CHEMICAL WARFARE

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SMOKE

The subject of my lecture this afternoon is "Smoke", including technical details, methods of placing smoke on a target, and the tactical use of smoke, following which we will discuss the Agenda and any other matters which you may want to bring up. I should like to devote my entire time this afternoon to the tactics of smoke in combined operations, but for two reasons I cannot do that. First of all, it would involve the assumption that you are all intimately familiar with the tactics and technique of smoke in general, which probably many of you have not thought about for some time, and secondly, even if I could go on that assumption, there are not enough data yet developed along the lines of smoke tactics in combined operations to justify spending that much time on it. I think that one of the important missions that you gentlemen will be called upon to perform upon conclusion of your studies here is to take the very meager information and thought that is now available on that subject and develop it to the extent necessary to put it into operation. To do this you will need a firm grounding in smoke in all its phases, and it will be my object to point out what these phases are, and to cover briefly the salient features of each, so that you may use my remarks as an outline for further detailed study. I have, therefore, divided my lecture into four parts, and I suggest that at the conclusion of each part we call a short recess, so as to avoid feeding information to you too quickly, and to enable you to ask any questions about points which may not be perfectly clear. The four parts are as follows:

First, some fundamental basic data on the nature of smoke itself, and the smoke weapons available to you.

The second part consists of smoke technique, and the technical methods of putting smoke down where it will do the most good.

The third part covers smoke tactics in general, and the final part, smoke tactics as applied to combined operations.

This may appear to be covering the field in unusual detail, but I offer as my excuse for that the very firm conviction that if you don't know the details of what you are trying to do here, smoke may prove a two-edged weapon. When properly used it has been demonstrated over and over again that it is of very valuable assistance in combat of almost every kind. Improperly used it may be much more of a detriment than it is of a help. As proof of this statement, I invite your attention to the report of the Dieppe Raid. I have not looked at this report myself for some time now, and cannot quote exact instances, but I remember very clearly that the report presented excellent illustrations of the proper and improper use of smoke. When it was properly used in this raid it was undoubtedly of great assistance, and when it was improperly used, it

was of considerable detriment. In certain instances the proper or improper use of it was both tactical and technical, whereas in other cases the tactical conception was logical, but the smoke was applied poorly technically, and vice versa. With these preliminary remarks therefore, I am going to start out at the very basis of the matter - that is to say, where smoke comes into the fundamental picture of Chemical Warfare as we see it.

Part I - Smoke Fundamentals

Tactical Classification: Chemical Warfare Agents may be classified tactically into four main categories, as follows:

a. Casualty Agents - Intended for use directly against personnel, for the purpose of causing casualties.

b. Harassing Agents - Intended for use against personnel or materiel, to make necessary the wearing of gas masks over prolonged periods.

c. Obscuring Agents - Intended to interfere with visibility.

d. Incendiaries - Intended to cause destruction of materiel by burning.

Now, the agents with which we are concerned this afternoon are the Obscuring Agents, which are the smokes, but the first thing to bear in mind is that there is no watertight compartment of these four categories with respect to any particular chemical concerned. White phosphorous, for example, which is one of our most prominent smokes, has also a very definite place under other headings. It is, for instance, an Incendiary - not a particularly good one for burning materiel, but when these incendiary properties are used against personnel it is a most excellent casualty producer. White phosphorous, therefore, should be shown in at least three out of the four main tactical classifications - that is to say, it is a casualty agent, and obscuring agent and an incendiary. There are also certain smokes known as "irritant smokes", whose main purpose is to produce a moderate casualty effect or strong harassing effect. They also produce a certain obscuring effect, but it is usually decidedly poor in quality, and this property is therefore not considered as a part of their tactical possibilities. This brings out the important point that in using smokes tactically for obscuring purposes, there are other possible effects that must be taken into account. The casualty producing and incendiary effect of white phosphorous is an example already quoted. Other smokes appear to be completely harmless. Still others are harmless as far as the smoke itself is concerned, but there are certain by-products in connection with the smoke formation that are corrosive or otherwise difficult to deal with. Those that seem completely harmless have sometimes caused trouble under extraordinary conditions. Recently in North Africa casualties occurred among native labor down there from smoke which heretofore has been considered completely harmless. Investigation discovered that these men had been working in the hold of a ship in an extremely heavy smoke cloud for several hours at a time. Now, gentlemen, almost anything that you put in the air is toxic if the concentration is strong enough, and you breathe it for a sufficient period of time. Take even tobacco smoke, for example. Some of you have probably received unpleasant effects in your eyes and head after a long poker game, which you may have attributed to other causes, but which were primarily due to absorbing large quantities of tobacco smoke over a long period of time.

If you get a concentration of anything in the air in sufficiently large quantities, and breathe it over a sufficiently long period of time, you will become a casualty, and may even lose your life. This is a matter of minor importance under ordinary circumstances, but it does bring up the possibility of trouble under certain conditions. The obvious remedy is either to relieve your workers frequently, or for them to wear gas masks

Definition of Smoke: The next question is: "What is smoke, anyhow?" The answer, from the strictly scientific viewpoint, is that smoke is a cloud of very minute particles (solid particles, you might call them - chemists would call them "colloidal particles" or "aerosols") suspended in the air. A true smoke, under that very narrow definition, is independent of the force of gravity, and acts very much as does a solution of a solid in water. It almost never happens, however, that a 100% true smoke is present in the air. Nearly always there is a certain percentage of particles which are large enough to be called "minute solids", and as such are subject to the force of gravity, and eventually settle out of the air. A smoke consisting primarily of particles in that form is called scientifically a "dust", and the typical smoke is therefore a mixture of true smoke and dust. The particles of true smoke, or aerosols, also tend eventually to coalesce together, forming larger particles, so that a true smoke eventually becomes a dust and settled down out of the air. There is a third possibility of getting very minute drops of liquid in the air, which is called a "fog". The particles in this case exhibit a behavior similar to true smokes and dusts and show the same tendency for the particles to grow larger and eventually settle out of the air. In practical chemical warfare we use all three of these states of matter indiscriminately, and refer to the whole thing as "smoke". Therefore, from now on, when I use the term "smoke", I mean any one of these possibilities or a combination of all three.

Method of Obscuring: The next question is: "How does smoke produce the obscuring effect which we are seeking?" In answering this, first consider a single particle of smoke in the air, and a beam of light impinging thereon. Now this smoke particle may act on the beam of light either by absorption, reflection or refraction, or a combination of all three. The relative predominence of these effects depends upon the color of the particle and upon its opacity or transparency. If the particle is dark in color, the effect is principally absorption, and if the particle is black, the effect is almost wholly absorption This form of obscuring means that a concentration of particles amounting to the equivalent of a solid wall or curtain must be set up in order to be fully efficient, because where absorption is the only effect any beam of light which does not impinge on a particle passes through the screen undistorted. In this connection it is interesting to recall that smoke used for tactical purposes prior to the last world war was nearly always black or dark in color, of which the carbon smoke from naval destroyers is a typical example. This smoke was produced by damping down the flues of the ship's boilers, thus causing incomplete combustion, and the emission of finely divided carbon particles into the air. Inasmuch as the smoke obscured through absorption only, it was necessary to have thick cloud in order to blot out all light and consequently this smoke cloud was volume for volume the least efficient

that possibly could be devised. Furthermore, the incomplete combustion caused heavy deposits of carbon in the boiler flues, and a great deal of extra and dirty trouble for the ship's crew at the conclusion of the exercises.

If the smoke particle in the air is white in color, a certain amount of absorption remains, but the principal effect is reflection. In this case, unless the beams of light impinge upon all the particles absolutely perpendicularly - which is impossible, except for a minute number of particles present - the reflected light travels back at an angle from its original direction, and so crosses and interferes with other beams originally travelling parallel thereto. In other words, the light, as a whole, is considerably distorted, including those rays passing through the screen, and which do not impinge directly upon any particle.

If the particle is transparent, a certain amount of absorption and reflection takes place, but the majority of the light beam passes through the particle, but is refracted in so doing, and comes out on the other side at an angle from its original direction. Thus, a considerable portion of the light passes through the screen, but is so distorted in doing so that obscurance is entirely satisfactory.

Summing this up briefly - smoke particles obscure by absorption, reflection or refraction. Probably no smoke obscures by one of these methods entirely, except, possibly, the black smoke, by absorption only. The efficient smokes obscure by reflection or refraction or both, with a comparatively small amount of absorption. The change from absorption to reflection varies directly with the color, the black smoke obscuring almost entirely by absorption, the white smoke almost entirely by reflection and refraction, and the intermediate colors by a combination of the three. The standard chemical warfare smokes are all white or of a light color. In some of them the particles are entirely solid, in others entirely liquid, and in still others a combination of the two. The latter effect is achieved by releasing into the air solid particles of a substance which is very hygroscopic. Such a substance then readily absorbs water vapor from the atmosphere, which condenses in a liquid layer on the surface of the particle, thus forming a liquid droplet with a solid core.

It is possible to express quantitatively the relative obscuring values of smokes. The unit for this purpose is known as the T.O.P. Value (Total Obscuring Power Value). Unfortunately, I do not have time to explain just what this value is mathematically, or how it is calculated.

Smoke-Producing Chemicals: Smoke munitions differ from toxic chemical munitions in that the chemical contained therein is not the same as the smoke which is finally produced in the air. In other words, it is impossible to load a shell or bomb with condensed smoke, but, on the other hand, chemicals are used which automatically produce smoke when liberated in the air. That is to say, a spontaneous chemical reaction takes place as soon as the chemical filling is released from the container. Strictly speaking, therefore, they should be called "smoke-producing munitions", but practically it is more convenient to call them simply "smoke munitions".

Chemicals for smoke production may be divided into two main classes, based upon the relative speed with which they are transformed into smoke. In the first of these classes practically the entire amount of chemical in the shell, bomb or other container, is transformed into smoke within a few seconds after being released in the air. Chemicals coming under this group might be designated as the "no maintenance type". In the other type the chemical rather slowly transforms itself into smoke by burning effect or otherwise, in which case the smoke cloud is maintained and built up until complete transformation takes place. Chemicals coming under this heading might be designated as the "self-maintenance type". The present principal standard chemicals of the "no maintenance type" are white phosphorous (WP), titanium tetrachloride (FM) and chlorsulphonic acid sulfurtrioxide mixture (FS). Of these white phosphorous is a white, waxy solid, which takes fire spontaneously upon exposure to the air, and burns, forming a white smoke. This smoke has the highest TOP Value of any substance yet discovered, but, owing to the heat effect from the burning, tends to give a so-called pillaring effect in the field in which a considerable portion of the smoke cloud rises high in the air and does not settle down where it will do any good. This effect, however, while undesirable for ground screening has been made use of in connection with screening of aircraft. FM and FS are liquid smokes and when released in the air either from shell, bombs or smoke spray tanks, immediately react with the water vapor of the atmosphere, forming dense white smokes. FS has very largely replaced FM owing to its comparative cheapness. Both smokes produce a strong acid by-product in their formation which is very corrosive near the point of emission or smoke formation, or if the chemical is still in the liquid form, but which quickly dilutes as the cloud travels down the wind. The acid effect is no longer dangerous after the cloud has travelled thirty (30) yards or more from its original source.

The principal standard smokes of the "self-maintenance" type are the HC smoke mixture and oil smoke. The HC smoke mixture is a mixture of chemicals which, when ignited, causes a chemical reaction with the evolution of a great deal of heat. The chemical reaction is not, strictly speaking, combustion, but resembles it in appearance, and is therefore spoken of as a burning mixture, and the heat of reaction is sufficient to distil off the smoke cloud as formed. There are no by-products. The oil smoke may be either the old-fashioned carbon smoke produced by naval destroyers as previously described, or the new static generator smoke, in which a special oil is mixed with water, heated and discharged through a system of fine jets. This produces a white smoke of very high efficiency which is maintained until the supply of oil in the generator is exhausted.

Smoke Weapons: In selecting the suitable weapons for the use of smoke, several important factors must be considered, such as range, capacity of shell or bomb or other container, rate of fire and so forth. There is no ideal, all-round weapon for smoke. If there were, then the use of smoke munitions would be confined to this single weapon. As a matter of fact, a number of weapons are considered suitable for smoke, but each weapon has its strong and weak points, and therefore the use of smoke munitions is fairly widely distributed. At the present time smoke is used in the following weapons:

[redacted]

Artillery,
Mortars,
Bazookas,
Grenades,
Smoke Pots,
Area Smoke Generators,
Aviation Bombs,
Aviation Smoke Tanks.

For many years artillery smoke shell consisted entirely of the "no maintenance" type, and the filling was mostly WP, with small percentages of FM or FS. This shell may be rated as follows:

Range	-	Good
Accuracy	-	Good
Rate of Fire	-	Fair
Capacity	-	Insufficient.

Owing to this last defect, smoke shell of this type are not suitable for producing smoke screens of appreciable size or duration, except under unusually favorable conditions. There has been developed recently, however, a base ejection smoke shell, which, upon impact, discharges from the bottom of the shell two or three canisters filled with HC misture, thus producing a smoke of the "self-maintenance" type. Experience with this type of shell to date is very limited, but it should produce a much more efficient smoke than the old non-maintenance type.

The 4.2" chemical mortar is probably the most flexible of all smoke weapons. Its range is satisfactory, and the rate of fire and capacity of the shell are good. A battery of 4.2" mortars, therefore, can establish and maintain a smoke screen of good size and duration, even under unfavorable conditions. So far the 4.2" smoke shell have been limited to fillings of the non-maintenance type, principally WP. If a base ejection shell for this weapon also can be developed, it should be even more efficient than it now is. Smoke shell for the 81 mm consists entirely of WP filling. The capacity of this shell is too small for smoke screens except those to blind isolated points, such as machine gun nests and so forth, although this shell has considerable additional value as a casualty producer. Both WP and HC fillings have been approved, or are under development, for various small mortars such as the 60 mm and the British 2". There are important tactical uses for smoke producers of this type by infantry troops where ranges of not more than 200 yards are required, and small screens of limited duration are all that are necessary.

Smoke heads are now under development for the Bazooka projectile. Whether these will be of the WP or HC type is not yet known. The use of this weapon for smoke purposes will be the same as in the case of the small mortars described above.

Smoke hand grenades have either WP or HC filling. They are used for close combat work, where small clouds are required, and the WP filling may be used for additional casualty effect.

There is now under development an adapter for the Ordnance grenade launcher, to enable this apparatus to take the smoke grenades. This will enable infantry to project

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smoke grenades for a distance of approximately 200 yards, and will thus provide an alternative smoke weapon to the Bazooka and the small mortars.

Smoke pots are static munitions, and produce smoke clouds which must be placed on the target by drifing down the wind. They were designed primarily for training purposes, but have proven valuable in the recent operations in North Africa for use in forming area smoke screens for the protection of ports and other vital installations. In the early stages of combined operations, the heavy area smoke generators will not be available to protect ports, and thus smoke pots form a capable substitute. Then again, the area smoke generators being located at some distance from the target, as will be explained later, it takes some time to establish the initial screen, and it is thus necessary to build up this initial screen by smoke pots located much nearer to the target. The British have developed an extra large smoke pot for such purposes. There also has been developed a variation of the smoke pot, by which it may be floated on water, producing the smoke cloud while so floating.

The purpose of area smoke generators has been explained above in connection with smoke pots. These generators are of two types. The stationary type is a simple smudge pot, such as often is seen around important factoriss and installations in this country. The vehicular type is a more efficient piece of apparatus, mounted on a truck or trailer, whose position can be shifted, depending upon wind conditions, to the most favorable location. The Esso smoke generator, one of the recent American developments along these lines, produces an extremely efficient and persistent screen of the oil smoke type.

Air Corps smoke bombs may be classified according to design and filling. Under the first classification, we have the aimable bomb with definite ballistic qualities, and the non-aimable bomb with practically no ballistics. The first type resembles the HE bomb in appearance, whereas the second type is nothing more than a modification of a tin gasoline can, with the necessary fuze and burster charge. When classified as to filling, we find that the ballistic type uses nothing but WP, whereas the non-ballistic type used both WP and HC fillings. Airplane bombs are efficient smoke producers since they have great range, high capacity and rate of fire. The only limitation is the carrying capacity of the plane and the number of planes available. There is another collateral limitation, however, in that the bombs of the non-ballistic type must be dropped at very low levels, thus causing vulnerability to the planes establishing the initial part of the screen.

Airplane smoke tanks use either FM or FS as the filling. As the plane moves over the target, the liquid is discharged through a pipe leading from the tank, and sprayed into the air through the effect of the slip-stream. An immediate smoke cloud is formed which lasts until the tank is completely discharged. This is the quickest method of establishing an initial smoke cloud, but if it is desired to maintain the cloud it must be re-established at frequent intervals by additional planes, and if a ground screen is desired, as is usually the case, the plane must fly at low levels, thus causing the same vulnerability as described under the non-ballistic bombs above.

Part II - Smoke Technique

This is a complex subject, and I shall have time to touch only on the high points this afternoon. Details of the principles I discuss may be found in FM 3-5. I shall refer to this Manual from time to time, as I cover certain important points.

Persistence of Smokes: A smoke cloud per se by its very nature is non-persistent. The entire substance is in the air where it will be quickly blown away, diluted, and finally dissipated altogether. A persistent effect can be achieved, however, by replacement of the smoke as fast as it is dissipated. Smoke munitions of the "no maintenance" type, therefore, produce a non-persistent effect, whereas smoke munitions of the "self-maintenance" type produce a persistent effect, until they cease functioning. The original smoke cloud produced by a munition of the "no maintenance" type, therefore, may be regarded as a more or less globular puff, varying in size according to the capacity of the weapon concerned, whereas that produced by a burning type munition is a cloud of definite length, dependent upon the time of burning and velocity of the wind.

Establishment and Maintenance of Smoke Screens: The principles as discussed immediately above, relative to the basic non-persistence of smoke, but the possible persistent effect according to the specific munition used, have a very practical application in the field. To be effective, a smoke screen must first be established and then it must be maintained for the length of time necessary to carry out the tactical action incident thereto. Inasmuch as the smoke cloud does not dissipate immediately, but takes several minutes to do so, it means that the maintenance of the smoke cloud requires a smaller expenditure of material at any given moment than the initial establishment. When we consider the technique of fire in a few minutes, we shall see that the weapons must be fired or ignited at a much higher rate for establishment than the subsequent rate for maintenance. Hence, in dealing with smoke screens in general, we must always follow the basic principle of sub-dividing the problem into the establishment factor and the maintenance factor.

Effect of Weather and Terrain: Smoke clouds being non-persistent are very dependent upon weather conditions, and, to a considerable extent, upon terrain. It is necessary therefore, as a prelude to calculating the size of the cloud and amount of smoke munitions required, to estimate the weather and terrain conditions existing at the time. These conditions as a whole may be classified as "favorable, average and unfavorable". Details of making this estimate may be found in FM 3-5. It should be pointed out here, however, that the fact that conditions may be unfavorable does not necessarily mean that smoke cannot be used successfully. It merely means that more munitions and more effort must be expended to produce the desired effect than would be necessary if conditions were average or favorable. Of course, if conditions are highly unfavorable all along the line, the smoke operation may have to be abandoned.

Travel of a Smoke Cloud: In discussing this matter, I will illustrate it first by a smoke munition of the burning type. Let us assume that a smoke pot is burning on the ground, and that we are observing it from the air immediately above the cloud formed. Suppose the pot has been burning for three (3) minutes. There will then be a solid mass of cloud extending down the wind, and the depth will be determined by the wind velocity at the moment. Viewed from the air,

however, this cloud will not be linear or rectangular in shape, but will be in the shape of a fan, with the apex at the source of emission. This is due to the fact that wind direction is never absolutely steady, but varies through a certain definite arc. Under favorable conditions this arc is comparatively small, and the rate of variation is slow. In unfavorable conditions, known as a "fish-tail wind", the arc is wide and the wind swings rapidly back and forth. In addition to the variation in the direction of the wind, the natural diffusion of the cloud itself tends to cause it gradually to spread sideways as it moves down the wind, and these two influences cause the fan or V-shaped cloud referred to. This effect is known as the "lateral spread", and varies markedly according to whether conditions are favorable, average or unfavorable.

Suppose now, instead of viewing the same cloud from the air, we view it from the ground, but at one side, half-way between the source of emission and the down-wind edge. From this viewpoint we see that the top of the cloud is not parallel with the ground, but that as the cloud comes down the wind, it rises higher and higher. In other words, the side view of the cloud is that of a triangle, with the apex on the ground, and the upper edge forming an angle thereto. This is due to the same diffusion effect as mentioned above in connection with the lateral spread, and also to convection currents that are present in the atmosphere, and the effect is known as the "vertical rise".

If we view the same cloud again from the side, but down-wind at the forward edge of the cloud, we find that this forward edge is not perpendicular with the ground, but that the upper part of the cloud is further advanced than the lower part. This is due to a differential in wind velocity as we go up from the surface of the ground. The wind velocity at ground level is always less than immediately above, and the velocity increases foot by foot as we go up. This differential is particularly marked for the first one hundred (100) feet or so above the ground, afterwards it becomes somewhat less. The result is that the upper portions of the cloud are travelling faster than the lower portions. During the earlier stages of the travel of the cloud down the wind, and before the vertical rise is very pronounced, the upper part of the cloud, which is more advanced than the lower part, tends to roll over in a series of ever-extending circles, somewhat resembling a breaker on the sea coast. This effect, together with the wind differential, causes the depth of the cloud to increase progressively as it travels down the wind, so that after the cloud has travelled a short distance its depth is considerably more than the simple product of the time of emission x the velocity of the wind. This effect due to wind differential is further increased by friction with the ground, particularly if there is any appreciable amount of underbrush or timber present, and this phenomenon is known as the "drag effect".

Let us now go back and illustrate the same phenomena by means of a cloud produced by a munition of the explosive or non-maintenance type. We first get a globular puff of smoke. As it travels down the wind the lateral spread causes it to broaden itself. The vertical rise causes it to increase in height. The drag effect causes it gradually to spread out in depth. Therefore, after it has travelled one hundred (100) yards or so down the wind, the cloud assumes a wedge shape, in which all dimensions gradually increase until it is totally dissipated.

Merging of Smoke Clouds: a. On the Ground - In this case, let us assume that we have a line of smoke pots ten (10) yards apart, and ignite them simultaneously. Each pot produces, owing to the lateral spread, a V-shaped cloud, travelling down wind. Now then, what happens after these sepatate clouds have travelled a certain distance? The answer is that they merge, owing to the lateral spread, forming one large homogeneous cloud.

b. From the Air - Suppose three (3) airplanes, all at the same altitude, but fifty (50) yards apart on each side, release a cloud from smoke tanks simultaneously, flying across the direction of the wind. These clouds are originally almost linear in shape, but as they drift down the wind, the drag effect of each causes them to widen out. Finally, the forward end of the second cloud catches up and merges with the rear end of the first cloud, and the same with the third cloud, so that eventually, due to the drag effect, all three clouds merge. These clouds also spread laterally, owing to the lateral spread, but in this particular case it is the drag effect that causes the merging rather than the lateral spread as on the ground. Of course, ground smoke screens also can merge by drag effect, but that has little practical application. By estimation of weather and terrain conditions, velocity of the wind and so forth, the distance down wind at which these various types of cloud will merge can be estimated fairly accurately.

Dilution of Smoke Clouds: As a smoke cloud drifts down the wind it becomes larger in width, height and depth, owing to the lateral spread, vertical rise and drag effect. If a non-maintenance munition has produced the cloud, or if a self-maintenance munition has ceased to function, the cloud, after drifting a sufficient distance, will expand to such an extent that it has become very much more diluted than it originally was, and the obscuring power is lost. Based on weather and terrain conditions, type of munition and other factors, formulae can be found in FM 3-5 by which the distance that the cloud can drift down wind before losing its obscuring power can be calculated.

Reinforcement of Smoke Clouds: As a corollary to the above discussions as to the behavior of smoke clouds, it is apparent that a smoke cloud drifting down the wind and gradually diluting can be reinforced by using additional smoke-producing munitions. If reinforced at the source, the duration of the cloud will be maintained as long as reinforcement continues, but the effective depth will not be changed. If reinforced by an additional smoke-producing munition down the wind at the same time as the original munition starts functioning, the duration of the cloud will not be affected, but the effective depth will be increased accordingly. Both of these possibilities find practical application in ground warfare, and the second alternative is of particular importance in firing smoke clouds with a lateral wind. This will be discussed in more detail later. Airplane smoke clouds from smoke spray tanks can be reinforced in a similar manner, either simultaneously for greater depth, or progressively for greater duration. The reinforcement of smoke clouds from airplane bombs is a variation of the normal ground technique.

Technique of Fire: Two basic types of smoke screen are possible:

a. The screen to prevent ground or sea observation.
b. The screen to prevent air observation.

Smoke screens established for purpose a. above should be formed in contact with the ground or sea. This type of smoke

cloud will also serve under purpose b. above, but a screen established specially for this purpose should be placed up in the air some distance above the ground or sea, in order not to interfere with ground or sea activities.

It should be re-emphasized at this point that the laying down of smoke screens consists of two main factors - namely, the establishment and the maintenance.

Ground Screen: The proper technique for laying down a ground screen varies according to the direction of the wind.

a. 6 o'clock Wind - Obviously this is the only wind which permits of the use of smoke pots and other static generators. When using projectiles, bombs or spray tanks, the center of impact in the case of projectiles and bombs should be six probable errors up wind from the upwind edge of the target, and the line of flight of the plane in the case of spray tanks should be a similar distance up wind. The reason for this is to allow the individual clouds from the projectiles or bombs to merge before reaching the target, and in the case of the airplane, for the cloud to drag out to a sufficient extent. If more than one plane is used simultaneously, the distance each plane must be upwind is calculated in accordance with wind velocity, so that the clouds may merge by the time the target is reached.

The only exceptions to this rule are where white phosphorous is used as a smoke material, and its casualty-producing effect is to be taken into account. If fired for casualty effect only, then the center of impact coincides with the center of the target, and the corresponding inefficiency of the smoke screen is ignored. If, on the other hand, it is used for combined smoke and casualty effect, the center of impact is placed one probable error upwind. Under these circumstances the smoke screen formed is not perfect, but part of its efficiency is deliberately sacrificed in order to add a fair amount of casualty effect from shells impacting within the target area.

Methods of calculating the number of rounds per minute, according to the size and shape of the target, will be found in FM 3-5. To establish the screen, twice the regular rate of fire as thus calculated is required for the first minute.

b. 12 o'clock Wind - With this wind the center of impact should be two-hundred (200) to five hundred (500) yards behind the front edge of the target in order that after passing over the target and towards our own lines the cloud will be sufficiently diluted so as not to interfere with the movements of friendly troops. The proper rates of fire can be found in FM 3-5 also, and double the rate of fire for the first minute is again required for establishment of the screen.

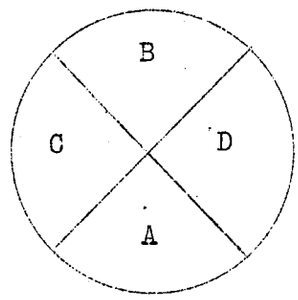
c. Lateral Wind - The center of impact should be two probable errors toward the emplacement from the near edge of the target. The smoke cloud should be initiated on the upwind end of the center of impact, and reinforced at suitable intervals downwind. This means that fire on the upwind point should be at twice the rate of that at the reinforcement points downwind. The same rule applies for establishment at twice the over-all rate of fire for the first minute. In other words, if the average rate of fire as calculated from FM 3-5 for the specific target concerned is two (2) rounds per minute, hence the screen is maintained by an upwind point of impact, reinforced by other points down the wind, and the maintenance rate of fire will be four (4) rounds per minute on the upwind point, plus two (2) rounds per minute on each of the downwind reinforcement points.

For establishment of the screen during the first minute, the rate of fire will be eight (8) rounds per minute on the upwind point and four (4) rounds per minute at each of the downwind reinforcement points.

d. Oblique Winds - It is customary to classify all winds into one of the categories cited above by dividing the circle of the horizon into four (4) equal segments, as follows:

Enemy line

Our line



All winds within the angle of Segment "A" are considered 6 o'clock winds, all those within Segment "B" are considered 12 o'clock winds and those within Segments "C" and "D" are lateral winds, and the technique is employed accordingly. If the wind should be almost exactly on the dividing line between two (2) segments, then a combination of the technique of both types may have to be employed.

Relation of Smoke Front to Target: Let us illustrate this first by using a munition of the burning type, such as a smoke pot. Suppose a certain target is two hundred (200) yards wide and the smoke pot emplacement is several hundred yards up the wind. The line of smoke pots will therefore be laid out with a proper interval between each individual pot. Now, if the distance between the two end smoke pots is also two hundred (200) yards, then a considerable portion of the cloud is almost certain to miss the target, due to variation in the wind direction. To overcome this, a sufficient extra number of smoke pots must be added to each end of the line, or the original number of smoke pots placed sufficiently further apart so that the distance between the two end pots is considerably greater than two hundred (200) yards. A formula will be found in FM 3-5 by which the amount by which the smoke front must exceed the width of the target may be calculated. This principle applies equally to projectiles and bombs. The center of impact in such cases corresponds to the smoke front. As with the smoke pots, this center of impact must extend a corresponding distance beyond each side of the target.

Airplane-produced Clouds: As explained above, this is a variation of the 6 o'clock wind ground screen technique, and when a single plane is used, closely resembles same. When several planes are used, as previously explained, the line of flight of each plane must be calculated, so that the clouds will merge not later than upon reaching the upwind edge of the target. Methods of calculating this may be found in FM 3-5.

Area Smoke Screens: These screens are used almost entirely to prevent aimed fire by enemy aircraft. They should be placed up in the air to avoid interference with ground or sea activities. This may be achieved in two ways:

a. By planes using smoke tanks, but releasing the smoke several hundred feet above the ground.

b. By area smoke generators placed at some distance from the target.

Planes are not very well suited for this purpose, except for the initial establishment of the screen, as they are seldom available in sufficient number to maintain it.

Area smoke generators are satisfactory for maintenance, but when placed at the proper distance from the target are slow in establishing the initial screen. To overcome this, an inner ring of generators or smoke pots, just outside the target area, is necessary. Both rings are used simultaneously to establish the screen, after which it is maintained by the outer ring only. The inner ring produces a temporary ground screen until the outer ring smoke comes into effect, but this is unavoidable. The outer ring is placed at a considerable distance from the target. There are two reasons for this - first, to create a screen of sufficient size, in order not to mark the target by its very presence, and, second, to give full play to the vertical rise effect. After the vertical rise of a cloud becomes quite pronounced - that is to say, after it has travelled several hundred yards, the rolling front, characteristic of the drag effect, becomes progressivly less, and the top portion of the cloud shows less and less tendency to come down. Since dilution is taking place at the same time, it means that, after the cloud has travelled a mile or more, the lower portions are sufficiently thinned out so as not to interfere with ground or sea operations, whereas the upper portions are still sufficiently dense to prevent observation from enemy aircraft.

Unless the wind direction is steady for the locality concerned, both inner and outer rings must extend entirely round the target area. With shore areas, barges must be used, containing the generators, or else it is necessary to depend entirely on the inner ring from the ocean side.

The best technique is to commence the smoke by using all the generators in both rings. Then, after the screen is established, use the generators on the upwind semicircle of the outer ring only.

Day Screen versus Night Screen - Color Effect: Although a white smoke has a much higher obscuring power than any colored smoke, as previously explained, for night use a darker smoke has certain advantages in that it cannot be seen as easily, and it is not necessary to have such a high obscuring power at night. Even day screens for obscurance against enemy aircraft observation do not require the high obscuring power that ground screens do.

Interference with Antiaircraft Fire: Smoke screens interfere with light antiaircraft fire, and thus the locations of the inner and outer rings of generators for area smoke screen use must be carefully coordinated with the corresponding locations of light antiaircraft batteries. Heavy antiaircraft weapons are practically unaffected by smoke screens, owing to their radio-location devices.

Part III - General Smoke Tactics

Area Smoke Screens: As previously stated, these are used for defense against enemy aircraft only. Therefore, there are few tactical problems involved. The principal tactical instructions for the use of area smoke screens are as follows:

a. In addition to technical requirements, the outer ring of generators should be placed sufficiently far from the target area so that the screen itself will not mark the spot.

b. Light antiaircraft emplacements should be located outside of the screen area.

c. The operation of the generators must be coordinated with the aircraft warning system.

d. The generators should be operated by Chemical Warfare Service personnel, but under the direction of the local anti-aircraft command.

e. The use of area smoke screens should be confined mostly to moonlight nights. On other nights they are not necessary, and in the daytime, other methods of defense against aircraft are usually more effective.

Ground Smoke Screens: In combat ground smoke screens are used for two general tactical purposes:

a. To deny to the enemy information of battlefield activities.

b. To reduce the effectiveness of hostile fire.

These main uses will be discussed in more detail later, after consideration of the relation of smoke to fire superiority.

Relation of Smoke to Fire Superiority: This relationship has been demonstrated practically at Edgewood Arsenal by students at the Chemical Warfare School over a period of many years. The demonstration is held on the rifle range, using the 300 yard firing point, and consists of three phases, as follows:

a. In the first phase, each student fires 10 rounds at the target, without smoke. Fire under all the phases is done in the prone position. The students consist of members of all branches of the Army and Navy, and as such vary in skill from expert riflemen to those who have never shot a rifle before. Under these circumstances, the number of hits scored by a group of this type without smoke averages 40%.

b. The second phase consists of the firing of 10 rounds per student, with a smoke cloud placed immediately in front of the target. This reduces the percentage of hits to 12% on the average.

c. The final phase consists of the firing of 10 rounds per student with smoke placed on the firing point, or directly in front thereof. This reduces the percentage of hits to an average of 3%.

The lesson to be drawn from this demonstration is that smoke reduces the effectiveness of aimed fire by both enemy and friendly troops, no matter where it is placed, but that if the screen is placed on enemy troops, and not on friendly troops, enemy fire is reduced to 3% and friendly fire only to 12%, thus giving a fire superiority ratio of 4 to 1 in favor of friendly troops.

Examples of the General Tactical Use of Smoke: Smoke is effectively used in the following types of action:

a. To screen an advance against a hostile position.

b. To protect a flank exposed to enfilading fire.

c. To support local attacks on machine guns or similar fire.

d. To screen indefinite targets, such as machine guns or antitank guns whose general location is known.

e. To screen movements within the friendly position.

f. To blind hostile observation posts.

g. To deceive the enemy as to the location of the main attack.

h. To cover river crossing operations.

i. To cover withdrawals.

j. To aid in counterattacks.

Smoke used within our own lines will draw fire. Therefore, it should never be used immediately in front of or within our own lines if it can be avoided.

In the defense, the use of smoke is limited to screening distant operations and to supporting counterattacks.

Although smoke (WP) is used primarily for screening purposes, its casualty value should not be overlooked. When placed directly upon the hostile position, the particles of white phosphorus thrown from bursting shell will cause many casualties.

Use of Smoke in the Offensive: See paragraph 18 d.(1) to (7) inclusive, including figures 6 and 7, with explanatory notes of FM 3-5, pages 26, 27 and 28.

Use of Smoke in the Defensive: See paragraph 19 d. of FM 3-5, page 34.

Part IV - Smoke in a Landing-Assault

Weapons Available: All weapons considered in Part I of the Lecture will be available for a landing assault, with the exception of artillery, which probably will have HE missions of such importance that the guns cannot be diverted for the purpose of firing smoke. In addition, the following special weapons will be available:

a. Special LCV Landing Craft for the 4.2" Mortar - This craft is equipped with a special firing platform in the center to take the 4.2" mortar, thus enabling the mortar to fire directly from the craft itself. Under these circumstances, the range of the mortar is limited to a maximum of 2,050 yards, since the firing platform will not stand a recoil shock of a propellant charge greater than that necessary to produce this range. The craft also carries the entire mortar squad, consisting of 8 men and a sergeant, a gun cart, ammunition cart, and baseplate for normal land operations, and 160 rounds of ammunition. Thus, when the craft reaches the shore, the mortar is dismounted from the firing platform, taken out of the craft, mounted on the gun cart on shore, and normal land operations are resumed.

b. Floating Smoke Pot - This floating smoke pot contains 27 lbs of HC smoke mixture, and burns approximately 12 minutes. These are carried in type LCPL landing craft, which can transport 150 floats in addition to the personnel necessary to operate them. The floats should be spaced from 10 to 15 yards apart in the water.

c. Rack for 4 Floats - These racks are made to fit LCV, LCPL, or LCPR types of landing craft. All four smoke floats are ignited at the same time, and by the use of these racks the source of smoke emission may be moved from place to place according to wind variation or changes in the situation.

d. Exhaust Smoke Generator for LCPL landing craft - This is a modification of the oil smoke area generator, whereby the smoke mixture is fed into the exhaust pipe line of the motor of the landing craft, producing a dense white smoke from the exhaust orifices of the motors.

Screening of Ports: This requires a normal area smoke screen laid down by methods described under Part III above, dealing with general smoke tactics.

Amphibious Smoke Tactics: The most difficult of smoke operations in connection with the landing assault is to screen the first wave of assaulting troops. The screening of subsequent waves is comparatively simple, as will be explained later.

The ideal type of smoke screen for use with the first wave of assaulting troops is the box type of screen. This means that the length of beach along which the troops will actually land is heavily screened, but the screen itself extends only a short

distance out into the water in order that the assaulting troops may progress towards the shore unimpeded by their own smoke, but on both flanks the screen extends for several thousand yards out to sea in order to protect the assaulting troops from enfilade fire from both shore installations and enemy naval action. An ideal screen of this type is practicable only with a 6 o'clock wind. In such a case, the flank screens are laid down, either by floating smoke pots, or smoke generators, either of the normal type installed in barges or the exhaust smoke type, as described above. When properly laid, in sufficient quantities, the smoke will drift ashore, and obscure both flanks from the point of origin to a distance considerably beyond the water's edge at the beach. The smoke screen on the beach and along the water's edge directly in front of the assaulting troops is laid either by means of airplane bombs or preferably 4.2" mortars mounted in landing craft as described above. The 4.2" smoke shell may be exploded by impact on water, forming thereby a satisfactory smoke screen, although this practice requires about double the number of shell per minute as is required for a similar screen on land. The initial screen thus is created on the water, but as the troops approach the land, the mortar fire is shifted to the beach and progressively further inland.

With a lateral wind, it is possible to duplicate the ideal screen as described above with reference to a 6 o'clock wind, except for the upwind flank screen. In other words, it is possible to have the downwind flank screen and the frontal screen on the beach, but the upwind flank screen must be omitted, otherwise the smoke will drift down in front of the assaulting troops and interfere with their vision and render their operations more difficult.

The 12 o'clock wind is the most unfavorable type of wind for an operations of this kind. With such a wind the only chance of laying a smoke screen is by means of aircraft using either bombs or smoke tanks or a combination of both. In such a case, the two flank screens might be laid successfully by dropping bombs of the burning type on shore and causing the smoke to drift out to sea which is just the opposite from the method employed in the 6 o'clock wind. Under favorable conditions, it might be possible also for a plane to lay a frontal smoke screen across the beach to be assaulted, also using bombs or smoke tanks, but it would be necessary to have the point of origin of such a screen at least several hundred yards inland so that it would thin out when drifting out to sea, in order not to interfere with the vision of the assaulting troops.

The Screening of Subsequent Waves: On the assumption that the assaulting wave has landed successfully, and has established a beach-head, the subsequent waves may come in through a smoke cloud, as it is no longer so necessary to operate under conditions of clear visibility. A general smoke screen over the water is all that is required, therefore, and such a screen can be laid down almost in any wind condition, since it is of no particular importance where it finally drifts.

Chemical Troops with Assault Forces: The latest experiments indicate that the proper proportion of chemical troops in an assault force is one (1) battalion per amphibious division, or one (1) company per regimental combat team.

Concluding Remarks

The above rather meager information on smoke tactics in a landing assault is all that I am able to give you at this time. As I said at the start of my lecture, comparatively

little study and experimentation has yet been given to this most important feature of combat operations. Possibly further study may develop ideas in conflict with those I have expressed here. All I can do, therefore, is to give you the latest thought available on this subject, in order that you may use this as a basis for further study. In my opinion, one of the most important tasks that this Assault Training Center faces is the development of sound and thoroughly worked out, smoke tactics and technique as applicable to amphibious operations. Therefore, I shall now conclude the lecture and proceed to the conference, as scheduled, in which you can ask any questions that may have come to your minds during my talk, and we will also discuss the points listed on the Agenda.

[redacted]

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CONFERENCE
HQ ETOUSA

4 June 1943
KM

Review of discussion following the lecture:
"CHEMICAL WARFARE" by Col H. W. ROWAN, CWS

Question 1 - Should Cml troops be assigned to the landing for decontamination of beaches and protection of troops? on what scale?

Conclusions reached: Chemical troops would be valuable as experts, but assault troops must be responsible for their own individual decontamination. Vehicles and heavy decontamination equipment should not be counted on for the early stages of the operation. One decontamination company should be assigned two beaches. Also the following chemical troops will be required: one chemical weapons company for each regimental combat team and one battalion, less three companies, assigned to divisional headquarters. Battalion landing teams to have one weapons platoon attached. Latest T/O not yet approved, contamplates a company consisting of three platoons, four mortars each.

Question 2 - What factors determine their landing priority?

Conclusions reached: If gas warfare is not a certainty, only one company should be landed in the early stages of the operation. The remainder of the chemical troops for decontamination would be held in reserve and brought in on call.

Question 3 - What is the minimum amount of protective equipment against Chemical Warfare that the assault troops and other echelons of the landing force should carry?

Conclusions reached: See CWS report on subject "RAP Sub Committee, MN, Report of Sub-Committee on Decontamination".

Question 4 - What are the most profitable uses of smoke during landing operations:

a. Covering ships and landing craft?
b. On or off beaches to screen the approach of landing craft and movement of troops across beaches?
c. For the protection of engineers clearing beaches of mines and obstacles?
d. For screening beach installations and activities from hostile air observation?
e. To cover parachute or glider troop operations?
f. Other uses?

Conclusions reached: Covered in lecture and FM 3-5

The covering by smoke of both assaulting troops and enemy shore installations results in comparative advantage to the assaulting force, since:

a. It tends to equalize the respective powers of fire support and thus destroy a normal defense advantage.
b. It screens the maneuvers of the assaulting force from the observation of the comparative immobile enemy.
c. It helps to protect the assaulting convoy from precision enemy air attacks.

[redacted]

[redacted]

Question 5 - What smoke cover can Cml units provide in a landing assault?

Conclusions reached: While afloat smoke can be laid down by mortars (maximum range 2000 yards, impact on water or land), smoke floats and smoke generators, Once ashore normal technique will be used.

Question 6 - What use may be made of flame-throwers in a landing assault? What is their effectiveness?

Conclusions reached: Flame-throwers will be valuable as mop-up weapons.

[redacted]

SUPPLY

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ASSAULT TRAINING CENTER
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HQ. ETOUSA

ADDRESS BY
MAJOR A.G.PIXTON, FA.
SERVICES SUB-SECTION ASSAULT TRAINING CENTER, ETOUSA (PROV)
SUPPLY AND ADMINISTRATION DURING LANDING ASSAULTS.

5 June 1943

First, as a means of orientation, I would like to give you the proposed organization of the Far Shore Group as it now exists:

Hq and Hq Co. (Regt. Hq. Combat Engr. Regt.)
3 Engineer Bns. (Combat)
Signal Company
Medical Battalion
Q.M.Service Battalion
Q.M. Gas Supply Company
Ordnance Ammunition Detachment
Ordnance Medium Maintenance Company
M.P.Company
4 Amphibian Truck Companies
Chemical Decontamination Company
Detachment Group Regulating Station Transp. Corps
Q.M.Railhead Company

In keeping with the War Department policy of standard units, these are to be organizations as set up by approved W.D. T/O's.

The organization of the Engineer Amphibian Brigade was considered but was thought to be inadequate, due to the time factor involved during which the fighting units must be supplied over the beaches.

Due to the state of preparedness against invasion along the west coast of Europe, it is thought likely that we will not land near a large seaport. If the landing takes place near a port large enough for us to use and we capture the port, it will probably be destroyed, asfar as operations are concerned, before it falls into our hands. Therefore, we must be prepared to maintain our operation without a major port from 30 to 90 days. In lieu of the major port, we must have an area of sheltered waters for unloading and operations.

With this in mind, a committee made a thorough study and recommended that the above units be organized into a composite unit known as the Far Shore Group, which I will refer to as a brigade for brevity.

This Far Shore Group has in it the necessary elements to support the initial landing and also to supply all the follow-up divisions for their continued operation inland. When and if a port is taken, certain parts of the Far Shore Group will be available to operate the port facilities.

In order that the Far Shore Group be properly trained for combat, it should be married to the Assault Division with which it will work, as far in advance of the actual assault as possible. It is, of course, preferable that this be done during the training stage in the United States so that each unit becomes

[redacted]

acquainted with the idiosyncrasies of the other.

This marrying process should be accomplished by attaching the Far Shore Group to the Division. In this way, the division commander has direct control over the attached brigade (F.S.G.) but the brigade still retains certain control over its units for administration, training and operations.

The smaller operating teams of the brigade, such as would support a Regimental Combat Team, can either be attached to or in support of the Regimental Combat Team. This is a command decision and should be made by the division commander. The real solution comes in the training of the units. The division commander should make it clear to his regimental commanders that the shore personnel must be left to perform their duties on the beaches and should not be sent to the front lines as fighting troops. They should not be used as infantrymen - any more than you would issue rifles to the artillery and put them up into the front lines. As you all know, the beach is usually the bottleneck in amphibious operations. It cannot be organized and functioning properly if the troops are not present to carry out their normal missions.

The mission of the brigade is to control the beach area so that the troops and supplies can pass through it in the most expeditious manner.

In order to organize the far shore to receive the supplies and troops, the leading echelons of the brigade must land fairly early in the operation. If they land too early, they will suffer excessive casualties, and if they land too late, the beach area will become congested and will hinder the landing of later elements. Assuming that the initial assault division willland in seven waves, the elements of the brigade should land somewhat as follows:

Two or three members of the naval beach party, which is attached to the brigade, should land in the first assault wave. They set up range markers in the center of the beach to guide the boats of the following waves. Then by means of shielded lights or signal flags, they further assist in guiding the boats to their proper beaches.

In the third wave is some additional personnel of the naval party, and the forward echelon of the operating teams of the brigade. For convenience, I will refer to these teams of the brigades as battalions, which will operate the beach area for an R.C.T. The naval beach party regulates the boat traffic, prepares for salvage operations, and establishes a small command post on the beach to aid in the operations of the communications.

The forward echelon of the shore battalion will set up its command post just off the beach, from which the operations of the shore units can be supervised. Beach reconnaissance is directed to include marking the limits of the beach, suitable landing sites for vehicles, roadways from the beaches, dewaterproofing parks, dump sites and defensive gun position sites. A sufficient number of dumps will have to be provided to supply the R.C.T. to which the battalion is attached, plus all of the additional units which will pass through that beach area. Initially, separate dumps are established for water, rations, oil, gasoline by octane number and ammunition by caliber and type. The dumps are situated from the line of first available cover to a line inland about 500 yards. If the dumps are established much farther

from the water, the unloading of supplies from the landing craft is greatly slowed down and the beach becomes congested. However, with the maximum use of 2½ ton amphibian trucks, or "Dukws" as they are called, it is possible to set up the dumps farther inland, as the distance over land, within limits, does not materially affect the round trip time of the Dukws.

If the dump area includes buildings, then certainly these buildings will be used to the best possible advantage as dump sites. Dumps must be well dispersed, camouflaged, concealed and protected in every possible way from enemy observation and fire. As soon as these various locations are determined, they are marked by conventional signs and panels so that the supply phase can function properly.

This forward echelon of the shore battalion also sets up a message center, establishes and maintains initial communications, records units and supplies as they land, and keeps the situation map. The equipment carried in the third wave consists of beach marking equipment, naval beach party equipment, radios and telephone sets.

Now, in the fourth and fifth waves, come road building teams, obstacle removing teams and gas decontaminating teams. They have angle dozers, matting for road surfaces, demolitions, chemical warfare equipment, medical supplies and signal equipment. The teams remove beach obstacles, build roads across the beaches, and neutralize any gassed areas, just as their names imply.

In the sixth and seventh waves will come the troops who will handle the bulk of supplies and equipment during the supply phase. The supplies must be unloaded, placed in appropriate dumps, a record must be made, and then they must be issued to the using troops as required.

The remainder of the personnel and equipment of the shore units will be landed as soon as their service can best be utilized. At this time, a reorganization or final organization of the beach is effected. During this time, a clearing station is established by the medical battalion; salvage work on the beach is done by the naval beach party and ordnance medium maintenance company; wire communication nets are established linking the battalion with the forward units; prisoners of war and casualties are received and evacuated to the near shore on empty landing craft.

At this stage, the supply situation is reorganized so that all supplies of one type will go to one specific beach rather than having all different types sent into all beaches, as was the case initially. It is during this reorganization period that Corps or Army takes over the control of the supply situation and the brigade, as such, steps out of the picture. In many cases, this will meanonly that some additional troops will be sent in to supplement those already operating the beaches, and that the various services will take over the operation of specific beaches or dump areas.

In landing operations, the same problems are always present. There are a limited number of boat spaces available. General Cota wants as many infantry in the first waves as possible; Colonel Lock says the engineers must be heavily represented to reduce the fortifications; Colonel Brewster says the artillery must get ashore early or the operation will fail; and so forth.

That, of course, is only natural so I will add my two-bits worth.

First - Command, control and communications on the beach must be initiated very early in the attack.

Second - beach exit roads must be available before heavy vehicles, with the possible exception of tanks, are landed.

Third - Dump sites and the personnel to operate the dumps must be landed before and not after the beach is flooded with supplies.

The question usually comes up as to the difference between the Shore Group Engineers and the engineers of the assaulting units, and as to why they cannot be interchanged.

On the near shore, the two units will often work together to establish the embarkation areas and facilities. But, on the far shore, each unit has its own specific task and must function separately to make the operation a success. The engineers of the assaulting forces will demolish beach obstacles, clear minefields, and reduce fortifications in the beach area. They will then advance inland with the assaulting forces.

The shore engineers, who land in the third and later waves, execute all engineering work necessary to facilitate the landing of personnel, vehicles, and supplies, and their movement over the beaches inland. This includes the building of beach roads, the removal of obstacles and other such things which would interfere with the efficient operation of the beach areas. Their functions are separate and distinct and must be considered as such at all times.

APPENDIX A

SHORE PARTY GROUP.

Hq & Hq Co. (Regt.Hq,Combat Eng.Regt)	9	28
3 Eng. Bns (C) ((320 & 632) x 3)	96	1896
Signal Co (T/O 11-7)	10	287
Medical Bn. (T/O 8-15)	35	470
Q.M. Service Bn. (T/O 10-65)	21	920
Q.M. Gas Supply Co. (T/O 10-77)	3	125
Ord. Ammunition Detach. (T/O 9-17)	3	100
M.P. Co. (Motorized Div.) (T/O 19-27)	5	130
Ord. Medium Maint. Co. (T/O 9-7)	7	162
4 Amph. Truck Cos (T/O 10-57) (40-120 men)	16	480
1 C. M.S. Decant. Co. (T/O 3-217)	4	200
1 Detch. Group Reg. Station,Trans.Corps	37	150
1-Q.M. Railhead Co. (T/O 10-197)	4	110
TOTAL:	250	5058

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REVIEW OF DISCUSSION FOLLOWING THE LECTURE
"SUPPLY AND ADMINISTRATION DURING LANDING ASSAULTS"
BY MAJOR A.G. PIXTON

7 June 1943.

1. What is the composition, organization and equipment of Shore Party Groups?

Conclusions reached:
The composition, organization and equipment of Shore Party Groups is being strided by a special committee. Questions of air supply and other special units are to be considered by that committee.

2. Should Shore Party Groups be attached or in support of the Divisions with which they will operate? If so, when and for how long? If not, who controls their activities?

Conclusions reached:
Shore Party Groups should be attached to the Tactical assault units with which they operate. They should pass to the command of higher echelons as soon as the situation permits; that is, as soon as headquarters of the higher echelons can be brought ashore. They should operate as Shore Party Groups as long as maintenance over the beach is continued.

3. For how long a period initially will the Shore Party Groups be able to supply the tactical troops before being reinforced? How will they be reinforced?

Conclusions reached:
In the absence of detailed logistical data no final conclusions can be reached. However, information was presented to the conference indicating that a Shore Party Group (Appendix A) can handle an average of 2300 tons of supplies a day.

4. What considerations affect the landing priority of the Shore Party Group and its equipment?

Conclusions reached:
The principles governing landing priorities set forth in FTP 167 and the Engineer Amphibian Training Guide No. 1 are accepted as sound. It is recommended that special consideration be given to the early landing of aviation supply units.

5. What Naval boat control personnel will be working with the Shore Party Group?

Conclusion reached:
The conference accepts the personnel as given in FTP 167.

6. What functions should be prescribed for the Engineer Component of the Shore Party Group, and what for the Division Engineers?

Conclusions reached:
The Engineer Component of the Shore Party Group is charged with construction and maintenance work on the beach itself. The Divisional Engineers are Tactical Units and they work with the assaulting troops.

7. What installations, dumps, etc., will be established by the Shore Party Group and approximately where in the beach area will they be located?

[redacted]

Conclusion reached:
The Shore Party Group will establish dumps for supplies, dewaterproofing parks, and defensive gun positions. If possible the Shore Party Group will establish the dumps in their final locations but due to the tactical situation and the methods available for handling supplies temporary dumps may have to be established in the first available cover.

8. What arrangements are necessary for feeding and caring for prisoners of war and/or divilians?

Conclusion reached:
The MP Company will be responsible for feeding and caring for prisoners of war.

9. What will be disposition of the Shore Party Group after ports are in operation?

Conclusion reached:
After ports are in operation Shore Party Groups will be available for new assignments, consistent with their specialized training, preferably at the ports.

10. What light transportation is a minimum requirement to be taken ashore by assault battalions for moving forward ammunition, water, weapons and for messenger and other services?

Conclusion reached:
This is being considered by the committee mentioned in the answer to question 1.

11. How can supplies best be landed with a minimum of rehandling and a minimum use of carrying parties?

Conclusion reached:
Supplies can best be landed with a minimum of rehandling by (a) transporting them direct to the final dump areas, and (b) using DUKWS and amphibian tractors to complement landing craft but not as a substitute for landing craft.

12. If the first two or three waves of an assaulting RCT are landed on a beach not suitable for landing vehicles, artillery. tanks or supplies, can another beach be substituted? Who would make the reconnaissance and the decision?

Conclusion reached:
The leading assault battalion must follow the prearranged plan. Reserves of regiments and higher units may be directed to the desired beaches.

MEDICAL

ASSAULT TRAINING CENTER
CONFERENCE
HQ ETOUSA

7 June 1943
KM

ADDRESS BY: Col C. B. SPRUIT, MC
(Deputy Chief Surgeon, SOS, ETO)

Medical Service in a Landing-Assault

I regret that General Hawley is not able to be here to talk to you in his own inimitable way about this most critical of all tactical operations and the medical service therein.

I do not know of any better way to start a discussion of landing operations than to repeat a conclusion reached by the Lassiter Board, composed of a group of distinguished officers in the AEF at the close of hostilities. They were attempting to evaluate the lessons learned during the combat in France, and to set up doctrines, organizations and proper employment, for units of all branches of the army. This Board prefaced its remarks on the medical service, as follows: "Nothing depresses the morale of the army more than the feeling that the men, when wounded, will not be properly cared for; nothing exalts the confidence and morale more, not only of the Army but of the nation, than the feeling that, if a man is wounded, he will receive adequate care at the hands of an efficient medical service, and that the dead will be properly buried."

I should like first to consider the whole problem; not the medical problem alone, because medical service does not operate alone in a vacuum but operates as a supporting agency of the assault troops and is that agency provided by the Commander to see that his wounded are properly cared for. The problem, from the tactical standpoint, is the attack on an organized zone. All information that we have from France, and from the periphery of the continent, indicates that furious activity has been, and continues to be, exercised in the organization, not only of an initial defense system on the beach, but of a series of defenses well back, with the provision of mobile reserves to move swiftly to any part of the coastal area.

A landing operation in terms of more common tactical operations, may well be classified as the attack of a heavily-fortified zone, which operation is always approached with caution, and with the greatest amount of advance preparation, which gives careful consideration to the character of the resistance, the possible reactions of the enemy, the heavy casualties entailed and the loss of tactical control during the landing.

What will be the characteristics of an organized beach zone on the Continent? It will have fields of fire; observation; and all manner of communication worked out to the last degree. It will have obstacles. It will have a centralized command and control, with adequate reserves held in proper places to move quickly to repel the invaders. Not only must that be overcome by our forces, but there will also be organized fields of fire, gunfire on the beach by light and medium artillery firing at oncoming craft and by

long-range artillery to cope with the naval support. Through all that fire must come our small boats over a water area which will be replete with underwater obstacles and with barbed wire. On the beach itself, we will meet obstacles, barbed wire, coordinated fire of small arms as well as light and medium artillery. Overhead, there will be air opposition; not only on the water, but on the beaches and the land. And we have to consider, in addition, the possibility of gas. If there is any mechanism more surely calculated to provide a heavy casualty load, I am not aware of it.

An evaluation of our experience in the last war indicates that infantry regiments attacking a fortified zone would, in dead and wounded, suffer 25% losses. I see no reason to believe that this figure is unreasonable as I look at the map ahead of me here. In other words, out of every four men who go ashore or get to the shore (and that does not take into account losses in mid-channel) one out of every four men is going to be a casualty before the day is over. The same proportions may obtain on the second day by which time we hope to have breached the beach zone.

There is the job. You have to build up a fighting force which has survived the perils of the cross-channel operation and which has overcome the obstacles of the beach area, the fire of the shore area, and then on the landing beaches you have to build up fire power on the shore to assault the enemy's organized positions in depth.

The medical service, as it will come along, comprises first the three battalion medical sections and the regimental medical headquarters section of the infantry regiments. Following these units will come collecting elements of the division medical battalion to relieve them, and later ambulances or $\frac{1}{4}$ ton trucks to evacuate casualties. Behind that comes the balance of the medical battalion with a clearing company and, at the same time, medical supply agencies set up on the beach to receive incoming supplies as they arrive.

Here we have an operation where we take off from land; cross a water gap, and land on a hostile shore. The critical link in the whole phase is the water gap. If there is an air of intangibility about what I shall say this afternoon, it is because we have as yet no definitive statement as to the medical set up for the water gap. By the water gap, I mean from the high water mark in U.K. to the high water mark on the beach of the Continent. Until we know that, and know it conclusively, until we know who is going to do what, and how much we have a most critical weak link in our evacuation. No cogent planning can be done until that is settled. The whole problem regarding amphibious outfits which have been rechristened, I think, "far shore groups" remains obscure because a clean-cut decision has not yet been made as to the responsibility for the area from high-water mark on one shore to high-water mark on the other shore.

Everything I am going to say to you today is already covered in field manuals. We have the general field manual on landing operations in which there is a small section on medical service, which was lifted from Field Manual 8-25. I might say here that FM 8-25 was approved in 1940 by the Secretary of War and Secretary of Navy at which time it was very clearly laid down, and accepted by the Navy and the Army, that the Navy would operate from high-water mark to high-water mark, operating the water transportation and caring for the casualties on the water gap. What is the present situation on that? Who is going to operate the water gap? Who is going to take the casualties at high water mark on the hostile shore, wade out in the water and place them on craft? This must be answered and provided for.

Here we have a specialized operation for which we are contemplating the use of a new unit. The amphibious medical battalion, and the medical battalion proposed not so long since for the far shore group, have the fatal deficiency of not providing enough litter bearers. It is one job to haul casualties to the beach from aid stations or from medical installations on the shore and deliver them on the beach line itself for loading on to craft. It is another job to get those casualties on the boats, craft, ships, water ambulances or whatever we will have. We can get the casualties from the field back to the beach area, but if we cannot get them on to the boats, they won't get back to the U.K. And we have to get them back to the U.K.

If we do not have that forward link securely forged and adequately provided for, the whole question of evacuation will fall down. If you want to know what that means, let me refer you to the Gallipoli landing and to what happened at the beaches on one of which they finally had to run a transport aground on the beach. They had to stop all receipt of stores and ammunition on that beach for a whole afternoon, until they could clear the beach of wounded. If I seem disturbed about this, I am. Because it is going to be part of my job to take care of these casualties.

We are not doing wishful thinking now, we are getting ready to shoot for record. There is the burning problem that faces the medical service and consequently the combat morale and efficiency in this landing operation. Until that problem is boldly approached, squarely faced, and resolutely solved, the medical service will not function; because it cannot.

When we examine the various phases of a landing, we find the initial phase which is carried out by the infantry combat team. That phase divides itself rather conveniently for abstract consideration, into the initial assault by the battalions, coming in to seize the beach, to feel for soft spots, and to push in as far as possible with the objective of clearing small arms fire from the beach. Suppose two battalions go in abreast. If one battalion goes ahead and the other is held up, the regimental commander is apt to throw in his reserve battalion. This reserve will come in on the next wave to the place where progress has been already made, in order to flank out the resistance. Thus we have a regimental area, by a union of the two beaches. When the regimental beach area is consolidated, the future landing of units will be along those parts of the beach that give easy access to shore.

Initially, then, the medical service on the two beaches, would be the collection done by the battalion medical sections. At the same time that the assault goes on, supplies begin to come ashore. At that same general time, communication facilities will be put ashore, so that a shore-to-ship and a ship-to-shore communication can be set up and carried on. There must be personnel to begin to build up dumps that will be established on the beach sometime during the first phase, as stores will be coming along.

It used to be the thought, perhaps outmoded now, that every craft coming ashore should carry in it, not only the combat personnel, but a certain increment of reserve supplies. Thus, every craft would be carrying a certain amount of supplies; ammunition, signals, engineers, medical supplies, water, food; perhaps enough to support the number of people coming in on that particular craft; perhaps enough to support half. But there should be reserves of stores constantly built up. That means that there must be medical

personnel on the beaches to care for the medical stores coming shore.

What happens to the wounded in this phase? I am very doubtful that any studied evacuation, seaward, can be set forward during the early stage. I assure you, and you must be prepared for it, that walking wounded will come back or will scramble into every craft leaving the beach. It happened at Gallipoli and it will happen here. Until we can provide an organized evacuation service we must consider the return seaward of casualties of walking wounded on almost every boat. They will flock down to the shore. Those in the initial stages are helped back on the boats by their comrades. They will have to get out. Otherwise you are going to have the beach area clogged with wounded to the detriment of morale and the impedence of combat.

An interesting proposal came to my attention recently. It was that men who are wounded should not be sent back because of the deleterious effect on their comrades. I believe that wounded, lying around the beach area, uncared for, with troops landing and passing through them, will have an even more harmful effect. That has been the experience of history. So studied provisions for evacuation facilities (I am going to use the word "Must") must be provided.

By the end of the regimental phase, we should have on shore, and in operation, the combat team with its artillery, the medical detachments of the infantry and artillery, and a collecting station, set up on shore to support the first-aid stations. The operation of the collecting stations will be a normal operation. They will collect and sort casualties from aid stations, handle the walking wounded and evacuate other cases from the beach area to the shore area. I have spoken of the necessity of providing troops for the reception of medical supplies and for the building up of a medical supply dump. This can be augmented later on even here by placing a small number of men from the supply detachment of the medical battalion at the job of receiving stores and of sending them forward to the collecting and aid stations. The whole operation is going to be difficult. The medical beach party, or whatever is provided, should come ashore, and take over the operation of medical service there. Their function is to receive, sort, and care for the casualties from the collecting company; to prepare litter cases for evacuation and load them on craft, carry out resuscitation measures for the seriously wounded, of whom there will be many; and receive and issue medical stores.

The next state of the operation ends with the seizing of a line that will clear the beaches of medium and light artillery fire, running in some 8-10,000 yards. By the end of that time, we will have ashore: divisions, reinforced with the medical elements of the division; the medical battalion in normal operation but with reduced transportation; medical supply point, augmented if necessary by elements of a medical depot, (preferably of Army, because when the combat moves well in, they will have to operate a medical depot on or near the beach). The beach and shore party combined continue to receive casualties from the collecting company, to store initial medical supplies, and to evacuate wounded off shore. Here we ought to be able to get craft in, to evacuate wounded seaward. Again, what will be done is problematical.

Having struggled with the problem of scales most of the winter, I am concerned about how much transportation we will have to do the job. As far as medical service is concerned, the faster troops go, the harder it is for the enemy to hit them. The fewer the casualties we have, the less the medical problem. By the same token, the slower the troops go, the more apt they are to stop missiles, the greater the casualties, and the greater

becomes our task. So, if troops are going fast, we will not need so much equipment, so many medical supplies. We will need transportation, however, because we are going to have to carry them back a long way. When the troops advance slowly, it is easy to keep up with them since they do not get beyond the range of litter bearing. But the casualties are heavy, because they are longer in one spot to receive enemy missiles. There we do not need so much transportation but we do need plenty of supplies. Those factors must be evaluated in getting up scales, whether assault scales, intermediate scales, or whatever they may be.

We now come to the final stage of the landing operation. That is the staging of the coordinated attack of divisions to seize the Corps objective; that final objective which removes all artillery fire, except long range heavy artillery, from the beach.

By this time, we should have ashore all of the Division medical service, and the Corps medical battalion. The Army medical supply depot should be in operation, distributing medical supplies to the element ahead. There should be motor ambulances from the Army medical regiment ashore, to evacuate the clearing stations of the Division There should also be ashore an evacuation hospital and a surgical hospital in the shore area. And there should be evacuation from the beach back to U.K.

The business of the shore, or beach party remains the same; receiving, sorting, caring for casualties pending transportation; loading them on to whatever craft may be available and sending them on their way; receiving, sorting and forwarding medical supplies. The medical supplies in the early phases of the operation are going to be those required in combat. They are supplies, not equipment. We cannot replace heavy equipment at this time.

All through this, however, there remains the question of the operation on the water gap. There are a variety of expedients that may perhaps be used. We may have ambulance boats. We may have landing craft. In the initial stages, walking wounded will attempt to get on, and should be received on, every returning craft to clear the beach. It was figured last year, during trials, that on the first two days, we would have about 8,000 casualties. As I recall it, that did not include the dead. This is a big load of casualties and will tax all of our facilities in caring for them. But again and again, I must refer to the question of the craft, and of the people at the beach to load them. It will be a burning problem in the early days of the assault. We cannot leave the casualties on the shore. We must get them out.

The questions that must be answered are: How are we going to operate this water gap? Are we going to send wounded back on special craft? Where on the shoreline of the U.K. will they land in the first days? I have heard some talk recently of moving wounded by hospital ship to the Mersey and the Bristol Channel. From where will the hospital ships come? Who is going to provide them? Some ships cannot put into shore. They will have to stand well out. What will be the nature of the transportation from the shore to the hospital ship?

Something was said about bringing the wounded out on craft and swinging them up by davits on to the decks of the hospital ship. That will require provision for special davits.

I suggest, if the troops come over in transports, that the sorting of the wounded, in the early days, provide that only the seriously wounded should go to the hospital ships. The slightly wounded should be sent back to sick bays on their transports. That means that special provision must be made for them on the

transports, standing well out in the Channel. One of the outstanding lessons of Gallipoli was the fact that provisions had not been made for the slightly wounded. As a result, the slightly wounded filled the hospital ships and the seriously wounded went back to the transports. In order to be able to receive slightly wounded on the transports but also to receive seriously wounded, (because the status of a casualty may change on the journey from the shore to the ship, from slightly wounded to seriously wounded by virtue of enemy action), it can be provided that medical personnel be placed on ships and transports with supplies and equipment to handle wounded returning to their transports, to be ready to do emergency operations to save life, and to maintain life thereafter, until the seriously wounded can be shifted to the hospital ships. To recapiluate, we must sort cases of the slightly wounded quickly and give them such medical care as they urgently require. We must get the seriously wounded back to the place where they can get the treatment necessary to save life and keep them alive. That means hospital ships. And on shore, we must have the evacuation hospitals, to receive the slightly and seriously wounded, as well as the surgical hospitals to receive the desperately wounded. Why? So that the forward medical elements of the divisions are not immobilized by unevacuated casualties.

Proceeding on the assumption that we will have hospital ships standing out in the Channel, communication between the shore and the ships is going to be important. We used to have a beachmaster and a shore party commander. I do not know what there will be now. The problem should be considered and provision made whereby medical information of casualties and supplies can travel back and forward. It may be that medical stores for a certain beach area have been sunk en route; that the supplies are being used up fast and need replenishing; that the casualties are piling up and evacuation facilities are inadequate. All of that has to be considered and provided for.

During the organization of the beach, stores will be unloaded through the water. They must be received. They must be taken off the beach and up into a shore area. That shore area will have to be organized. There must be a place left for medical stores. In the evacuation, by water as it must be, we again require personnel, to stay on the beach and to load casualties. They can also be used to unload medical stores. In other words, there must be a medical work party on the beach.

On the shore, there will be a place where casualties will be congregated, awaiting evacuation seaward. They must have facilities for that. In the initial stages, it may be the battalion aid station; later on the collecting station; later the clearing station. When they pass on, and hospitals come ashore, there will be personnel in the beach area to receive casualties from the front and to forward them to the beach. Perhaps an evacuation hospital will be kept on each major beach until we come into possession and operation of a port, when a port hospital and hospital ships and carriers will handle the evacuation from the ports.

That brings us to another consideration - movement. During the assault phase, obviously, everything moves over the beach. Until we get a port, everything else will have to continue to move over the beach. Beach and shore organization should be carefully planned and the personnel thoroughly trained. Once ports are opened supplies may continue to be unloaded on beaches because of limited port capacities, but hospital ships will be able to and must run into the port, be loaded and dispatched. If not hospital ships, ambulance carriers or comparable means will be employed. Whatever the craft used to do it, a loading port, or loading dock for casualties, should be on early priority.

Let me discuss the organization of the beach in the U.K., which is the reverse of the hostile shore problem. In the initial stages of the assault, with casualties going back on every craft they are able to board, we will find from the mouth of the Thames to Lands End, because of wind, water, fog and enemy action, boats putting in to beaches, harbors, ports, or just going aground with medical people and wounded to be cared for. We will require, and will organize, some system of observation on shore areas to warn of the arrival of craft. Elements of Corps and Army medical regiments and battalions will be held, in mobile reserve, to meet the returning craft, to pick up these casualties and to take them to some initial receiving point. This will undoubtedly be under canvas where they can be sorted, cared for and then distributed to the numerous hospitals we will have prepared in the Southern Base Section area. All of this is that simple part of the main problem which takes place on the friendly side of the water gap.

Before we close, there is a new development in evacuation we must consider - the air. I hope that we will be able to consider air evacuation as something we can rely on in increasing proportion, subject to weather, to relieve us of the greatest handicaps to our mobility - the movement of seriously wounded. I am going to ask Colonel Grow, who is Surgeon of the Eighth Air Force and a pioneer in air evacuation of wounded, to talk to you about that subject.

[redacted] Col Grow 1

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[redacted] June 1943
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ADDRESS BY: Col MALCOM C. GROW, MC.
(Surgeon, Eighth Air Force)

Medical Service in a Landing-Assault

The evacuation of wounded by air must be predicated upon the assumption that we will have air superiority because, the transport planes which we would use for this purpose are unarmed. They are not covered by the Geneva Convention and do not bear the Red Cross. That is rightly so, because these transports are dual purpose ships. There is no plan at this time for the use of specialized ambulance airplanes. The enemy, therefore, is absolutely justified in shooting down all transport planes, whether carrying wounded or not, because the plan is to use them to bring supplies from England to airdromes on the other side. The same planes will be used to carry back the wounded. They are vulnerable and open to attack on both trips.

It must be repeated that we cannot use air evacuation successfully unless we control the air. You can perhaps avoid attack as we did in Africa early in the game by flying low. The enemy fighters do not like to dive close to the ground. Unquestionably, here in a cross-channel operation you could fly close to the water. We might also furnish some fighter escort for these planes. In general, however, you must base your use of air evacuation on the assumption that you have air superiority.

Here are some of the things that are important. We must have aircraft and some place across the water for them to land. We need suitable airdromes for the transport airplanes which are pretty big aircraft, requiring runways at least 2400 to 3000 feet long. Then we must have an airdrome, over here in England, where supplies can be assembled or airborne troops can assemble to be sent across. We will need a service for the reception of wounded at our English airdrome. There will be a problem on the continental side of collection, sorting, as well as caring for the wounded in the aircraft, plus the problem of loading and flying them back.

An example of what air transport planes are doing was demonstrated during the operations at New Guinea. They transported wounded from some rather sketchy landing fields, across a range of mountains, a distance of 130 - 140 miles. They carried, in 70 days, 13,000 wounded. They did not have any refinements down there.

In North Africa I do not know the exact number of wounded transported by air. But I understand it was very large, and they tried out, for the first time, the air transport evacuation squadron. This is composed of medical personnel consisting of six medical officers, twentyfive nurses and about sixtytwo enlisted men. I don't intend to discuss the basis of their organization or how they were split up. It is enough to remember that they worked with the transport group using 48 C-53 or C-47 cargo airplanes. That is, a multi-motored airplane, capable of carrying 18 litter cases. One of these air transport squadrons would probably be assigned to an air transport group, as an evacuation unit. They are split up into 24 evacuation teams. Each group of 48 planes, in theory, would be capable of transferring, on one trip, 864 cases. Actually I think it safe to assume that not more than half of these airplanes will be in actual operation at any given time. That makes it 18 capacity times 24, the number of aircraft, on a capacity or 432 cases per group.

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I do not know just what plans have been made for this particular operation. Talking to General Candee, I understood that he has plans for ten air transport groups of this nature. If this comes about, we hope to secure ten of those air transport evacuation squadrons. With these facilities they can transport 4,320 cases by air, providing they have the weather, on the basis of 24 planes per day per group making one flight daily.

Weather should not be too much of a consideration here, unless you have actual fog conditions. They will have no mountains to cross. It is desirable to keep at a low altitude. They will just have water to cross, free of obstruction. So, given reasonable weather and reasonable landing fields, on the continental side, you could transport 4,320 cases on one trip. The distance is short, they can travel at a rate of 160 miles per hour. I think, under good conditions of loading and unloading of wounded, they can make several trips a day. That possibly would be one answer to the problem of evacuation of casualties.

There is one thing to remember; I do not believe they could work very early in this operation. I think we first have to make the assault. As this proceeds we will widen the beach head front so that airdromes can be secured and have a wide enough area, not under long range artillery fire. It seems to me that unless you anticipate a very wide frontal attack, some days must go by before you could depend on regular air evacuation. Just how early that would be, would depend on the success of the assault, its extent, the depth of penetration and the airdromes you could take. Under favorable conditions, airdromes could be repaired and made usable as early as the third, fourth or fifth day.

At the European airdromes, it will be necessary to collect the wounded. Not all cases are suitable for air transport. Cases immediately following operation are not suitable to be transported by air except in great emergency. They do not stand it very well, and there are some other types of cases as well which we need not enumerate at this time. Consequently, a certain amount of sorting has to be done at the airdromes.

Evacuation hospitals are large, heavy units. We cannot expect too many of them to function early in the operation. In North Africa, I thought there was a need for a light unit as a receiving station to prepare the wounded for evacuation. The Air Force does not have any hospital installations so we temporized with what we calleda 240bed collecting station. It enables one to put 24 men to bed, give them a little bit of blood-and-thunder surgery, if necessary, and prepare them for evacuation. These smaller units can be combined. For instance, you might have 10 airdromes, from which each of these transport groups could work. In that case, you could have one of these 24 bed units on each one of the airdromes. Perhaps, the 10 transport groups will be working on only 3 airdromes. In that case, you can combine a number of these 24 bed units at each airdrome, dependent on the number of casualties, the location of the airdrome and the ability of the ground forces to deliver the wounded to the particular area.

The use of these units requires them to be located near the airdrome, thus providing a set-up to receive casualties sent in there by the ground force surgeons, and to handle sick and wounded from the air force. A very close liaison must be established between the airdrome collecting station and the ground force surgical installation to pass information as to when wounded can be received and as to when transport planes will be there. The airdrome collecting station personnel must be prepared to load wounded into airplanes. The evacuation squad would then assign nurses to accompany the returning patients on the air journey.

Then we have the vital problem of getting the nurses back to the continent. You must send the minimum of people to act as nurses. I think that probably one nurse could handle the 18 patients in each airplane, because on the return trip there is always the problem of the weight space factor, which should be used for vital supplies.

Another thing to be arranged is an excess number of litters. You do not want to have litters hauled back to you; you do not want to have blankets sent back to you on the return trip of the transport airplane. Litters and blankets weigh a great deal. Every ounce coming toward the front is vitally necessary. Arrangements must be made for a reserve supply of litters and blankets laid down on the continental side. As far as medicines and necessities for recusitation are concerned, the airplanes will be equipped with these.

I think you can see clearly that air transport can be used for the purpose of evacuating wounded. It may help to solve some of Colonel Spruitt's problems. There is one other type of air evacuation which I have not discussed and which is now under consideration. The use of specialized airplane-ambulances has not been found to be economical under most conditions, nevertheless, I think we will need them especially in a job like this. A light airplane, probably with Red Cross marks, to be used for no other purpose than for the collection of casualties up front would be very valuable. It must be light, for probable landings in small fields. It might possibly be a helicopter, which is a new development and would serve very well. However, it carries only two or three patients. But it requires only very small landing fields from which to collect wounded to bring them back to the larger airdrome. The helicopter is a specialized airplane, but up to this time it has not been accepted by the Army for the transportation of wounded. However, we must leave this out of our plans at this time, but we do have transport airplanes for the cross water jump.

That concludes my remarks.

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ADDRESS BY
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COMBINED ARMS IN A LANDING ASSAULT

4 June 1943

Amphibious assault of a fortified coast line comes under the general classification of operations covered in FM 100-5, under penetration. The doctrines set forth in FM 100-5 for a penetration are applicable, but their application requires special techniques, skills and equipment, due to two things - special nature of terrain in a broad sense, in that the approach march must be made overwater; and second the strengthening of the main lines of resistance by the construction of concrete and steel defensive works.

In a penetration, the main attack passes thru some portion of the area occupied by the enemy's main forces and is directed on an objective in his rear. In our particular situation, the enemy's total forces are so disposed that our attack will pass thru his immediate defenses, directed on an objective which will make possible our subsequent dealing with his mobile reserves, with some measure of freedom in the choice of maneuver for this subsequent action. Our objective for the break through must, therefore, be terrain features most favorable to defense against counter attack by hostile mobile reserves, the holding of which will secure the room required for building up and maneuvering sufficient force for offensive action against those reserves.

Our Field Service Regulations state that the essential conditions for success in a penetration are surprise; sufficient fire power, especially combat aviation and artillery, to neutralize the front of penetration; favorable terrain within the hostile position for the advance of the attacking troops; and strength to carry the attack through to its objective.

We have discussed most of these conditions in our previous conferences. We have concluded that it is futile to hope for strategic surprise, but we should expect some measure of tactical surprise. Certainly no effort to this end must be spared. It must be remembered that it would be purely a wild goose chase for the enemy to initiate movement of his mobile reserves until he is able to know specifically where to send them. If we refuse to divulge the real direction of our amphibious approach until the latest possible moment and further confuse the picture by means of feints and diversions, we gain valuable time before we must be braced to defend a beach head against counter attack by hostile reserves. In the smoke and confusion of battle, there is little, if any, difference in the appearance from the enemy's viewpoint, between the main attack and secondary attacks for purposes of diversion. The fog of war blinds foe as well as friend. Sufficient fire power has been a major topic running through all our discussions and rightly so; for I know of no more important a question to be resolved. The weakness of an amphibious operation has been lack of continuity in supporting fire. The gap comes just when assaulting troops are most vulnerable. Without going into details, suffice it to say we must be prepared to deliver continuous fire, support through all phases of this operation. How it will be done, our

various specialists must work out.

It is equally important that our planners coordinate the product of these various specialties into a comprehensive and completely integrated fire plan, making use of all effective means. I am inclined to concur in Colonel Bonesteel's statement that the assault must be preceded by an overwhelming air bombardment of several days duration - a Ruhr valley on the Channel Coast. Aside from the physical destruction and casualties thus produced, we must not overlook the shock and fatigue effect on those enemy personnel whose blood is not drawn. We can still preserve a certain measure of security of intentions by launching, say three major air attacks at different places on the coast, one or two weeks apart. It is the old story of crying "wolf", with a little of the war of nerves idea thrown in. I realize that the necessary means run into big figures, but when we mount this operation, we are laying all our ready cash in one deal of the cards.

Favorable terrain within the hostile position for the advance of attacking troops should not require elaboration, except for one point. The enemy recognizes favorable terrain for our attack as well, if not better, than we. He will defend here more strongly to compensate for theaccidents of terrain. In the normal attack of an organized position, we believe the corridors to be favorable for attack, in spite of this fact. In a defense embodying concrete pillboxes and strong obstacles, the preponderance of defensive advantage, provided by such means, may alter the concept of terrain and make the ridge lines more favorable. I do not say that they will, but I do say that the possibility is a point not to be overlooked. The final answer is a command decision to be made only aftercareful evaluation of all the known factors.

Strength to carry the attack through to its objective carries important implications with regard to the sea approach and movement across the beach of supporting weapons, support companies, artillery and reserve battalions. Depth, in the amphibious assault, is largely a matter of timing in the landing of the immediate reserves.

FM 100-5 states that the distribution of troops in a penetration provides for three separate impulses; a break through the hostile position; a widening of the gap thus created by enveloping one or both interior hostile flanks; and the seizure of the objective. The same manual states that the attack of a fortified locality may be divided generally into four phases. The first, however, is reducing the hostile outpost system and gaining close contact with the main position. In view of the enemy's disposition to make his main defense at the beach line, this first phase is accomplished by the destruction or neutralization of coast defense batteries. The three remaining phases are: breaking through the fortifications at the most favorable point; extending the gap by isolating and reducing hostile emplacements on its flanks; completing the action by moving mobile reserves through the gap to complete the encirclement and isolation of remaining fortifications while continuing the attack against them from the front.

This last phase was developed with the expectancy that the fortified locality would consist of a series of strongly organized

positions in considerable depth. Our G-2 people believe we will encounter a brittle crust. In view of this fact, I believe the third phase will be the pouring through the widened gap, of troops who proceed directly to the over-running of the enemy's direct support artillery positions. The beach must be cleared of the fire of this artillery before it can be organized for the large scale task of passing troops, material and ammunition required for meeting the enemy's mobile reserves.

Always remember that these mobile reserves are the boys who will make you wish you had stayed home if you are not prepared to meet them. The operation from a bird's-eye-view is a race between the speed of your build-up and the movement of these reserves. Commanders must guard against being diverted from this race by annoyances from the flanks.

To summarize, the penetration of the beach defense position consists of three impulses; a break through the crust on a narrow front; the widening of the gap; and the pouring through the widened gap to over-run the direct supporting artillery. The question arises; how wide must the gap be made by the second impulse? I will say, wide enough to provide artillery positions free from small arms fire, from which to support the third impulse. The question may arise; why make a small gap and then widen it instead of making a wide gap at first? Some one assault company may be expected to find a spot which is a little softer than the average. The battalion commander must be quick to exploit this bonus. By drilling a small hole through on the immediate front, defended localities on the flank may be assaulted from the flank and the rear, thus providing for their earlier reduction.

We might now consider what echelons will deliver the impulses and how far each may be expected to go. I shall not attempt to go into detail, because to do so one must have a mission, an objective, complete information of the situation and ample time to make a plan.

There must be sufficient depth to deliver strong impulses and they must be so timed as to keep the penetration moving. This requires careful planning in order that the sea approach may deliver the echelons making these impulses at the time they are needed. It also means there must be boldness in all command echelons in the committing of reserves. It is axiomatic that reserves are used to exploit success - never to attempt to salvage failure. Failure for the most part must be written off and put out of mind. Regardless of the careful timing employed in the making of plans, the enemy will upset many features of the timetable. Quick, sound positive decision in all command echelons is mandatory to meet such contingencies. Such decision can best be made if the contingencies are anticipated.

The organization of the command into tactical groupings provides for self-sustaining combat units down to include battalion teams, so that each echelon of troops will be able to exploit local successes promptly, without reference to the next higher unit. Failure on some beaches must be expected. We count on initial success on at least one beach. How far can the battalion team exploit this success? I do not know. Probably one assault company will find a soft spot or crevice. The battalion commander is alert to commit his support company. The

assault company can be expected to advance but a short distance until disorganization, casualties and loss of breath will bog it down. The penetration thus started must not bog down. The battalion commander commits his support company to exploit the initial success and keep the attack moving. The company which is passed thru, or around, supports the advance of the fresh company by fire. So too, there is a limit to the depth that can be achieved by the battalion. So too must the regimental combat team commander be alert and bold in committing reserve battalions.

Will the assault battalion make the initial break through and the regiment with its reserves, widen the gap? I cannot say at this stage. It seems reasonable. If so, the division commander must lose no time in utilizing his reserves to pour through the gap, defeat the immediate local reserves and over-run the direct support artillery. If due to a streak of luck, the assault battalion creates a wide enough gap to provide supporting artillery positions free from small arms fire, the gap widening impulse by the regiment may not be necessary. The regimental combat team commander must be alert to this possibility and must be prepared to use his reserve battalions to gain favorable ground for defense against counter attack by local reserves, enabling this division commander to use his reserve in a direct thrust through the supporting artillery positions.

On the other hand, it may take the regiment to get through the crust, and it may be all the division can do to deal with the local counter attack, and to hang on. In such event, the corps or task force commander must be prepared to employ a follow-up division in a passage of the lines to over-run supporting artillery and press on to the major objective. The whole purpose of the amphibious assault is to get a toehold, change the beaches from a battleground to a logistical supporting aid and operate offensively against the enemy inland. The more quickly this state of affairs is reached, the more quickly we get off of thin ice and meet the enemy on a more firm basis. There must be no stalemates in the action leading up to this state of affairs. There will not be any stalemates. Either you deliver the impulses to keep the ball advancing toward the goal line or you find yourself in a position that has absolutely no future to it.

How far each echelon carries through with each impulse, I will not attempt to say. I will say that it must be predicted in some reasonable fashion in planning. Then each echelon of command must be prepared to slide the scale up or down, according to the fortunes of the battle. In other words, if one echelon, after initial success, threatens to bog down before carrying through its intended phase, the next higher echelon takes over by skillful use of reserves and a corresponding shift is made all up the line to carry out the original plan with the simplest possible modifications. If we get a windfall and find one echelon sailing through its intended phase and capable of carrying through the next, we slide the scale down a notch, capitalize on an unexpected bonus and accumulate a back-log with which to facilitate our dealing with the mobile reserves.

Incidentally, this indicates that the planners should arrive at the necessary echelon to seize and hold the beach head, and

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then provide the equivalent, in strength, of one echelon higher, to meet contingencies.

The order of landing troops, timing of the boat waves, composition of the boat waves, these are details I would be foolish to attempt to answer on the basis from which I would have to approach them today. I expect next week at Woolacombe to contribute in some measure to the formulation of a solution, for better or for worse.

The outline of procedure, as I see it is:

First, maul and bruise the beach defenses by air bombardment and naval artillery. Take out the coast defense batteries by fire, by airborne troops or by raiders; or blind them with smoke. Get ashore something that has a reasonable chance with fire support or under cover of darkness, to survive until it can cut lanes thru beach obstacles sufficient to enable the spearhead troops to dash across the flat sands to where accidents of terrain afford some protection for those firing, while others advance by skillful use of terrain. Put ashore at any particular stage only the type of troops who have a chance to survive and employ their means, and who by employing their means will thus facilitate the landing and dash across the beach of the next required type. Minimize the effective means of fire support. Possibly, tanks can assist very early from hull down positions in the water. I am pessimistic about tanks on the beach until assaulting infantry have fairly well gotten rid of enemy anti-tank fires.

As General Cota so ably stated, assault infantry, or Rangers, or spearhead troops (whatever we call them) must advance by fire and movement and come to grips with emplacements that are delivering defensive fires on the beach. One real honest-to-John rifleman, from a hull down position in a crater, can make firing through an embrasure a most embarrassing and painful operation; particularly so, if rifleman "A" has his rear secured by rifleman "B" in another hull down position. By such procedure, rifleman "C" to "J" inclusive are enabled to advance, if they have been made skillful in the use of terrain. I do not subscribe to any idea that infantry must have all the defensive installations blown to kingdom come and put out of action in order to advance, providing they have been trained to shoot and hit what they are shooting at, and to advance individually at opportune moments, making skillful use of the cover and concealment afforded by terrain, craters, debris and what not. Good well trained non-coms, with initiative, coordinate the teamwork.

As soon as they have reasonable chance to survive, some tanks may be landed or advanced from hull down positions in the water to assist the infantry by delivery of direct fire on embrasures.

Artillery must be gotten ashore as soon as small arms fire on the beaches is sufficiently reduced. Perhaps use of SP armored artillery initially will provide for earlier fire support from beach positions or hull down in the water.

Support Companies must be landed to be available for exploitation of any initial success. We do not want them ashore until the assault has progressed sufficiently far to get them off the flat sand without becoming committed, unless of course, we

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need them immediately upon arrival for exploitation. I see no reason why support companies should not assist the advance of the assault by fire from cover or concealment, particularly by fire on the flanks on the initial dent in the defensive line.

Before we progress too far by fire and movement, we begin to think of ammunition and more artillery. This requires beach organization, and demands shore party elements; likewise, beach signal means for communication with ships afloat. Artillery and beach elements are vulnerable to air attack. So we must have AA artillery. I am speaking of AA battalions and not guns.

I might digress here to say that I do not see much in the way of a job ashore for AA guns until we come to large scale beach organization behind a beach head. Isolated AA gun battalions without AA area warning system are not going to cause enemy air forces any particular concern. They come into play when you begin to establish an area defence against high level bombardment. The low flying plane is not a suitable target and during the earlier stages of our contemplated operation I do not believe we will offer any particularly lucrative target to the enemy's high level bombardment.

The lads you want ashore early in the game are the anti-aircraft AA battalions. Like Field Artillery, they can come ashore as soon as they have positions secure from small arms fire. I believe they will be needed ashore as soon as particular amount of beach organization is attempted.

Reserves of successive echelons must be landed to be available for exploitation of successes in the various impulses I have outlined.

In addition to accompanying tanks in early stages of the penetration, tanks should play an important role in the exploitation of the break through.

Tank destroyers will undoubtedly be desirable as soon as it becomes necessary to repel hostile counter attacks.

Track laying vehicles ashore create a requirement for more engineers to remove obstacles to their movement, and for artillery to take out the AT guns that are their worst threat. Without pursuing this discussion of the sequence of landing any further, I will say that the point I want to get across is that we get ashore a small group that can survive and make possible the landing of something a little stronger. Each element bears a particular relation to its file leader and its file closer. The ideal is; each element ashore just when needed, no element ashore before it is needed. No element ashore just for the sake of getting it there, but for the purpose of doing the job that must be done then, to carry out the logical sequence of drilling a hole, reaming it and rushing through it.

Plans must be complete to the last detail. Everything must be timed with relation to space and with relation to expected events ashore. Commanders of all echelons must be

alert, aggresive, have the courage to make positive decision on the ground and must anticipate disruption of time schedules. They must think continually - "What will I do if this happens?" - "What will I do if that happens?". Commanders must be bold in the use of reserves to exploit successes. Each must remember he was given a self-sustaining unit for the express purpose of enabling him to exploit his successes at once, hitting his adversary a knock out blow while he is still off balance.

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ASSAULT TRAINING CENTER
CONFERENCE
HQ ETOUSA

4 June 1943
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ADDRESS BY Lt Col A. T. MASON, USMC

COMBINED ARMS IN A LANDING-ASSAULT

My participation in the conference this morning is not within the strick limits of the subject which has been set. In addition, what I have to say may be so well known to you already as hardly to bear repetition.

What I wish to discuss is the method of putting the combined arms on the beach. I consider it so important that I take the chance of being obvious and repetitious. Once on the beach, you come into a case of land warfare and from that point on Colonal Adams will continue.

When you put your troops on the beach, you are committing them to action. The manner in which you commit troops to action is, if not the most important phase of the battle, at least one which will have a major and continuing effect on its course. Getting into action over the water area, off the beach and over the beach itself is analogous to doing the same thing over land but it presents a number of difficulties which do not normally occur on land; the absence of cover is one of the greatest of these difficulties.

In thinking over this problem of the forward motion into combat, I am reminded somewhat of a meeting engagement. Here the object of troop leading is the attainment of an ideal in which every troop unit will, in continuing its march arrive precisely at the time and place where it is wanted by the commander. Conversely, no troop unit will arrive and be held in an exposed position any length of time before it is required. While a troop unit ashore may occupy an assembly position in defilade or in the cover of woods, for example, no such thing is possible when you are on the exposed and level plain of the sea so that these considerations become even more important in the landing assault. The attainment of the proper rhythm of battle, or of approach to battle, is a basic and fundamental consideration which must affect all your planning and all your performance.

What this comes down to, really, is a computation of time and space factors, and I propose to explain briefly how troops are moved ashore. The system I am about to describe is one which we use in a long overseas expedition and so is not applicable, in its entirety, to the problem you face. Nevertheless, as a basic system, it is a type solution which should be understood, so that it may be varied, as it can be in many ways, to meet your requirements.

This chart indicates how a regimental combat team may be put ashore from a transport division.

Transport division (4 APA, 1 or 2 AKA) carries a reinforced regiment plus some division elements which I will omit. The Transport division carries around 120 LCVP and 20 LCM(3).

Three of the APA's carry - each - a reinforced battalion.

Boats of the Tr Div organized into three groups - one for each battalion - each group 40 LCVP, 6 LCM(3). Each group is organized into waves - by wave we mean the boats which land

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simultaneously. Each wave is organized into boat divisions.

This organization into groups, waves, and divisions is not just for fun or to have sort of a parade. Its purpose - and it is an important one- is to provide for command and control. While this command and control is convenient and necessary for the naval officers who must maneuver these formations of boats over the water, it is, at the same time, a troop command and control organization as well as a naval one. In fact, the details of organizing the boats into waves and divisions are based on the tactical troop units and on the tactical plan. Unless the organization is based on the troops - on the requirements of the military commander - it becomes futile and ineffective. That is why it is important for you to understand it and to understand its capabilities and limitations - where it can be varied and where it cannot.

As an example, the formation shown here might be based on this plan: two companies in the assault, each with a support platoon. That is why there are two divisions in the first wave of each company and only one in the second wave. The boat division by definition is the number of boats required for a small troop unit. Then we have the support company; in this case the tanks are with it; one platoon is in a following wave. The last wave contains what, for the moment, I will just call the odd lots and let go at that. Note that the battalion commander is embarked with the boat group commander - a naval officer - in a separate boat. This principle should continue so that appropriate troop commanders are embarked with corresponding naval commanders.

A couple of simple variations are readily apparent. If, for example, you wished to attack in column of companies, the manner of changing the formation is obvious. If you wished your support company to be in LCI or your tanks - following the assault waves - to be in LCT, there is no great difficulty - in this particular situation - in accomplishing it, so far as the landing area itself is concerned. You do, of course, have to make the most careful calculations and have to accomlist most precise execution in coordinating the speed of various types of landing ships and craft from the near shore into landing area.

This may be an appropriate place to mention another principle, which, in addition to rhythm, should be observed in commiting your troops to the attack; that is <u>flexibility</u>. The plans which you make will be the result of long study and will be complete down to minute details. This does not mean, however, having completed your plans and having attained the right conditions of weather and other circumstances, you can merely push the button and let all the wheels and gears and cams and levers proceed automatically to the final grinding out of the solution. Your organization afloat, your control and communications, must be so arranged that every military commander, from the top down to the platoon leader, can vary the execution of his plan to meet the exigencies of the situation. Our doctrine or standard procedure, if you like, provides that, although the Navy is responsible for putting you ashore, the senior military commander present in any boat formation has the authority, so far as the Navy is concerned and subject to navigational considerations, to change the place and time of his landing if he sees fit to do so.

It is getting into the philosophy of the affair somewhat but I would like to point out that organization, control and communications, important as they are, are not so important as flexibility in the mind of the commander. And I mean second

lieutenants as well as generals. Those leaders who, during the battle, are not forzen into set courses, but who can observe, think, change plans, and even improvise according to the situation, are the ones who are going to cause the battle to be won. You know that and you know that such men are rare. I only mention it because it may not be readily apparent that this form of military leadership must be exercised by the military officers while they are still afloat. They are not mere passengers in the craft; they are commanders in all that pertains to them.

To go back to our planning, I am not going to offer you any detailed plan as to how you commit your combined arms to action. Such a plan required long study and preparation in the face of a particular situation and the development of such plans will be the functions of the Assault Training Center. I intent merely to indicate how such a plan is evolved and some considerations which should receive your attention.

The first thing is that we work backwards; we find out what we want ashore and when we want it; and we make the landing plan accordingly. This is so obvious I am ashamed to say it. Yet I have heard a naval officer say, after a thoroughly confused landing maneuver, "What difference does it make how they got ashore; we put them on the beach; let them shoulder their guns and march to the sound of the firing". This attitude is not common, of course, but you cannot expect naval officers, who need a lifetime to learn their own profession, to understand troop tactics ashore. The responsibility is yours to make the landing plan, within naval limitations, so that it fits your tactical plan.

One of the figures you will use will be the speed of advance of the landing craft. Let us assume that your speed in the landing area is 10 knots, which is 10 nautical miles, or 20,000 yards per hour. This is 333 yards per minute. Another figure you will use will be the speed of accomplishment of various tasks by leading units ashore, insofar as this affects the desired time of arrival of following units. As a simple example, let us suppose that there is a ridge 500 yards inland and that once this ridge is in possession of our infantry, the enemy can no longer deliver aimed small arms fire on the beach. You consider this to be a good time to put ashore your pack artillery and you figure that the rate of advance of your infantry from the beach to the ridge, will be 100 yards a minute. Your artillery will then be in the boat wave 5 minutes or 1665 yards behind the leading wave. This is a very elementary example of course, and the situation which faces you is very complicated and difficult. The attack on the channel coast of Europe involves techniques of warfare of which we know very little, and the use of special troop units which are not at present fully organized and equipped, much less trained. One of the most important tasks of the Assault Training Center, it appears to me, will be to make time studies of the various phases of the attack in order to develop basic figures for planning.

Now let us examine briefly the order of landing of the various arms and services.

If there are underwater obstacles, I would think it certain that your leading units must be naval demolition engineers who will make channels for the landing craft which follow. Dealing with obstacles is a very continuous process, of course, but the responsibility passes from naval units to military units as the grounding points of the craft are reached. This raises an interesting question. Should the craft of the naval demolition

units contain military engineers or should the latter follow in separate craft, arriving just in time to make use of the prepared channels? I offer no answer, but leave it to the development and training centers to work out. The equipment required by the naval demolition units may leave no room in the craft for engineers. Moreover, one may conceive of a considerable expenditure of the leading craft if the work of the naval demolition engineers is done under fire.

In any case, the next element to enter the action, will be the engineers who are tackling the beach obstacles and beach fortifications. You may have infantry with them, but I should think, in this case, not. I would visualize the engineers being accompanied by gun craft which would give support by firing against beach defenses.

There would possibly be special assault units of the commando type, landing over cliffs to get at emplaced guns and other installations. While they would be separate from the battalion landing team, their action must be coordinated, and I should think they would be landing about this time or even earlier.

After the engineers, and in time to take advantage of obstacles clearance without delay either way, would come the leading infantry units. Artillery and tanks would land at a time interval, in reference to the predicted performance of the infantry, and in the case of tanks, to your proposed tactical employment. This is rather obvious, as is also the employment, and time and place of commitment of the reserve battalion, the reserve regiment and divisional units.

There are, however, certain special units which should be considered with the assault battalion. One is the shore party in which is included its naval component, or beach party. I assume that general duties of the shore party are common knowledge and that you also realize that no landing is going to get along very far without the shore party. There are two factors here which conflict. One is that you need the shore party very early in the game. The other is that the nature of its work requires its personnel to be exposed, so that the beach must be fairly free of fire before it can operate. A fairly good guess would be to land the shore party with the support company of the assault battalion.

Another special unit to think about is the shore fire control party. This party is required to control the naval gunfire, which is, initially, the main artillery support of the assault battalion The shore fire control party is an agency of the battalion commander and should land with him, let us say approximately with the support company.

Finally, and very important also, are the special units which will undertake the immediate defense of the beach. Even an occasional strafing plane can cause great disruption of the incessant and vital work which is going on continuously along the shore. Landing craft flak designed to assist you here, and what you put ashore in the way of antiaircraft and antitank for the beach will depend on your analysis of expected enemy reaction and capabilities.

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That winds up what I have to say. I certainly have not covered the subject and could not, for there have been books written about it. Many of the considerations have been covered in previous sessions of this conference, FTP 167, while not in all respects up to date, contains discussions which, literally summarize the thought and experience of hundreds of years. It has no plot, and is a sure cure for insomnia, but I earnestly recommend it for your attention and for studious application to your particular problem.

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ASSAULT TRAINING CENTER
CONFERENCE
HQ ETOUSA

4 June 1943

DISCUSSION AFTER
TALKS BY LT COL ADAMS AND LT COL MASON

AIR SUPERIORITY: Without air superiority, no operation of this nature is possible. Area bombing on certain areas will be necessary. In drawing up the plan, the air should not be counted on to destroy mortars. Mortars must be engaged by mortars. Paratroops can bring down mortars under cover of darkness.

NAVY: It was stated, by the U.S. Navy representative, that a battleship with, say 16" to 14" guns, would have the necessary advantage over the shore batteries and would furnish the necessary fire support, at night. The Shore batteries would have the advantage over a battleship in the daytime. Therefore, from the Navy point of view, the operation should be planned so that arrival is made at dawn or very nearly after dawn. In that way, a battleship could put up a pretty good show during the night. It was discussed and decided that it would be the ideal situation if battelships were used and that battleships could operate in a cross-channel operation. However, it was pointed out that one of the troubles, from the aspect of battleships was the lack of space in the Channel, causing the battleship to be very vulnerable to submariesn etcetera. It was thought that possibly, an older ship could be used, - steaming in at 25 knots at night, preceded by small escort vessels to survey the area.

GENERAL: It was proposed, for such an operation, that first the area is given a bombing, with particular attention being paid to shore batteries. Second, the Naval gunfire would take place on the night preceding the attack. Third, a smoke screen on the morning of the attack. Fourth, a Ranger Battalion to follow up and to overcome the batteries - the Rangers to be landed in rubber boats from the sea under the cover of smoke. Paratroops would be put in with the Rangers, being dropped in the rear of the batteries - probably two companies of paratroops on each battery - one company of Rangers to each battery. The idea was to lift the Naval gunfire and to put down smoke just before dawn, smoke being the final phase of the Naval bombardment.

There was a discussion as to the relative merits of smoke, produced either by aircraft or by shell. It was stated that experiments have been carried out and found that the basic smoke screen laid by air, with holes filled in and kept up, is the most satisfactory method. Experiments are now being conducted in the firing of smoke mortars directly from landing craft.

Radar (R.D.F.) installations should be reduced the day before the assault, if possible.

There must be a carefully pre-arranged plan on all these matters. Additional units of Ranger troops should be available to be thrown in against unforeseen contingencies. Tanks must go ashore with the first wave. Initial penetration can be achieved by special assault detachments which move through lanes in obstacles made by preliminary fire of all types, assisted by fire from tanks, hull down in the water, close to the pillboxes. It was suggested that, during this phase, neutralization of hostile supporting artillery and of mortars by air bombardment and by Naval gunfire, might be adequate to permit the assault detachments to function.

The first operation should be the reduction of specific pillboxes. The beach defenses should be subjected to strategic air bombardment for a period of days prior to the landing of the assault troops and this strategic bombing should be followed closely by heavy tactical bombing in direct close support of the assault. Naval gunfire should be placed on the beach defenses immediately prior to the time of landing for neutralization effect.

Rocket craft can be brought in to fire immediately prior to the time the initial assault wave lands. This rocket fire would assist in neutralizing beach fire sufficiently to permit the landing of troops without too many losses. Tanks should be used to support the assault troops initially by firing directly at the embrasures in the pillboxes from hull down positions.

Smoke can be laid down on the pillboxes with the idea that, when it lifts, the tanks would be able to fire at the embrasures.

The troops will land under cover of all these supporting fires. Each assault detachment, plus tanks, will have specifically designated pillboxes to overcome. If two or more pillboxes are assaulted simultaneously, only two additional tanks will be required for each additional pillbox since they would have the benefit of flank fire cover from the tanks to the right and left. The important thing is that a definite plan is laid and each known pillbox is assigned to a specific unit. Normally an assault platoon, organized along the lines previously discussed, plus the necessary tanks for close support, should be assigned to assault each pillbox.

Simultaneously, attacks would be made on the hostile defenses from the rear by paratroops, and other airborne units would come in to block the hostile reserves from the beach area.

To summarize, air bombardment, naval gunfire, rocket craft and other small supporting craft, and tanks, would support the landing of the Ranger type battalions and their assault of the hostile pillboxes. The specially organized assaulting units would be followed by regularly organized and equipped infantry who would exploit the breaches that had been made and move quickly inland to the objective.