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RESEARCH ON STRIKING FORCE TACTICS

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CHAPTER I - INTRODUCTION

In studying striking force tactics we must consider the following main points:

A - Extension of Attack Range

The attack range of a battleship fleet is limited to 30,000 - 40,000 meters. For an aircraft carrier fleet, the attack range is extended to several hundred nautical miles. Elements of a carrier fleet may be advanced separately, avoiding vulnerable concentration, without being deprived of capabilities for concentrated attack on the objective. The development of the carrier fleet closely parallels the transition from massed land warfare in the days of spears and swords to modern, open land warfare brought about by the use of firearms.

B - Weaknesses of Carriers

Modern carriers have been disabled by a few direct hits by 250 kg (550 pounds) bombs. Battle experiences prove that carriers cannot escape even when AA and fighter plane cover are excellent. Despite present and future plans to strengthen AA, carriers cannot be safeguarded against air attack unless some epochal AA equipment makes its appearance. Because of this, carriers are forced to use a combination of negative means of defense: dispersion and deception. This partially offsets the advantage of attack range.

C - Importance of Decisive Battle

Plans for the destruction of the enemy's units on every occasion in which they appear are vital when viewed in the light of his great military expansion. When he is not completely annihilated, the comparative ease and speed of his recuperative powers is apparent from successive battle experiences.

Historically, there are two general patterns followed in decisive battles:

1. Cut off the enemy's retreat by bold turning and envelopment and destroy the enemy main body on the battlefield, pursuit then being simply the mopping up of a routed enemy; or

2. Defeat the enemy on the field of battle and, after he has fallen into a disadvantageous situation, carry out a fierce, resolute pursuit and annihilate him.

Analysis of past naval battles in which battleships constituted the most important fleet element indicates that the second pattern was generally followed. The tactical principle involved specifies the use of gunnery and torpedo fire to destroy the balance of power. Thereafter, annihilation is effected gradually during a resolute pursuit.

Decisive battles involving a predominantly carrier fleet - a striking force - will follow the first pattern. The distance between the opposing fleets at the crucial moment is very great. The difficulties of pursuit are greatly increased. The reserve power to pursue is often lacking because of the enormous plane losses sustained even by the victor in a single engagement (see tabulation which follows). Increased effectiveness of AA fire is a further factor. Without a capable reserve force retained in the rear, pursuit will be difficult. Pursuit from the spot of the attack will usually result only in the disposal of damaged enemy ships.

Judging from decisive battles in the history of land warfare, we find that most generals have won their great victories by flanking and envelopment. Napoleon alone, at JENA, achieved success by following the second pattern.

AIRPLANE LOSSES IN AERIAL BATTLES AT SEA

Battle	CORAL SEA	STEWART ISLANDS (TN: 2nd SOLO- MONS Battle)	SANTA CRUZ (TN: South Pacific Battle)
Carriers	SHOKAKU(CV) ZUIKAKU(CV)	SHOKAKU(CV) ZUIKAKU(CV) RYUJO(CV)	SHOKAKU(CV) ZUIKAKU(CV) ZUIHO(CVL) JUNYO(XCV)
Usable planes after battle	Carrier fighters: 24/36	Carrier fighters: 41/78	Carrier fighters: 44/90
Usable planes before battle	Carrier bombers: 9/36	Carrier bombers: 25/54	Carrier bombers: 18/72
	Carrier attack: 6/36	Carrier attack: 34/45	Carrier attack: 24/54

CHAPTER 2 - BATTLE EXPERIENCE

Indications of the revolution in naval warfare are contained in the sea battles which have occurred since the beginning of the Greater East Asia War. Former naval theories of battles in which the contestants, striving for victory, concentrate their forces, meet within sight of each other, and exhaust all methods of gunnery and torpedo warfare, one might even say "slug it out", are felt to be obsolete in military art. The new naval theories, which employ the aircraft carrier as a capital ship, and which are based on the considerations set forth in Chapter 1, resemble methods applied to land rather than sea war. We realize that we have now stumbled upon the anticipated revolution in the art of war.

In considering the evidence of tactics in successive naval battles we have not abandoned the conventional conception of naval warfare. A situation in which the contestants concentrate the strength on hand and engage each other cannot be considered new tactics. However, the change in the capital ships naturally suggests the appearance of new tactics.

On 7 May 1942, in the Battle of the CORAL SEA, CarDiv 5 seized an excellent opportunity for a surprise attack, taking advantage of the enemy's preoccupation with the SHUNO (CVL), but we lost our chance to seize the initiative in attack because of an unfortunate mistake made by a reconnaissance seaplane in the identification of a large tanker as a CV. (See Chart 1, Battle of the CORAL SEA.) The enemy also, directing his full strength toward attack on the SHUNO, lost an excellent opportunity to attack CarDiv 5.

On 5 June 1942, in the Battle of MIDWAY, when our striking force was restrained by the attack on MIDWAY, we let an enemy fleet which appeared on our flank seize the initiative for attack. (See Chart 2, Battle of MIDWAY.)

On 24 August 1942, in the Battle of the STEWART ISLANDS, our fleet was restrained by GUADALCANAL and the RYUJO (CV) was damaged, but by sacrificing her the main force of the Third Fleet succeeded in gaining the initiative for attack on the enemy fleet. (See Chart 3, Battle of the STEWART ISLANDS.)

On 26 October 1942, in the Battle of SANTA CRUZ, the enemy sent out a BatDiv in the area south of the SOLOMONS to divert our fleet, planning a surprise attack. Instead they were diverted and absorbed by the advance guard of our striking force and brought upon themselves a crushing defeat.

In surveying these battles we discover that the secret of successful striking force battles is to divert and restrain the enemy on one side, and then to attack suddenly from the flank. This discovery was a product of chance in successive battles. We must deliberately develop such situations and, advancing, destroy the enemy on the field of battle.

CHAPTER 3 - METHODS OF FIGHTING DECISIVE BATTLES

Let us survey the methods of fighting decisive battles in land operations, methods which we must adopt as reference material for the new striking force tactics.

We can best shock and destroy the enemy on the battlefield by an enveloping attack, after securing all his retreat by envelopment on both flanks, or both. In many cases the application of these common principles is accompanied by great danger. Therefore, the trend of the military world in general is toward the safe method of merely repelling the enemy or occupying territory. We are even apt to neglect studies which, although striking some danger, may lead to destruction or severe damage to the enemy. All great generals of the past have unmistakably planned and properly executed enveloping battles when annihilation of the enemy was strategically necessary, even though, considering the perils involved, this would have seemed absurd to the average man.

Such methods are outlined below.

Envelopment on both flanks

This is the method adopted by Hannibal at CANNAE about 200 B.C. An army can envelop both enemy flanks at once, with forces equal or inferior to those of the enemy, because an army which has major armor points on either flank can sustain an all out frontal assault even with a slightly weakened front.

Hannibal, with twenty-two thousand men, secured his front against a Roman army of fifty-five thousand, and then enveloped and destroyed both Roman flanks. Since then the remarkable advances made in weapons and in tactics have resulted in the attaining of frontal resistance, and it has been possible further to decrease frontal strength. In 1914, in the Battle of TANNENBERG, the Germans with sixteen thousand men completely repelled the main body of SAMSONOV's army of two hundred thirty thousand Russians. Subsequently, men they were able to envelop and destroy the Russian army in the marshy forest region. This was but the endorsement of the principle of CANNAE in the modern age. Sufficient strength must be reserved for the enveloping movements. When strength is poured into the front, pressure may be allowed here but the result of the battle can only force the enemy to the rear.

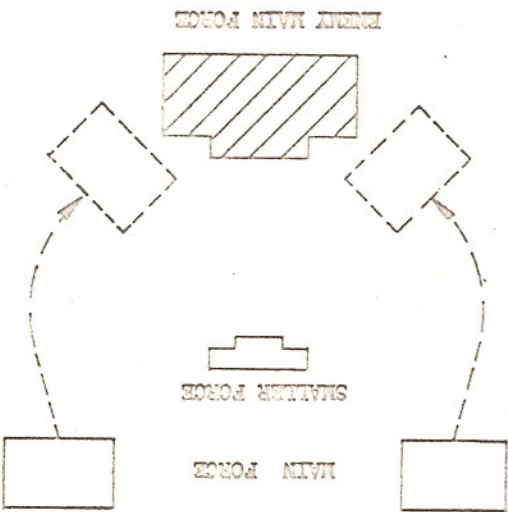


Figure 1.

If the forces stationed on either wing fiercely, resolutely and swiftly envelop the enemy's flank, without concern for the situation at the center, the danger of collapse of the front will be avoided, and a brilliant conclusive battle will be achieved.

In planning enveloping movements three general plans can be followed:

Turning or flanking with a force stationed on both wings;

The movement of units from the center force to the flanks of the front line, as in the Battle of MUKDEN, and

Converging on the field of battle forces which were stationed strategically on exterior lines.

Which of these plans should be adopted depends on the tactical situation.

Envelopment with your main strength on one flank

In applying this tactic, a frontal attack with the lesser force facilitates a flank attack with the main force. It, as well as envelopment from both flanks, is an excellent method of inflicting destructive blows on the enemy. However, inconclusive envelopment - as when the enemy's flank is turned with the lesser force in order to facilitate the frontal attack - will not inflict a conclusive blow, although it may repel the enemy (as at the Battle of LIAOYANG).

Envelopment on one flank was the common method of both Frederick the Great and Napoleon. Frederick usually fought with numbers which were inferior to those of the enemy, and were insufficient for immediate double envelopment. He would first execute a flank attack, and then, taking advantage of the situation while the enemy was shifting his front, would embark on a plan of envelopment on both flanks. (Such a maneuver occurred on 5 December 1757, when with only thirty-five thousand men he shattered an Austrian army of eighty thousand at the Battle of LEUTHEN.) Napoleon stressed pursuit, and was content to envelop on one flank, holding a crack army in reserve up to the last moment for this.

This method takes advantage of the fact that the enemy cannot completely reform on a new front. Though the method does not equal envelopment on both flanks in effectiveness, it is possible to attain conclusive results with it. Yet it is very difficult to inflict a completely decisive blow when the enemy has retreat routes on the other flank which was not enveloped. However, when there are obstacles on the un-enveloped flank which cannot be by-passed, a situation similar to that created by envelopment on

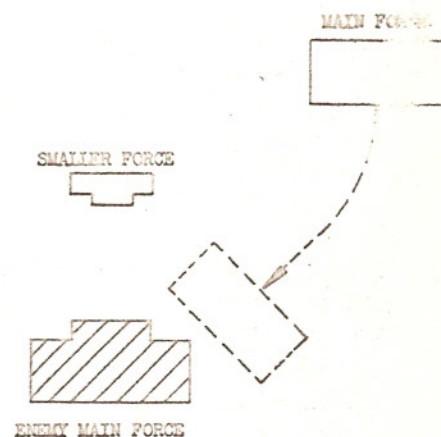


Figure 2.



The tactic by which you try to turn the enemy's rear with your main force should be termed strategic envelopment. By advancing to his rear with your main force you attempt to cut off all retreat. If you wish to inflict a direct decisive blow, you must in addition tactically envelop. Conclusive results can be achieved by turning when the enemy fails to guess our plans, or when we do not vacillate although he does know them. However, today's developments in radio, reconnaissance, communication, etc., require a highly favorable tactical situation to attempt turning.

Turning

both flanks exist.

CHAPTER 4 - TACTICS

The following is an investigation of the tactics of the striking force, using as a basis the observations of the previous chapter.

Principles of Task Organization

We must, by the use of enveloping dispositions, seize the enemy and destroy him on the battlefield or cut him from his home base by pressure on his rear communication lines. Whether to envelop from both, or from only one flank depends primarily on the situation. But you must plan to destroy him with one blow, diverting and containing him with a small force on the front, and directing your main attack at one or both flanks, threatening his flanks and rear.

Originally, striking force battles differed from land battles. Topography was not a factor. Striking forces were weak in defense and lacked toughness. As a result, when the enemy attacked our important installations and bases his activities were restricted and he lost freedom of movement.

(TN: This next paragraph is not clear. It discusses, however, the ways by which striking forces have grown stronger and tougher. The concept of flank envelopment is cited as one cause. The principle of surprise is another. The chance of surprise is recognized as much greater if the approaching force stays beyond the range of enemy land-based planes. It is also recognized that searches of the approaching force will probably be limited to one direction.)

In your diversion force, it is profitable to use a division of battleships and decoy carriers if possible. Or, when luring the enemy into a trap through the use of a small, advance carrier force, keeping at a suitable distance from the main force, carry out the diversion by skillful maneuvering and the use of tracking planes.

The views of CarDiv 2 on decoy carriers follow:

In view of the weaknesses of carriers, when large enemy carrier forces are anticipated, it is extremely profitable to use decoy carriers in order to limit losses and to assure battle results. Battle lessons of operations in the CORAL SEA and in the INDIAN OCEAN teach us that camouflaging tankers is unwise, due to their slowness. Should they be discovered by the enemy they will inevitably sustain staggering losses. As a result, application of this method may be negative due to the necessity of extreme caution. Decoy carriers are effective when one begins to use them aggressively, and so high speed decoys are essential. The following is a plan for such use:

Temporarily camouflage a light cruiser as a decoy carrier. (The simplest method is to spread canvas over its bridge and stacks to simulate a flight deck and to camouflage it.) Attach two screening destroyers, and send them out ahead of your carriers.

Methods of Use

Coordinating the movements of diversion force with those of the force directly under the task force commander:

One example is as in Figure 3. When the search planes are launched, CarDivs 1 and 2 change course 60° to port and starboard of the base course and proceed at a fixed speed for two hours. (To illustrate, at a hypothetical speed of twenty knots.) They then return to the base course, and take formation preparatory to dispersal.

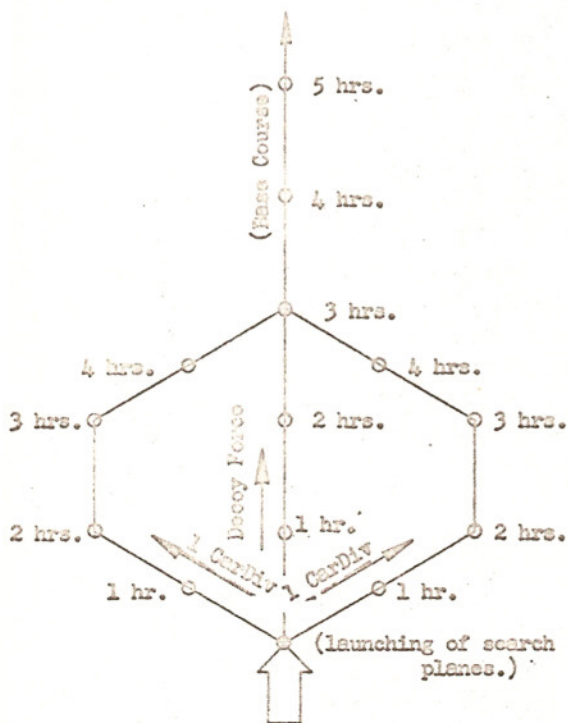


Figure 3.

If the search planes have not contacted the enemy after three hours the carriers change course 60° toward the base course; and after five hours, without further orders, they join up.

The decoy unit continues along the base course, and if it does not contact the enemy after five hours it reverses course and forms the line of return of the search planes.

If the search planes contact the enemy the decoy unit will advance toward him according to orders. The CarDiv on the enemy side will alter course to the opposite side at once, and, with the decoy carrier in the lead, will generally take station astern.

Coordinating the movements of the diversion force with those of the vanguard:

Until contact, the decoy unit will operate in conjunction with the vanguard. Upon contact, it will keep station midway between our carrier force and the enemy striking force. No matter what the situation, the decoy unit will advance between the enemy and our carrier force, and will endeavor to attract the enemy planes.

When the enemy search planes are contacted, the screening destroyers and the decoy carrier will lay smoke screens to conceal the ship's type. Should the enemy attack unit approach, take evasive measures swiftly, and also try to repel enemy planes with AA gunfire.

We need not dwell on the fact that the great principle in the utilization of military power is the assembly of maximum power at the point of principal attack.

However, the success or failure of a conclusive battle is intimately related to the thoroughness with which this principle is applied and requires special attention. You must economize on power in the secondary attack area (where diversionary and containing movements are executed).

The movement of forces in the secondary attack area is extremely difficult, and the fortunes of war are often controlled by the battle situation in this area. Therefore, it is vital to facilitate the operations in the main attack area by endeavoring to achieve the objective of diversion and containment by suitable maneuver. It is necessary to maneuver aggressively and lose no opportunity to shift to attack. When carriers are disposed in the secondary attack area and maneuvered negatively throughout, not only is the objective of the operation not attained but also losses will be inactively incurred. Therefore, in accordance with circumstances, it is necessary to consider advancing and making a surprise thrust at the enemy; or, using the advance attack units, make a one-way attack and neutralize many enemy carriers, thus making the engagement advantageous for the force directly under the CinC.

Enveloping the enemy depends primarily on the situation. You can envelop by means of tactical movements such as turning or flanking movements from your existing approach disposition, or you can envelop by means of strategical movements, that is, by the use of forces which have previously been disposed on exterior lines and are converged on the field of battle. However, in general, when you have the initiative in controlling the operation and can anticipate the time and place of the engagement, the latter method is advantageous. In leading and controlling movements of all units it is necessary to specify precisely the main force and the secondary force. For coordination, clearly assign the missions of all detached forces.

When your forces are dispersed, never forget the danger of piecemeal destruction. Especially in this so when planning strategic envelopment. Therefore, conceal your own plans carefully, while trying to learn the enemy's situation in advance by exhaustive searches. A detailed explanation concerning this appears later in the text. In envelopment on both flanks it is certain that the enemy will fall into the evil practice of dividing his forces, unless they are inferior to ours or unless he has massed them. Theoretically it is hazardous to plan such envelopment with less or equal power against an enemy deployed on a suitable front. Yet there are many historical precedents of blows inflicted on a superior enemy by this method. In the long run, the real error in war is the commonplace. The most important factor in striking force battle tactics is surprise attack. You must try for complete surprise of the enemy by bold maneuvers.

Although we should study tactical fleet movements (both before and after contact) in greater detail, it must be remembered that in striking force warfare situations change quickly and the issue is resolved in a moment. Therefore, set up a preparatory enveloping disposition during your approach so that you can envelop immediately after contact. The fleet which cruises massed is likely to lose the benefits of the initiative when it attempts to envelop by shifting its strength after contact. There is also the danger of exposing plans by such sudden maneuvers. Since you will be at a disadvantage in responding to changes in the situation, it is necessary to consider holding suitable forces in the rear and, by maneuvering them in response to the enemy situation, complete the envelopment.

When planning envelopment by strategic maneuvers, you must: (1) direct all units to the anticipated battle area; (2) suitably contract the operational front; (3) make inter-unit communications reliable; and (4), once you see an opportunity to overwhelm the enemy immediately, strive to annihilate him with one blow. Historically, the dangers of operations on exterior lines have often been traceable to hesitation or negligence. Take particular notice of this.

In the case of either strategic or tactical maneuvers, deliberation is important. If, after evening contact, you plan an attack for the following morning, moving into position during the night, and if the enemy's movements are not clear, consider his possible shifts. Such deliberation enables you to restrict your morning searches to one direction, and leaves you at a suitable distance from him.

Neither frontal attack nor inconclusive envelopment on one flank have the possibilities of a surprise attack. Although it is possible to destroy the enemy, you will probably only repulse him. Since this tactic does not promise decisive results, plan on conclusive envelopment on one or both flanks. But when you have discovered the enemy within attack distance, freedom of movement vanishes, and it is difficult to take a suitable enveloping disposition. You must then be content with a frontal attack or an inconclusive single flank attack.

Since an assault will often be unavoidable under such conditions, dispose in depth as much as possible, offsetting the enemy attack by an attack of your own by advance forces, supported by rear forces.

As previously stated, it is difficult to achieve conclusive results by pursuit.

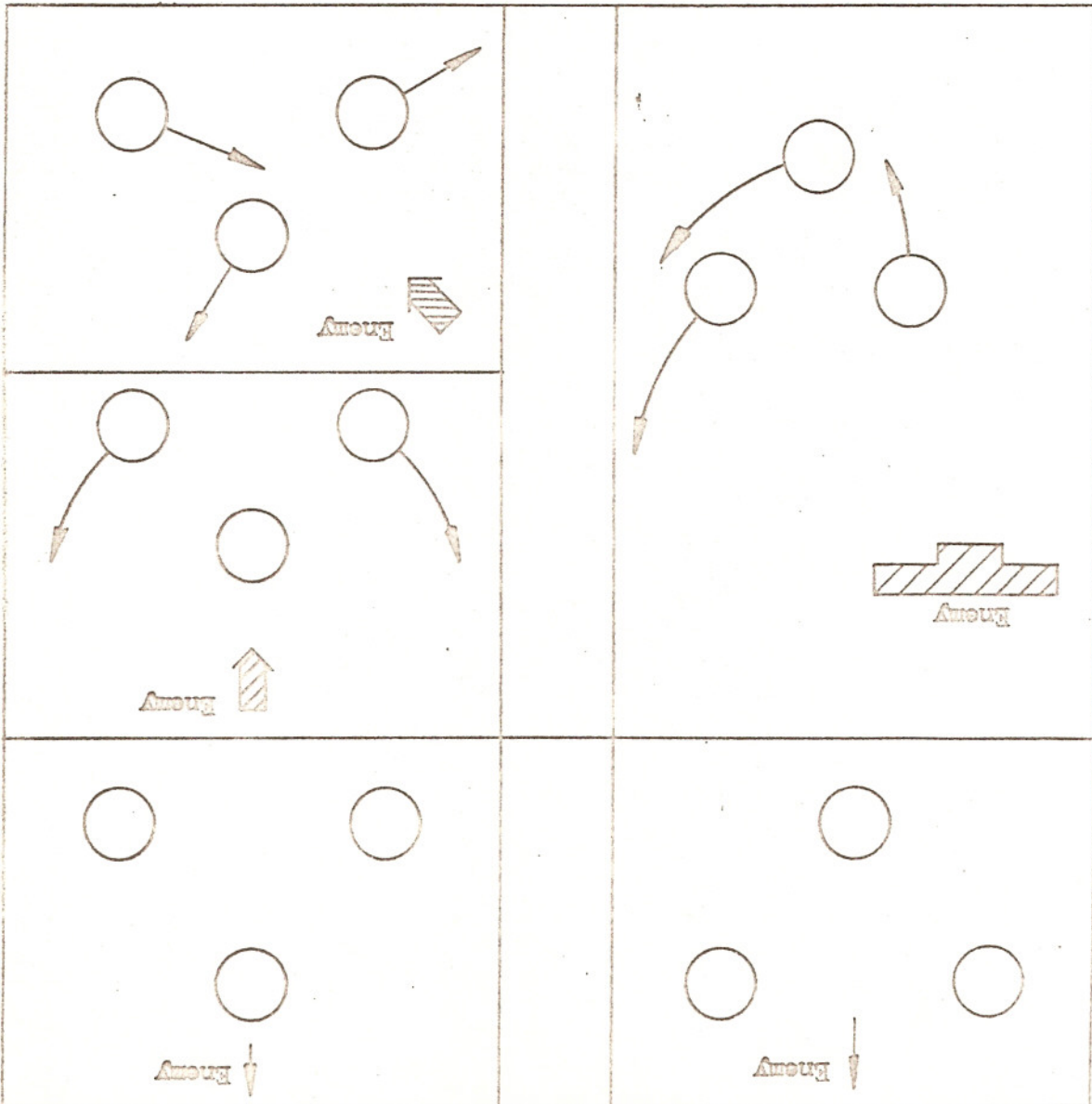
Victory or defeat turn on the initial phases of battles, particularly striking force battles. Often both forces are separated by a considerable distance at the crucial moment. Pursuit becomes increasingly difficult, and we must therefore often be content with disposing of crippled enemy ships.

In striking force battles in which plane losses are severe, a great deal depends on the rear force which is disposed in depth for a pursuit engagement. There is a danger that it may advance too soon, becoming confused with the advance force and creating a vulnerable concentration of ship targets, thus increasing the losses incurred. On the other hand, if you lose the chance to initiate the pursuit you cannot catch the enemy. We recognize these tactics to be unsatisfactory, but should you sometime face such a situation you must try to overcome the disadvantages by violent resolute attacks.

Battle experiences teach us that carriers have great weaknesses on one hand, and on the other have inordinate destructive power. Cover these weaknesses by dispersing your carriers, thus reducing the damage risk. At the same time, render the enemy's carriers inoperative by attacking his main force with a part of your force, and then utilize the remainder of your strength to inflict further damage. The extent of your dispersion of carriers varies, and depends on difficulty of communications and command, the enemy situation, etc. Generally, the units of a striking force disposed in one area should be able to execute necessary searches unaided, and have sufficient strength to carry out air attacks which are capable of rendering several enemy ships inoperative in one blow. Generally, it is advisable

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(Note: Each circle represents one Card IV.)



(The significance of the sketches below is not explained in the text. Presumably they illustrate preparatory enveloping dispositions set up during approach.)

FIGURE IV

to attach the necessary screening units to each CarDiv of three carriers and disperse these CarDivs at a suitable distance. This distance must be determined in the light of the enemy situation, field of vision, and aircraft potentialities, in order to reap full results of the battle and at the same time avoid simultaneous discovery and attack. The Battle of SANTA CRUZ indicates the best distance to be at least one hundred miles.

Organization and number of planes required for an Air Attack Unit

Battle experiences of air attack against fleets which maintain a heavy AA screen give us the following basic statistics:

POWER

To damage an enemy carrier until it is inoperational for planes - about three 250 kg (550 pound) bombs

To sink a carrier - about seven Mod 3 torpedoes (?)

To sink or render inoperative a screening destroyer - about one 250 kg bomb

PERCENTAGE OF HITS

Dive bombing: 40-50%

Torpedoes: 50-60%

LOSSES

We anticipate losses of 33%

It is estimated (for this hypothetical operation) that the strength of one enemy group consists of a nucleus of three carriers, with 18 screening destroyers and 40 planes for air cover. Computing the number of planes required for an Air Attack Unit to annihilate this enemy group, we arrive at the following:

VF (to "control the air") - about 40 planes.

VB - about 81 planes (to neutralize carriers @ 9 planes for one ship, total 27 planes; to neutralize gunfire of screening ships @ 3 planes for one ship, total 54 planes).

VT - 54 planes (to sink carriers @ 18 planes for one ship, total 54 planes).

The standard number of planes which present carriers are capable of carrying:

Large class carriers (SHOKAKU (CV) and larger)

27 VF
 45 VT and VB
 9 VSO

Total: 81 planes.

Intermediate class carriers (HITAKA (XCV) class)

27 VF
 18 VB and VT
 9 VSO

Total: 54 planes.

Two operations are required to launch all of a carrier's planes, and there is usually a 30-45 minute delay between launchings.

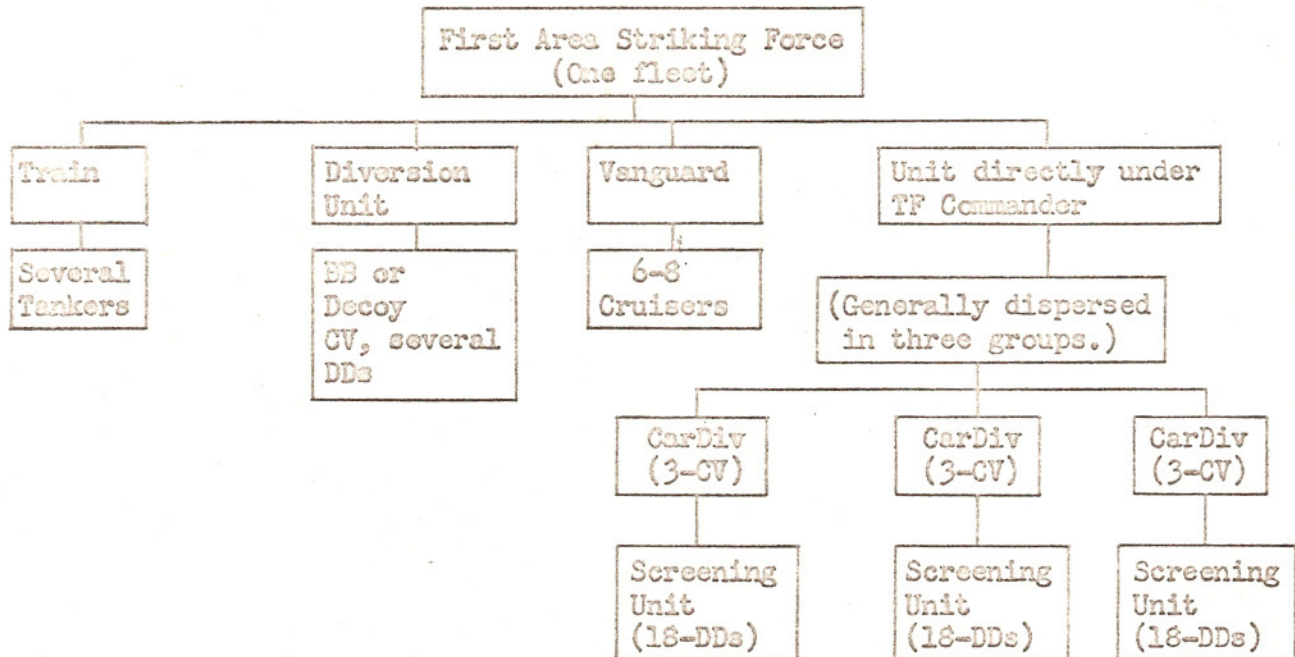
In a daylight assault against a fleet with strong AA protection, coordinated VT, VB and VF attacks in sufficient force would be highly desirable. This is, however, prohibited by existing restrictions in carrier plane-carrying and launching capacity. Massing carriers to compensate for this is contrary to tactics requiring carrier dispersion. Consequently, in general the first attack, consisting of many VF units and VBs, will wipe out the enemy's air cover, wreck his carrier's facilities for handling planes, and cripple the protective screen of DDs. A second attack, composed of VTs, will attack and sink the enemy's carriers under cover of the confusion. Adopting this method enables you to reconcile the discrepancy in the planes hypothetically necessary for a decisive victory and the planes actually available from three CVs.

One plan for an air attack force organization follows:

Type of attacking unit Type of plane	Combat Air Patrol	Reconnaissance Unit	Attack Units launched in first attack		Attack Units launched in second attack		Sub-total	Total
			Fighter Striking Unit	Dive Bomber Unit	Fighter Striking Unit	Torpedo Bomber Unit		
Carrier 1 Carrier fighter Dive bombers Torpedo bombers Recce planes	9	9	12	27	6	18	27 27 18 9	81
Carrier 2 Carrier fighters Dive bombers Torpedo bombers Recce planes	9	9	12	27	6	18	27 27 18 9	81
Carrier 3 Carrier fighters Dive bombers Torpedo bombers Recce planes	9	9	12	27	6	18	27 27 18 9	81
Total	27	27	36	81	18	54	243	

When engaging the enemy, the striking force will disable the launching facilities of a number of enemy carriers with one attack. The air attack unit as outlined meets this demand. One CarDiv of 3 CVs as a dispersed unit has the strength to eliminate nine (certain) to fifteen (maximum) enemy aircraft carriers simultaneously.

Plan of organization of a fleet as a striking force:



(See also Figures V and VI.)

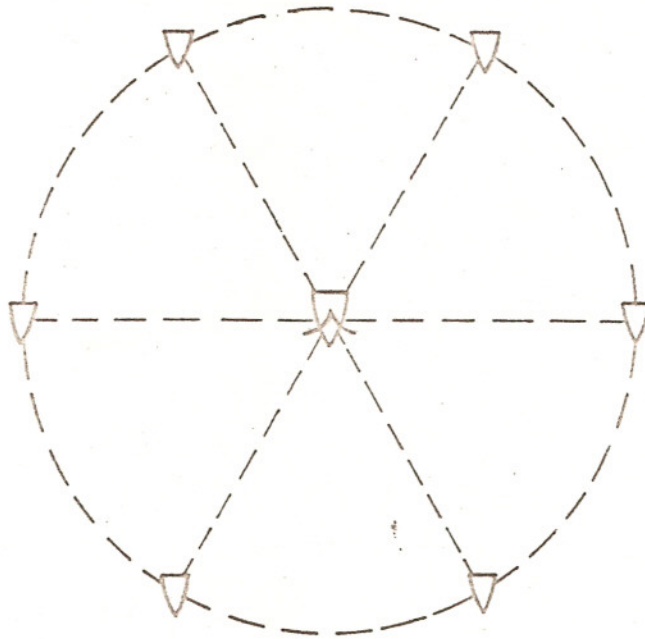
Dispersal distances for a fleet:

Hypothesis: You are in a situation in which it is difficult to make suitable enveloping dispositions by maneuver. Submarines, land-based planes, and the vanguard have failed to give advance information on the situation as expected. While avoiding discovery and attack, through the search of the units directly under the task force commander, you plan to achieve success by bringing the rear forces into battle.

Aircraft speed - 200 kts
 A/C search radius - 600 nautical miles
 A/C attack radius - 500 nautical miles
 Carrier speed during approach - 24 kts
 Carrier speed at high speed - 30 kts
 Field of vision - 20 nautical miles

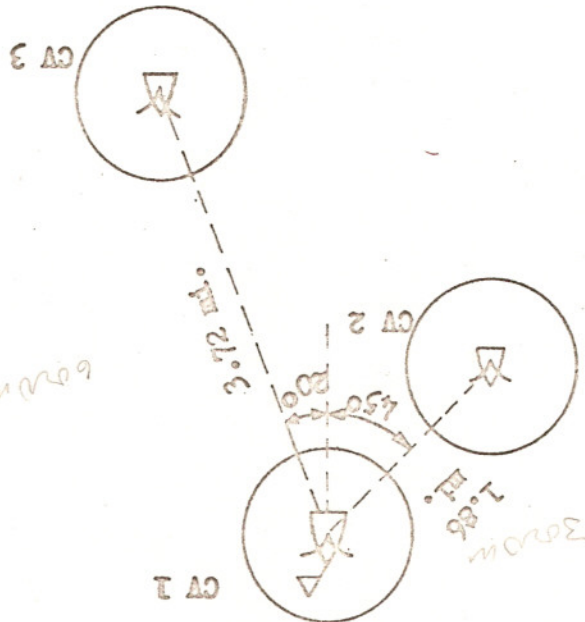
(the same conditions apply to the enemy as to us)

(Editor's note: See introduction for comments on this fanciful estimate of carrier plane radii.)



EXAMPLE DISPOSITION OF
SCREENING DD's

(“CV 3 will be responsible for launching combat air patrols and receive planes while attack units of CV's 1 and 2 are held in readiness.”)

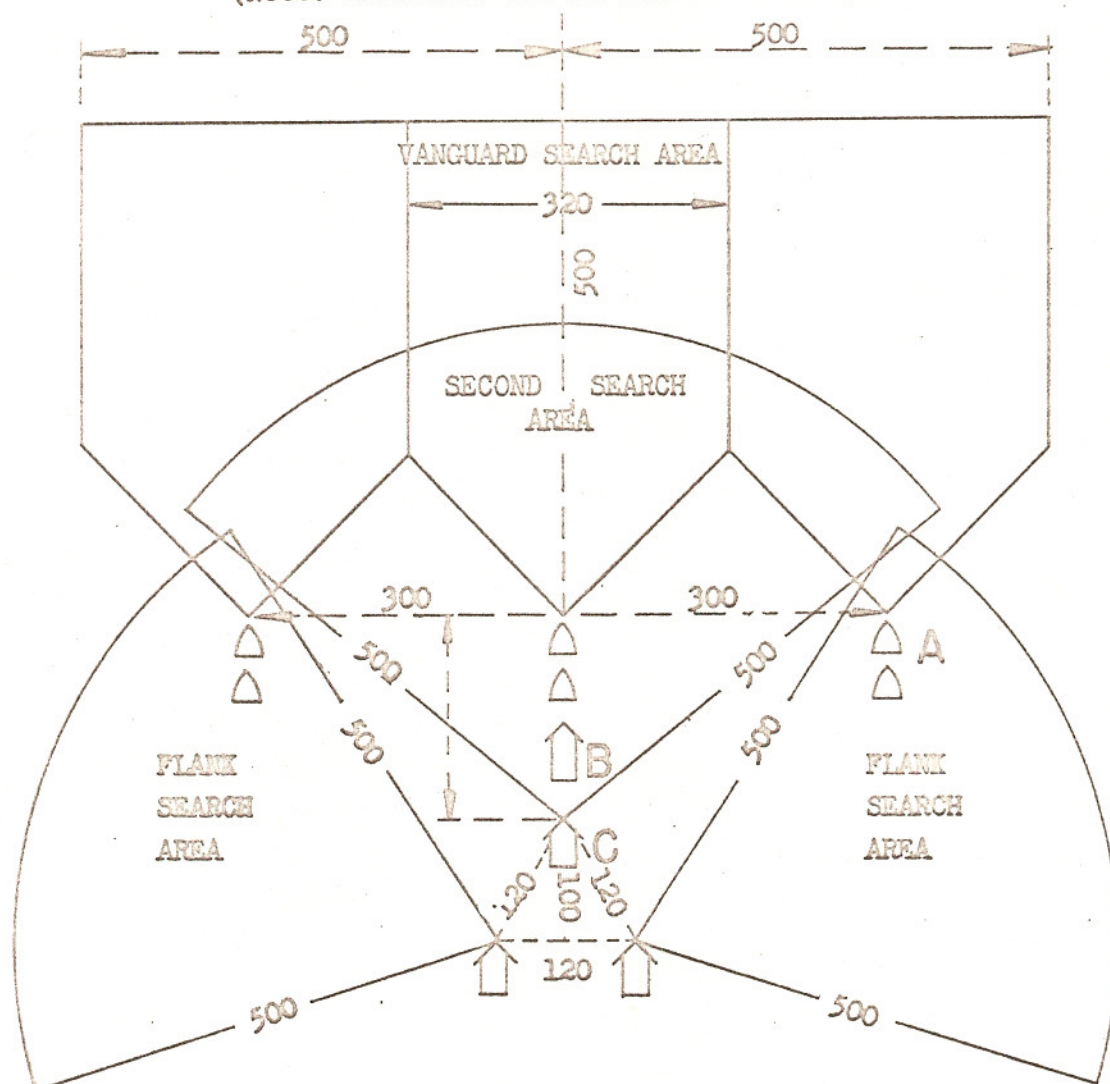


EXAMPLE OF CARDIA
APPROACH ORDER

FIGURE A

EXAMPLE OF SEARCH FORMATION

(Note: distances are in nautical miles)

HYPOTHETICAL STRENGTH OF UNITS SHOWN ON CHART

- A. Vanguard: 6 cruisers with 8 recce seaplanes each.
- B. Probably indicates diversion unit, which consists of 2 ISE class BBs carrying dive-bombers, 1 TAIHO class CV carrying fighters and recce planes, 18 DDs.
- C. Main Fleet: 3 CarDives, each including 3 CVs and 18 DDs.
- D. Train (Not shown on chart) accompanies various units at their discretion.

FIGURE VI

Night attack in which fleet converges on enemy (see Figure VII)

Hypothesis: Vanguard reconnaissance planes discover the enemy in the afternoon. You intend to maneuver in the night so as to envelop and annihilate him early the following morning.

Plane performance (own and enemy):

A/C search radius - 500 miles
A/C attack radius - 400 miles

Your strength:

Unit under TF Commander
Diversion Unit

Vanguard

Two CarDive
Two BBs (ISE Class)
One CV (TAIHO Class)
Six cruisers (each with 8 VSO)

Enemy situation:

Spotted at 1500 while moving in a group; nucleus of some nine CVs; speed of 20 knots. You can anticipate his position by means of night tracking.

Sunset - 1800
Sunrise - 0600

Chart of Operation:

Plan to neutralize all enemy carriers with some 45 VB launched from diversion unit at 0300 (you can expect to neutralize five).

By 0700 the unit under TF Commander will launch its attack unit and destroy the enemy carriers.

Time schedule (see Figure VIII and editorial note in introduction).

We are to avoid giving the enemy the initial attack. The following formula has distance from the enemy force indicated by D.

Vf = speed of search planes
When Ve = speed of enemy fleet
Vs = speed of our fleet
Db = operational radius of enemy attack planes

Then $D = \frac{Vf \text{ plus } Ve}{Vf \text{ minus } Vs} \times Db$

$$D = \frac{200 \text{ plus } 24}{200 \text{ minus } 24} \times 500 \quad \geq \underline{640 \text{ (Miles)}}$$