the vessels in action to be somewhat restricted as to courses. In cases of this character, the Commander-in-Chief can so station his submarine groups as to increase the chances of forcing the enemy into the submarine danger area. The Commander-in-Chief must make a careful study of the areas in which fleet actions may be anticipated in order to utilize to their maximum value, the capabilities of the submarines in his fleet. If the Commander-in-Chief desires to withhold the submarine attack until after the gun fire, the submarine group should be kept in the background within easy radio signal distance, but in doing this, the Commander-in-Chief must realize that it will be more difficult for the submarine groups to make a successful dash across the space between the engaged fleets, due to the in-

ferior submerged speed of the submarines. Ships of the enemy that are all ready disabled would in such cases become easy prey for the submarines. Submarine groups accompanying a fleet are decidedly offensive weapons and of the greatest value when used just preceding a general gun action.

4. A ruse which might assist in forcing the enemy to keep away from certain areas and thus increase the chances of making the enemy cross the submarine danger zone, would consist of having the fast scouts of the fleet drop numerous poles, properly weighted to float upright in the water, and painted to look like a submarine's periscope. These same dummy periscopes floated out of a harbor with an ebb tide or dropped outside by scouts or fishermen may greatly influence the movements of an enemy sighting them. It would be extremely difficult to distinguish between dummy and real periscopes for it is very easy for a submarine to lie submerged and stationary with only a small amount of periscope showing.

5. The night maneuvers of submarine craft are the same as for surface torpedo craft and the same tactics should apply. As there is no possibility of "torching" and as the hull is so low in the water, it is extremely difficult to pick them up at night, even in the full rays of the searchlight. The maneuvers off Provincetown in the summer of 1911, demonstrated that in nearly every case the submarines could come within easy torpedo range of the enemy at night without detection. In a night attack submarines should remain in the "awash" condition, so that in case of self-preservation, or to pass through a picket line, the submarine can quickly run submerged.

RECOGNITION SIGNALS.

1. At night submarines on the surface will use the same recognition signals used by all surface vessels of the fleet. During daylight operations the problem of recognition is much more difficult. At comparatively short ranges, three thousand (3000) yards and less, the submarine submerged can recognize a

friendly vessel by her silhouette, or at shorter ranges by certain flag or shape signals shown from specific parts of the surface vessel. If surface vessels are fitted with submarine signal apparatus, code recognition signals may be sent using the bell within the limited distances mentioned in this discussion. By properly screening a submarine bell, it is quite possible to send the sound waves out on a line of bearing, or at least within a very small arc. However, in the absence of the submarine bell, the battleships or surface vessels must rely on their flag or shape signals to make themselves known as friends. The submarine has only two methods of recognition signals at her disposal, one, sounding code words or letters on her bell, and the other, carrying a certain shaped flag or pennant on her periscope. It would seem that the submarine bell method would be more efficient at greater distances than the other method but it has the disadvantage of warning friend and foe alike of the presence of submarines. From a submarine officer's point of view, it would seem far better to trust to the judgment of the commanding officer of the submarine to recognize friendly vessels, which he could most certainly do from a silhouette diagram at comparatively long ranges. After recognizing a friend a submarine may rise to the surface and exhibit surface recognition signals if such are necessary. This method, however, might endanger the submarine before she is recognized as a friend. The submarine officer desirous of getting within easy torpedo range would be very loath to disclose his bearing to a probable enemy by sounding his bell.

2. The ultimate answer to all doubtful points under discussion can only be found by continuous combined battle maneuvers, using all the necessary units of a fleet, and it is hoped that the coming exercises with the U.S. Atlantic Fleet may set at rest any existing doubts as to the military value as to the various types of submarines.

NOTE: This paper on "Defensive and Offensive Tactics of Submarines" was sent to the Navy Department with this letter of transmittal.

Confidential.

ATLANTIC SUBMARINE FLOTILLA,

U. S. S. E-1,

Newport, R. I.,

May 17, 1912.

From: Senior Group Commander, Atlantic Submarine Flotilla.

To: Secretary of the Navy, VIA Commander, Torpedo Flotilla,
Atlantic Fleet.

SUBJECT: Defensive and Offensive Tactics of Submarines.

1. Reference.- Letter No. 2725-224:1, HLJ-OG, dated April 25, 1912, from the Secretary of the Navy.

2. In accordance with the orders of the Secretary of the Navy, the Senior Group Commander has conferred with the Commander of the First Group, Atlantic Submarine Flotilla, also with Lieutenant H. M. Jensen, U. S. Navy, recently commanding the Submarine Group in Asiatic waters and now commanding the tender TONOPAH, and with all of the commanding officers of the Atlantic Submarine Flotilla. The reports of the Intelligence office on Foreign submarines and tactics have been carefully considered in the preparation of the following "study of the defensive and offensive tactics of the submarine".

3. The data and information at hand is decidedly meagre and such data can only be obtained by continued combined maneuvers of a battle fleet and one or more submarine groups.

/s/ C. W. Nimitz.

(1 Inclosure.)