

SECRET.

TRANSLATION NO. VII/20.

AIR HISTORICAL BRANCH.

THE IMPORTANCE OF AIRCRAFT CARRIERS

IN SEA WARFARE.

A Study prepared by the German Air Historical Branch

(8th Abteilung) and dated 27th March, 1944.

TRANSLATED BY:

AIR MINISTRY, A.H.B. 6.

23rd January, 1947.

THE IMPORTANCE OF AIRCRAFT CARRIERS IN SEA WARFARE.

CONTENTS.

1. INTRODUCTION.
2. HISTORICAL SKETCH OF THE DEVELOPMENT OF AIRCRAFT CARRIERS.
3. PRINCIPAL CHARACTERISTICS OF THE AIRCRAFT CARRIER.
4. OPERATIONAL POSSIBILITIES AND DUTIES.
5. THE BATTLE OF MATAPAN.
6. THE ATTACKS ON P. Q. 18.
7. THE 'BISMARCK' ACTION.
8. CONCLUSION.

1. INTRODUCTION.

Opinions about the role which the Air Force would play in future sea operations were very confused before the beginning of this war, due to the lack of practical experience in operations of this nature. Some held that air power, with its unlimited possibilities of development, could establish supremacy over the seas even when opposed by naval forces and would prove itself superior to the most powerful battleships. Another view was that the Air Force could only be effective in coastal areas because it was tied to the land and coast.

The course of the war to date has given a clear answer to this question. As a result of its intense technical development, unexpectedly great range, and amazing operational effect, the aircraft has assumed the utmost importance in sea warfare. On the other hand, the Air Force has had little opportunity to demonstrate its powers over the sea, and the value of the Navy and above all of battleships has in no way diminished.

A land-based air force cannot replace at sea a mobile naval force and the Navy still remains the chief fighting weapon in this sphere. The air force can usefully supplement and increase the striking power of the navy by means of well-timed strategic operations, but must always conduct its operations in conformity and in co-operation with the navy.

The value of the air force in sea warfare is evident from the variety of tasks which it has been able to assume during the course of the war:-

- (i) Protection of the coast and coastal fronts.
- (ii) Reconnaissance and patrols in wide sea areas, in order to gain information about the situation.
- (iii) Close reconnaissance for, and protection of, naval forces at sea.
- (iv) Bomber operations; offensively against enemy sea targets with bombs, torpedoes and mines or defensively against enemy attacks on our formations.
- (v) Reconnaissance of, and attacks on enemy merchant shipping and as protection for our convoys.

2. HISTORICAL SKETCH OF THE DEVELOPMENT OF AIRCRAFT CARRIERS.

The fulfilment of the above tasks, without which modern sea warfare is no longer conceivable, is, however, still limited by the range of action of the aircraft. Even if ranges are increased, it is still not possible for land-based aircraft to follow the naval forces far into the ocean. This fact led the great sea powers to establish numerous naval and air bases overseas, in order to bridge the largest gaps in their air defences. The occupation of the Azores is a good example of this.

Aircraft operating over the sea from such advanced bases still suffer from many of the disadvantages of the land-based aircraft. Modern sea warfare makes it necessary for aircraft to accompany the fleet, and be available for action at any time and at any distance from the coast. This fact was undoubtedly the primary justification for the introduction of the early sea-plane carrying ship (Flugzeugschiff) and its most notable successor, - the modern aircraft carrier.

The development of the carrier began in 1910 with the first attempt to fly an aircraft from the deck of an American cruiser. After this aircraft bearing cruiser, the next stages in development were the introduction of parent ships carrying a limited number of seaplanes, followed by a vessel with

a short flight deck free of obstructions at the bows, from which first seaplanes, on small wheeled carriages, and subsequently land planes took off, thus, avoiding the difficulties of a sea take-off. Following this innovation came the necessity of being able to land on the ship again, and so the form of the present aircraft carrier was evolved.

At first, existing ships of the most varying types and sizes were converted to carriers. As from about 1928, difficulties arising from the inadequacy of technical and tactical experience were gradually overcome, and the construction of new aircraft carriers became possible.

### 3. PRINCIPAL CHARACTERISTICS OF THE AIRCRAFT CARRIER

The main characteristics of the aircraft-carriers which have since been built, are determined by the specialized purpose which they serve. Built to the requirements of the air force, they can be described as 'floating airfields'. A class of ship has therefore been introduced which differs radically from all other types in shape, armament, speed, size and defensive power.

The necessity of providing an adequate flight deck and sufficient storage space for aircraft has decisively influenced the construction of the carrier. In consequence, armament can only be installed in parts of the ship which cannot be used for aircraft, such as the sides of the ship. Space is naturally limited and the question arises as to whether naval or Flak artillery should be given preference. The emphasis must certainly be on protection against air attack, to which the ship is particularly vulnerable because of the target presented by its flight deck, and naval artillery must be restricted to the absolute minimum necessary for countering light naval forces.

Because of its great vulnerability, a carrier must be capable of high speeds, both in order to evade enemy naval forces, and to enable it to re-establish contact with our own formations when special courses have had to be steered on account of the wind during take-off and landing. High speeds require large engines with great power, but the size of the engine room is limited by the space required for aircraft storage. For instance, when, during the construction of the "Ranger", the speed of 30.3 knots was considered insufficient, it was discovered that an extra 3 knots would reduce the number of aircraft by 40%.

In addition, the faster the carrier, the greater must be its displacement. As however it is obviously desirable that the loss of a carrier should not entail the consequent loss of a substantial proportion of the aircraft available at sea, one school of thought has favoured the construction of a number of smaller carriers. A reduction in size, however, necessarily evolves a reduction in fighting power, i.e. in speed and aircraft complement, so that despite the disadvantage mentioned above, there has been a tendency to build larger aircraft-carriers with a displacement of about 20,000 tons (metric). The emergency construction of the so-called 'Liberty' auxiliary aircraft-carriers of 7,000 tons (metric) cannot be considered as an important divergence from this principle.

As the carrier represents a particularly valuable fighting unit, which cannot easily be replaced, it will attract the attention of enemy naval forces. For reasons of stability however, it is impossible to protect the aircraft installations with armour plating, as this would necessitate the carrying of too much weight above the waterline. The aircraft carrier can best protect itself by avoiding close range actions. It can defend itself against air attacks with its own fighters and Flak, but will always be inferior in a battle with enemy naval craft.

The number of aircraft that can be carried will depend on the size of the hangars, which in turn is dependent on the size of the flight deck. As a rough estimate, about 40 aircraft can be accommodated in a carrier with a flight deck of 250 metres.

To summarise the above it may be stated that the ideal aircraft carrier is a ship of 20,000 tons (metric) with the highest speed (35-37 knots), minimum naval artillery and armour plating, complement approximately equal to that of a cruiser, heavier Flak than any other warship, number of aircraft limited to 40-50 (maximum) and a flight deck of 270-300 metres. At present, the aircraft-carrier represents the most complete answer to the problem of how aircraft can be made to accompany naval forces and carry out repeated and powerful attacks in mid-ocean.

#### 4. OPERATIONAL POSSIBILITIES AND DUTIES

The importance of the aircraft carrier in sea warfare is clearly evident from its properties and fighting value. All types of aircraft can operate from carriers in the following main classes of operations:-

- (i) Offensive operations: torpedo, bomber or machine gun attacks on enemy sea targets, naval and merchant ships - or targets on the enemy coast line.
- (ii) Defensive operations: fighter escort for the parent ship, our own navy, and for our offensive and reconnaissance operations.
- (iii) Reconnaissance operations: extension of the fleet's range of reconnaissance by strategic reconnaissance of larger sea areas, tactical reconnaissance for the protection of our own formations and artillery spotting during battles.

The view was originally held that the main task of a carrier was to provide reconnaissance for the fleet and that it must seek refuge behind the fleet on account of its lack of defensive armament. In fact, however, close range reconnaissance is carried out mainly by aircraft based on other ships of the fleet. The carrier itself is a warship of great value, whose main tasks include co-operation with the fleet, protection of oceanic trade routes and, under some circumstances, co-operation during landing operations by the creation of temporary and local air supremacy.

As is indicated by these duties, the aircraft-carrier is an offensive ship, since the aircraft which it carries on board are primarily weapons of attack. Only on account of the importance of attacks on shipping have defensive tasks been assigned to the carrier in addition to its original duties.

Of the main tasks of the carrier, co-operation with the fleet is of great importance. During a naval engagement, the carrier borne bomber aircraft can assist in the destruction of the enemy's ships not only by actual bombing but also by means of reconnaissance flights.

In landing operations, the fighter and bomber forces of a carrier can give decisive support to the ground troops and can gain local air supremacy. They must simultaneously undertake the protection of units of their fleet as soon as they are within striking range of the enemy air force. For this type of operation, it is preferable to employ small auxiliary carriers, in order to avoid the risk of losing larger carriers and many aircraft in such very hazardous undertakings.

For the protection of convoy routes, carrier-borne reconnaissance and fighter aircraft are particularly useful. The growth of U-boat warfare, and the fact that the aircraft is the most effective counter-measure to it, have made it necessary for convoys to be escorted by aircraft-carriers in sea areas which cannot be patrolled by land based aircraft.

Having given a general picture of the value in battle, and the tasks of the aircraft carrier, and an estimation of its operational possibilities, it is convenient to illustrate its importance in sea warfare by means of examples of our own and enemy operations during this war. The Battle of Matapan, the attacks on P.Q.18 in the North Sea, and the Bismarck action,

have been chosen, as they most clearly illustrate the points that we have mentioned.

#### 5. THE BATTLE OF MATAPAN

During the Battle of Matapan on 28th March, 1941, the aircraft carrier was able to prove conclusively its value as an indispensable component of a modern fleet.

On this occasion, an Italian battle group, consisting of a battleship of the "Littorio" class, three heavy cruisers and a destroyer flotilla, was attacking shipping on the Alexandria-Greece supply route, which had become more vital than ever because of developments in the south-east. In the sea area south of Crete, the Italian formation came into contact with a British battle group, comprising three battleships of the "Barham" class, one aircraft-carrier - 'Formidable' three light cruisers and a destroyer flotilla.

The Italian fleet began to retreat, a course which should undoubtedly have been successful owing to its greatly superior speed. The ships of the "Barham" class are relatively old and slow and the pursuit of the Italian ships, built for speed, would therefore, have been useless. Torpedo-carrying aircraft from the 'Formidable' were however able to overtake and attack the Italians who were heading for their bases.

The Italians had no air force available, and were therefore not in the position to repulse the air attack. Their battleship was hit by a torpedo, which caused a considerable reduction in the speed of the group and consequently the loss to the Italian of its decisive tactical advantage. The retreat could only be completed at the cost of sacrificing two heavy cruisers, which were left behind to cover the withdrawal and which were spotted and destroyed by the British during the following night, together with two destroyers.

This success was undoubtedly due to the British aircraft-carrier, which, by extending the fleet's range of action, was able to bridge the constantly increasing distance to the enemy, and consequently to facilitate the pursuit. This superiority of the British could only have been countered by an arm of equal value i.e. if the Italians had also been in possession of a carrier.

While the torpedo aircraft did not in fact sink any enemy ships they were nevertheless able to achieve a decisive tactical success. Actual sinkings, however, were only achieved by warships. From this it follows that the Air Force should be regarded as a first-class means of sea warfare but not as a force capable of exercising sea supremacy. It can supplement the effect of warships but cannot replace them.

The Battle of Matapan is of particular interest in that it took place in the narrow sea area of the Eastern Mediterranean, and disproved the theory that the carrier has its best effect when far from land. Both the British and the Italians could have employed their coastal based aircraft equipped with additional petrol tanks, but the advantage of the carrier in comparatively narrow sea areas lies in the immediate availability of its aircraft and in their complete independence from all the normal conditions of coastal operations.

The British could only employ carriers because their absolute superiority guaranteed adequate protection for their ships. After the fall of Crete, and the assault in N. Africa, when such protection was no longer possible, British carriers disappeared from the Eastern Mediterranean.

#### 6. THE ATTACKS ON P.Q.18.

It is not practical to describe the course of the battle in detail and consequently only those facts relating to the participation of aircraft carriers have been mentioned here.

SECRET

The convoy consisted of about 45 merchant ships, one aircraft-carrier, and a strong escort force including cruiser, destroyers and corvettes. Attacks were carried out over a period of 3 days, during which 28 ships (200,000 G.R.T.) were sunk, a result which appears satisfactory, but must be compared with the success obtained against the previous convoy (P.Q.17), which sailed without aircraft carriers, and of which all ships except one were sunk in spite of unfavourable weather conditions.

In the P.Q.17 attack, 2 Ju.88's and 3 U-boats out of a total of 7 were lost, whereas about 40 aircraft from 4 bomber Gruppen failed to return from the P.Q.18 attack. These higher losses coupled with greatly reduced successes are attributable largely to the operation for the first time of an aircraft carrier as escort to a North Sea convoy.

The importance of aircraft carriers in the protection of convoys was conveyed to the Navy and Air Force in an order from Hitler that the carrier should be the main objective of the attacks. For two days, the Air Force concentrated its attacks exclusively on the aircraft-carrier, but as it was sailing north of the convoy and was protected by a double ring of destroyers, the aircraft approaching from the south had to fly through the convoy escort and the double escort of the carrier in order to attack.

Owing to the strength of these defences, the attacks were not effective; the carrier succeeded in out-manceuvring almost all the torpedoes, which had they been directed against merchant ships, would almost certainly have sunk them. This indicates how the aircraft-carrier can protect the convoy, not only through its defensive power, but also by attracting to itself the main weight of the attack.

The majority of our losses can be attributed to the carrier-borne fighters, which attacked our bomber and reconnaissance formations and consequently hindered both our bombing accuracy and the continuity of our shadowing operations. They forced the attacking U-boats to submerge, and directed the attacks of the naval escort vessels dropping depth charges.

Experience of the P.Q.18 operation has taught us that successes without too many losses against convoys protected by carriers are only possible after the destruction of the carrier. Otherwise, whatever losses it may sustain, the convoy remains a compact unit, having at its disposal an excellent defensive weapon against air and U-boat attack.

#### 7. THE 'BISMARCK' ACTION.

The course of the battle is too well known to warrant its recapitulation here, but the following points may be noted with regard to the participation of the British aircraft carriers in the action:- The use of the 'Victorious' and 'Ark Royal' is a classic example of offensive carrier tactics. All aircraft available from the two carriers were directed against the 'Bismarck', and effective hits were scored with torpedoes on the ship's oil tanks and steering installations, which reduced the 'Bismarck's' speed and left her an easy prey for the enemy naval forces. The carrier borne aircraft also did valuable working in shadowing the 'Bismarck' during the subsequent pursuit.

As in the Battle of Matapan, nothing showed the superiority of air over sea power. The British use of their carriers in the 'Bismarck' action was a typical example of the ideal co-operation between sea and air forces in which the one supplements the value of the other.

The further the operation takes place from the coastal air bases, the greater is the significance of the aircraft-carrier. During the engagement which culminated in the sinking of the 'Bismarck', the only land based aircraft that could be employed were reconnaissance aircraft, mainly sea planes - whose combat value was negligible. The carrier-borne aircraft

/were

SECRET

were therefore the absolute masters of the air, and it was their task to cripple the 'Bismarck' before she entered into the effective range of our Air Force in France.

That the fate of the 'Bismarck' might have been different had she been escorted by an aircraft carrier is evident. The question may appear to be of purely academic interest, - but is nevertheless important if practical lessons are to be drawn from the action.

The 'Bismarck' had no possibility of obtaining a comprehensive picture of her situation. Increased reconnaissance would certainly have provided the C.-in-C. of the Fleet with valuable information and would have led him to choose the quickest route via the Denmark Strait to the Norwegian bases, during which our ships would have been within range of our air force.

The 'Bismarck' had no weapons other than her naval guns with which to defend herself. Her range of action could not be increased by the use of aircraft, and the British could therefore pursue her at will. Had the 'Bismarck' been escorted by an aircraft carrier, she would have represented a very nearly invincible combat unit.

The use of warships unaccompanied by aircraft-carriers far from the bases of their own air force is no longer conceivable after the 'Bismarck' action. Operations in coastal areas within the range of action of the air force represent only an unimportant part of the possible uses of battleships, and it therefore follows that a carrier escort should always be available.

#### 8. CONCLUSION.

It is often contended that Germany's sphere of interest does not extend beyond the coastal front covered by the air force, and that as a principal land power Germany can therefore afford to renounce aircraft-carriers which are of little value in coastal waters. The policy of attacking the enemy on his sea lines must however never be abandoned, and in this connection our submarines are of particular value. Attacks must be carried beyond the coastal areas if they are to exercise a decisive influence on the course of the war. Heavy surface forces can contribute towards this, as proved by the action of the battleships 'Scharnhorst' and 'Gneisenau' at the beginning of 1941, but the co-operation of a carrier-borne air force is also essential today.

In addition, it is certain that air support at sea would be extremely beneficial to submarine operations. They could be greatly facilitated by defensive operations, reconnaissance, shadowing and the diversion of enemy air forces by carrier borne aircraft.

In conclusion, it may be said that only by the use of aircraft carriers will it in future be possible to exercise air power in distant sea areas. The Navy, however, remains the main weapon of sea warfare; a weapon which the air force can usefully supplement, but never replace.

DISTRIBUTION: -

Same as Translation No. VII/17.