

THE DEVELOPMENT OF AIRCRAFT CARRIERS

BY

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Introduction

The probability that aircraft would operate from specialized warships at sea was widely prophesied in the late nineteenth and early twentieth centuries. Among others, Clement ADER and Victor LOUGHHEAD wrote of aircraft carriers that would form the core of future fleets. Both recognized the need for the ships to be designed around flight decks and aircraft support facilities but, significantly, they saw aviation as adding new weapons and capabilities to an existing form of warfare not as a new and separate force.¹ In 1912 the shipbuilding firm of William BEARDMORE proposed a design for an aircraft carrying ship to the Admiralty. This featured a long flight deck with workshops and hangarage either side of it connected, over the deck, by a bridge from which the ship would have been controlled. With the wisdom of hindsight, we can see that the ship would have been inoperable. Fortunately, the Admiralty declined to order such a ship until it had gained more experience of aircraft operations.²

The procurement of warships built or converted to carry aircraft was pragmatic: each step based on practical trial and discovery. The US Navy was the first both to launch and recover an aircraft using platforms built onto warships for the purpose. The German Navy was the first to see the value of rigid airships for reconnaissance in support of their fleet at sea although it was not permitted to buy one until COUNT ZEPPELIN's designs proved their utility. France, Italy, Spain, Japan and Russia all experimented with ships modified to operate hydro-aeroplanes, as seaplanes were then known, but between 1908 and 1918, it was the Royal Navy that led in the development of aviation and the integration of aircraft into the operational capability of its fleets.

Early British interest centred on airships since their endurance, radius of action and potential load carrying ability far exceeded that of contemporary aircraft. HM Rigid Airship Number 1 was ordered in 1909 but broke up on being extracted from its shed in September 1911. This setback, coupled with a change of leadership at the Admiralty, led to a shift of focus to 'heavier than air' winged aircraft and prompt steps were taken to evaluate them at sea.³ In January 1912 a Short biplane, piloted by LIEUTENANT SAMSON, was launched from a downward sloping ramp over the bows of the battleship *Africa* moored in Sheerness Dockyard. In May 1912 the same pilot took off from a more level ramp constructed on *Africa*'s sister ship *Hibernia* which was under way in Weymouth Bay (FIG.1). The success of these demonstrations led to the conversion of the cruiser *Hermes* to operate seaplanes in the 1913 fleet exercises. This in turn led to the procurement of *Ark Royal* in 1914 as a specialist seaplane carrier for the operational fleet.⁴

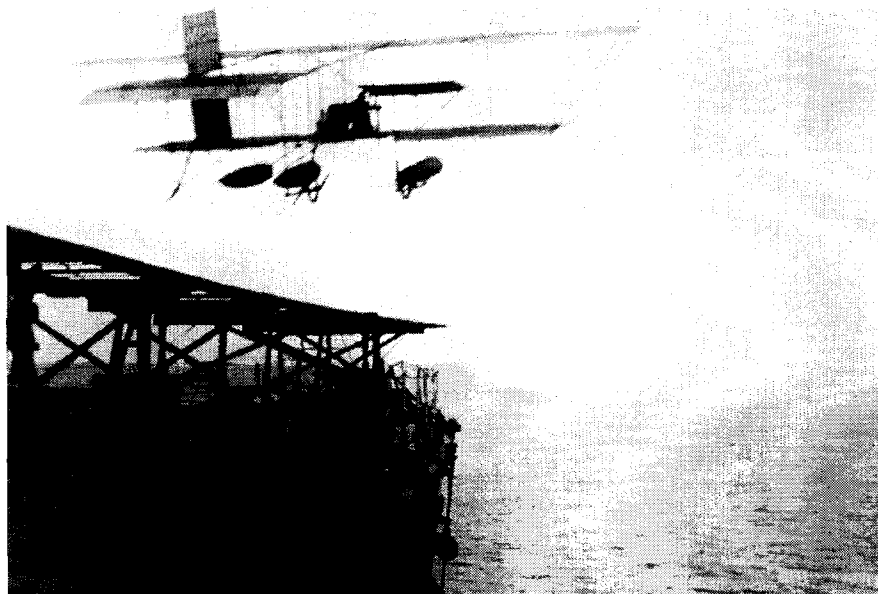


FIG.1 LIEUTENANT SAMSON TAKING OFF FROM HIBERNIA

Seaplanes were presumed to be the ideal aircraft for naval use since the oceans could form their runway. They proved insufficiently robust, however, to cope with even minor sea states and, if they did succeed in getting airborne, the floats proved too heavy and cumbersome to allow the performance required to intercept ZEPPELINS or carry a meaningful offensive load. Seaplane carriers were used as mobile bases and in early campaigns such as the Dardanelles and the *Konigsberg* action, allowed an aviation infrastructure that could not otherwise be provided. It rapidly became apparent that carriers needed to move with the fleet but in this they were hampered by the need to stop to lower their aircraft onto the water and again to recover them.

A number of fast merchant ships such as *Riviera*, *Empress* and *Engadine* were taken up from trade for conversion to seaplane carriers in 1914. It was hoped that their speed would enable them to regain fleet position after operating aircraft but this was not to prove practical. The pragmatic approach even survived the outbreak of war and these ships were hastened into service, with the simplest of canvas hangars and extended booms to operate aircraft. It was not until 1915 that they were given more thorough conversions benefiting from their early experience.⁵

At first, the tasks assigned to aircraft were not new and they performed functions which NELSON's captains would have understood. Flank marking for long range gunnery was expected to be important (FIG.2). Thus, preventing enemy aircraft from providing their fleet with a similar service grew in importance as the war progressed. Aircraft carriers developed because aircraft could not operate where they were needed without them. Nothing has changed.



FIG. 2 – SPOTTING THE FALL OF SHOT

First World War

The possibility of using aircraft to extend the influence of sea power over inland targets was first tested against the airship sheds believed to be at Cuxhaven in 1914.⁶ It was proved four years later when aircraft from *Furious* destroyed two ZEPPELINS in their sheds at Tondern. Frustration at the German ability to use ZEPPELIN reconnaissance to avoid battle when necessary led, at first, to the use of fighters seaplanes to counter them. When these proved ineffective, wheeled fighters capable of taking off from small platforms were embarked on seaplane carriers and light cruisers. These were 'one-shot' weapons that could not land back on their parent ship and had to ditch near the fleet if they could not fly to a friendly shore. Whilst reconnaissance types were considered important, the failure to sail the Grand Fleet's seaplane carrier *Campania*, prior to Jutland, due to a minor signals error, illustrates that they were not yet considered vital. ADMIRAL JELlicoe and his staff appeared ready to accept this ad hoc arrangement but his successor, ADMIRAL BEATTY demanded a more extensive and aggressive use of aircraft.

The Grand Fleet Aircraft Committee, set up in late 1916, asked for more aircraft carrying ships to be built as fleet units and, to save time, these were to be conversions of incomplete hulls. The number of new aircraft types was to be kept to a minimum by employing existing machines already in service with the RNAS ashore. These included the SOPWITH PUP fighter and 'One and a half STRUTTER' spotter/reconnaissance aircraft (FIG.3).



FIG.3 SOPWITH 1 1/2 STRUTTER TAKING OFF FROM HMAS AUSTRALIA IN 1918

As the potential of carrier borne aircraft became clear, BEATTY and his staff planned to use them to attack the High Seas Fleet in its defended home ports, a form of warfare dating back to before DRAKE and his fireships. To achieve this, they asked for an aircraft capable of taking off from a carrier deck, with an 18" torpedo weighing nearly a ton, and of landing back on board after the mission. The aircraft that evolved was the SOPWITH T1 (subsequently named the 'CUCKOO' because it was designed to lay an egg in someone else's nest). Attack at source was an altogether more sophisticated approach and demanded flush deck carriers

and large numbers of aircraft, not just the handful needed for 'one shot' defence. The more important role entrusted to the carrier squadron was recognized by the appointment of REAR ADMIRAL PHILLIMORE as Admiral Commanding Aircraft (ACA) Grand Fleet.⁷ By late 1918, his squadron included *Argus*, the world's first true carrier, and the converted cruisers *Furious* and *Vindictive* as well as the smaller seaplane carriers.

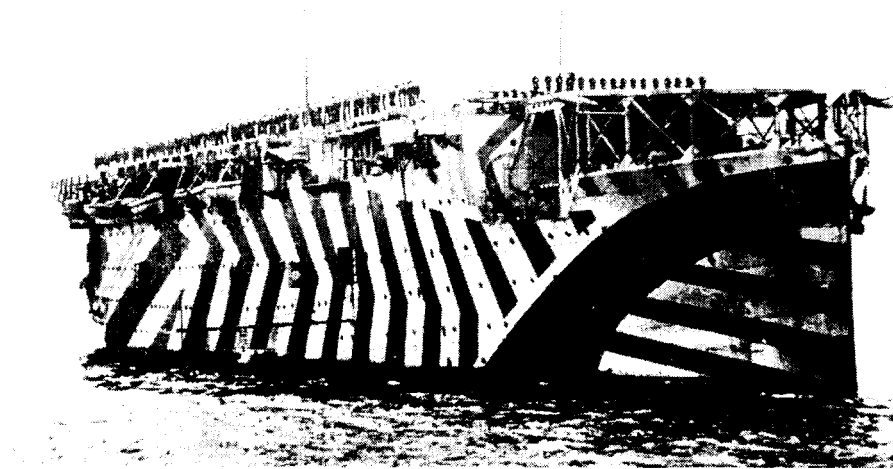


FIG.4 HMS ARGUS, OCTOBER 1918

The rapid growth of the torpedo attack force demonstrates how the RNAS was well placed, within a technologically advanced 'parent' service, to call on established weapons experts and engineers. Both elements benefited from the evolution of tactical and technical ideas to a far greater extent than separate services would have done.

Although there is no single moment when an air navy was born, by 1918 aviation was such a fundamental part of fleet operations that none could seriously contemplate sailing without air support. The impact of embarked aircraft on the First World War had been more evolutionary than revolutionary, but in a dynamic way that changed the face of naval battle forever. Shore based aircraft and their integration into the fleet command structure was an important aspect, and one that was not fully understood until it was lost after the formation of the land orientated RAF. No other navy had come close to the Royal Navy's understanding of aircraft and their potential. It is, therefore, surprising that at the very moment when success was evident for all to see, the momentum was lost.

Between the World Wars

On 'All Fool's Day' 1918 the RNAS and RFC were amalgamated to form a unified air service known as the Royal Air Force. This was a political act intended to calm public fears generated by German air raids on London, and the decision was not the outcome of study into how aircraft had contributed to the conduct of actual war. Nominally carried out under the authority of the Prime Minister, LLOYD GEORGE, the Report was the work of one man, the South African GENERAL SMUTS, who took account of the views of some senior officers. ADMIRAL BEATTY had, at first, been warm to the idea of a unified air service but by October 1918, when it was too late, he was complaining that the Air Ministry was 'failing to

provide for the growing requirements of the Air Force units attached to the Grand Fleet'. Similar ideas proposed in the United States had not survived open public scrutiny.⁸

Paradoxically, the RAF was formed before technology had delivered the hardware to make aircraft capable of operations independent of established naval and military forces. In the harsh post war economic climate therefore, it might not have endured had its leaders planned merely to do what the RNAS and RFC had done. To survive, the air marshals had to argue a case for strategic substitution warfare in which bombers would replace battle fleets and armies. A bizarre confrontation emerged in many countries wherein proponents of 'air power' actually opposed the use of tactical aircraft by navies. In the United States, calls by GENERAL MITCHELL for a unified air service caused intense controversy. Both the Navy and Army Boards, however, saw this as going 'much too far' and 'not the best approach to the aviation problems of the country'. Despite the hyperbole used in some quarters, the US administration managed to retain a rational approach.

Debate did force the USN to formalise the status of aviation within the Service. Funds to convert the collier *Jupiter* into an experimental carrier, renamed the *Langley*, were voted in 1920. Equally important, a Bureau of Aeronautics under REAR ADMIRAL William MOFFETT was authorized in 1921, charged with 'all that relates to designing, building, fitting out and repairing naval and marine corps aircraft'. Through the next ten years, ADMIRAL MOFFETT fought and won political battles that kept aviation within the Navy. Adequate funding was provided for new carriers and their aircraft and the roles and capabilities of aircraft within a balanced navy were identified. As Norman FRIEDMAN has observed, this period gave US carrier aviation organizational, institutional and individual foundations that have endured. Barred politically from this approach, the Royal Navy was forced to rely on an 'ad hoc' arrangement with a separate service administered by a separate Department of Government for air matters. Once established on a logical, sound footing, the USN gained a lead in air matters that it has never lost.

Progress in the USN stemmed from the driving force of men such as COMMODORE Joseph REEVES who was instructed in 1925 to develop 'strategy and tactics of the air in its relation to the fleet'. By introducing deck parks, arrester wires, crash barriers and Landing Safety Officers, sometimes against the advice of embarked pilots, REEVES doubled the number of aircraft in *Langley*, improved their sortie generation rates and gave her an operational capability. In the same year, GENERAL MITCHELL accused the Navy and Army of 'incompetency, criminal negligence and almost treasonable administration of the national defence'.⁹ For this he faced a court martial and ceased to be a factor in the debate about aviation. PRESIDENT COOLIDGE set up a President's Aircraft Committee chaired by Dwight D. MORROW, a prominent lawyer to advise on the best way forward. The 'MORROW Board', as it became known took extensive evidence and rejected calls for a unified air force. Further, it recommended that only pilots should be given command of aircraft carriers and naval air stations. This encouraged many senior officers, among them the future ADMIRAL 'Bull' HALSEY, to learn to fly at ages up to 50 and ensured that, in the next war, US carriers would be commanded by officers who knew how best to fight their commands. Progress after 1925 was helped further by a cycle of 'war games' involving Bureau of Aeronautics, the Naval War College and operational fleets.¹⁰

In Britain, it proved much more difficult to progress carrier aviation. It is difficult to understand how the theory of strategic bombing generated so much attention, while roles such as anti-submarine warfare, of such critical importance in the recent war, were sidelined. The bomber lobby dismissed the valuable tactical

lessons, learned by the RNAS in support of convoy protection, as being largely irrelevant. Most had to be re-learned after 1939.

As the technology of naval warfare improved in the 1920s and 30s, more complex aircraft were required. The Air Ministry was responsible for all aircraft development in the UK, and although it cannot be said that they deliberately provided second rate aircraft, they regarded naval aircraft as fulfilling a secondary function. Naval requirements were seen as being a 'complication' on what they considered a 'normal' design. This was not good design philosophy and would not have been possible in the USA and Japan where carrier aviation soon surpassed the Royal Navy's efforts.

Control of aircraft embarked in RN ships was split between the Admiralty and Air Ministry in the years between 1918 and 1939. From 1924, however, the Admiralty paid for the aircraft and provided 70% of pilots and all observers and Telegraphist Air Gunners. The Admiralty always retained operational control while the Air Ministry had administrative control, including the training of aircrew and the procurement of aircraft and equipment. Any attempts at technological progress had to be scrutinised by a series of joint committees, few members of which had any practical experience of sea flying. Operationally, however, the Royal Navy stayed ahead of the USN in multiple carrier operations, practised in the Mediterranean.¹¹ It is unfortunate that, when war came, the pressure of events caused carriers to be deployed piecemeal preventing the RN from putting much of its hard won knowledge to practical use.

In Japan, the Master of Semphill led the British Mission, which taught the Imperial Japanese Navy how to operate a naval air arm. The important role foreseen for aviation led to the light carrier *Hosho* being commissioned in 1921, before her contemporaries *Hermes* and *Langley*.¹² The influence of the RNAS was discernible throughout the expansion of the IJN's air component and gives clues as to what the RN might have achieved. Little is written in English about Japanese plans but analysis of their progress shows that they thought of carriers as forming part of a raiding force with fast battleships, a concept well suited to warfare in the vastness of the Pacific Ocean. They made steady progress and gained valuable combat experience in operations over China.

The German Navy is an example of a failed carrier force. The projected *Graf Zeppelin* was actually launched and incorporated many unique ideas for operating aircraft in rough weather, although not all were good. Plans to complete her were at first delayed by Luftwaffe opposition and then by a wrong appreciation of the vulnerability of carriers by the naval staff after the sinkings of the British *Courageous* and *Glorious*. They lacked adequate understanding of modern sea war and the determination of the British to make naval aviation work. *Graf Zeppelin* provides historians with two 'what ifs'. What if a completed carrier battle group had sailed into the Atlantic in May 1941 instead of *Bismarck*? Worse, what if the Admiralty's enthusiasm for air had been less and the RAF had succeeded, as the Luftwaffe did in Germany, in removing aircraft carriers from Britain's order of battle?¹³

From the outset, aircraft have operated from ships other than aircraft carriers. The Royal Australian Navy is an example of a fleet that recognized the value of aircraft at sea early, but lacked the resources to centralize them in a carrier. RAN cruisers serving in the Grand Fleet were among the first to be fitted with aircraft platforms, and many of the early experiments were carried out in HMAS *Australia*. Their loss, when they returned to Australian waters after the Great War, was keenly felt and attempts were made to establish an Australian Naval Air Service. These ended with the establishment of the RAAF in 1921 when the new Service was charged, like its British counterpart, with providing seaplanes, for

reconnaissance and spotting, capable of operating from cruisers. The seaplane carrier *Albatross* was inspired partially by political pressure to provide shipbuilding work in Australia when heavy cruisers were ordered from Britain, and partially in response to Admiralty advice that the Australian Squadron must be self sufficient in aircraft. The SEAGULL V/WALRUS (FIG.5) was designed to meet an Australian requirement for cruiser aircraft, and shows how seriously the RAN took aviation.¹⁴

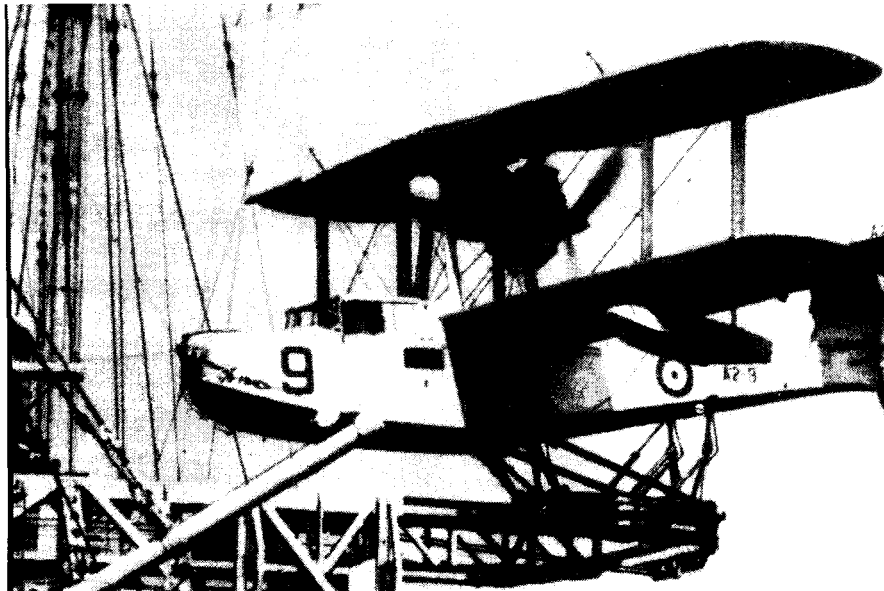


FIG.5 SUPERMARINE SEAGULL V OF THE ROYAL AUSTRALIAN NAVY ON A CRUISER MOUNTED CATAPULT

The Washington Treaty affected every navy but especially the British with their numerically large fleet of small prototype carriers. Even though there was scope to build new ships, the RN could not afford to do so until 1935 when the new *Ark Royal* was laid down. Both the USA and Japan were better placed with huge battleships and battle cruisers under construction, which could be converted, under treaty Rules, into carriers. Thus *Lexington* and *Saratoga*, both over 40,000 tons at full load and capable of 33 knots, gave the USN a surge in operational capability when they completed in 1927. At first they were thought to be too big, but their ability to carry air groups large enough to demonstrate the value of strike warfare and to cope with the larger aircraft due in service after 1930 made them invaluable. Japan gained similar advantage from the *Akagi* and *Kaga*. The RN had only the large light cruisers *Courageous* and *Glorious* to convert, both of which were just half the size of the American ships and capable of carrying only half the number of aircraft. With more available tonnage, the Americans and Japanese were better able to experiment than the limited British. After the small *Ranger*, the superb USN *Yorktown* and *Essex* classes resulted from the ability of the USN to try different hull forms in order to achieve the best compromise and stand as the best designs before the modern era.¹⁵

In the 1930s, after the experimental years, carrier aircraft were seen to have operational capability. In 1931 REAR ADMIRAL HENDERSON was appointed as Rear Admiral Aircraft Carriers (RAA) to act as the focal point for the development of tactics in the Royal Navy. He was not a pilot but had commanded *Furious* and believed in the use of aircraft for fleet operations. With six carriers he was able to

carry out trials with multiple carrier task groups (FIG.6), but did not fully appreciate the value of getting large numbers of aircraft airborne in a short time to carry out simultaneous attacks on enemy ships.

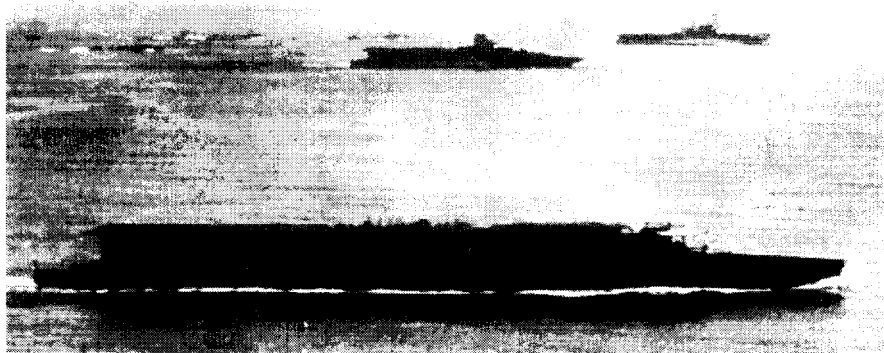


FIG.6 HMS FURIOUS, CENTAUR AND EAGLE OPERATING TOGETHER IN THE MEDITERRANEAN

Although HENDERSON did not realize it, his biggest problem was that the British did not know how far behind their rivals they had slipped. Because the RAF said that carrier flying was difficult, and impossible in the face of land based air opposition, senior naval officers presumed that every navy found it so and failed to challenge this lack of drive. Even naval aircrew failed to see the shortcomings since they were imbued with RAF doctrine in training. The lack of a REEVES or MOFFETT was only realized in the late 1930s when SIR Thomas INSKIP, an eminent lawyer like MORROW, was appointed Minister for Defence Co-ordination. In a judgement subsequently known as the 'INSKIP Award' he stated that naval aircraft and their crews were,

“A great deal more than passengers in a convenient vehicle.”

That,

“A pilot in the Fleet Air Arm will no longer be an Air Force Officer.”

That the Admiralty should,

“Enjoy a more decisive voice in settling the type of machine suitable for naval use”.

He gave the Admiralty two years to take over full control of the aircraft that flew from ships, and their shore support. With much help from the Air Ministry, control was handed over two months early.¹⁶

The appearance of high performance bombers in the late 1930s led to fears that visually directed interceptions by single seat fighters would not be practical. The RN, therefore, moved away from fighter defence of the fleet and reduced the number of embarked fighters. With their larger air groups, the Americans and Japanese did not recognize the same problem. The RN increased its fighter complements again when radar revolutionised fleet air defence, pioneering its use to maximize the capability of embarked fighters. All navies agreed the potential vulnerability of carriers to attack by aircraft or superior surface units, and created the balanced task force to use mutually supportive ships of various types to counter the threats. The RN produced the most extreme solution guided by ADMIRAL HENDERSON, who had become Controller, in charge of new

construction. In the period of re-armament after 1936, it would have been easiest to produce repeat *Ark Royals*, but HENDERSON chose instead to build the ILLUSTRIOUS class which substituted armour for hangar space with a consequentially small air group.¹⁷ A larger air group would have been impractical to man and equip anyway, as the RN did not yet have the resources. Another of HENDERSON's creations, and an example of how far the Admiralty was prepared to go to overcome Air Ministry opposition to carrier construction, was *Unicorn*, declared as a maintenance carrier but fully capable of operational flying. Such a ship was found necessary during the fleet concentration in the eastern Mediterranean at the time of the Abyssinian Crisis. That same crisis saw planning for a potential strike on the Italian Fleet in its base harbours, harking back to the Grand Fleet plans of 1918. These were to prove useful when Italy declared war in 1940.

Second World War

In 1939 the carrier navies differed in equipment and doctrine. Both the US and Japanese naval air arms were far larger than that of the RN. Both had had time to integrate fast carrier task forces into their fleet battle plans and were supported by industrial and training bases that had been indoctrinated to naval requirements for many years. The British lacked both, particularly a naval air industrial base, which understood what was required in carrier aircraft. All the RN had was a recently gained Air Branch determined to show how well it could perform. War, when it came, did not resemble the political expectation and they found themselves required to do far more than they or their admirals had anticipated.¹⁸

The first Axis aircraft to be destroyed in World War 2 was shot down by a fighter from HMS *Ark Royal* on 26 September 1939 and the last by fighters from HMS *Indefatigable* on 15 August 1945. Between these two dates, British carriers fought in every theatre of war in every conceivable role. Far from fearing land based air attack, they proved able to dominate battle space and spread sea power inland to attack strategic as well as tactical targets.¹⁹

The Royal Navy expected its carrier aircraft to 'find, fix and strike' enemy surface units. It equipped air groups with Torpedo Bomber Reconnaissance aircraft and few escort fighters trained to fight in a 'Jutland style' fleet action. The Norwegian Campaign, however, highlighted the reality rather than the theory of modern war. The Germans relied heavily on land based aircraft after the first landings by sea. The British had no planned air expeditionary capability and the brunt of air support for the Army fell on carrier borne aircraft from *Furious* at first, then *Ark Royal* and *Glorious*. *Furious* was ordered to sea in haste, some time after the heavy units of the Home Fleet. Her captain sailed without his fighter squadron rather than take the time to embark it, in order to make the rendezvous. Would a cruiser captain have sailed without ammunition in similar circumstances? Aircraft were not yet seen as vital for fleet air defence and carrier captains were not necessarily 'air minded'. The campaign saw the first ships sunk by air attack, the British destroyer *Gurkha* on 9 April and the German cruiser *Konigsberg* sunk by naval dive-bombers disembarked temporarily at RNAS *Hatston* on 10 April. SWORDFISH carried out the first air attacks on shipping with torpedoes, dive-bombed German troops and airfields and even flew combat air patrols in the absence of any other allied aircraft. SKUA fighter/dive-bombers showed impressive versatility,²⁰ bombing and strafing ships and shooting down a number of bombers despite their poor performance and light armament. LIEUTENANT LUCY, CO of 803 Naval Air Squadron became one of the allies' first 'aces' on this unlikely mount.²¹ *Glorious*, the second carrier loss, was wrongly employed ferrying a handful of RAF HURRICANES from Norway back to the UK. The Norwegian Campaign was a fascinating study in its own right and had a major

impact on future operations and training due to the loss of so many of the RN's valuable, trained aircrew. The USN studied the campaign in detail and made later use of its lessons when planning operations in the Pacific.

The attack, by aircraft from *Illustrious*, on the Italian Fleet in Taranto harbour in November 1940, should always be highlighted in even the shortest account of aircraft carrier contributions to naval battle. Theory became fact when half the battle fleet was sunk or disabled by a handful of biplanes bravely flown by men determined to prove their cause. The attack was based on plans for a force of carriers, drawn up during the Abyssinian Crisis. Due to the emaciation of naval aviation after 1918, only 21 obsolescent aircraft from a single carrier were available. The fact that these few achieved what they did was a magnificent, if officially unrecognized triumph. The tactic proposed by BEATTY's staff officers in 1918 was justified and the power of a fleet at sea had been brought to bear on an enemy who would not leave his harbour for a conventional action. The airborne torpedo was proved to be a formidable 'ship killing' weapon in the hands of expert aircrew. The 'what might have been' had the carrier force not been emaciated after 1918 can be imagined.²²

The determination of the 'Men of Taranto' to succeed can be judged by LIEUTENANT George GOING, DSO, RN. At noon on 11 November, the day of the attack, he was the observer in a SWORDFISH that was forced to ditch because of fuel contamination. He was rescued by a boat from the cruiser HMS *Gloucester* and, realizing that he might miss the attack on Taranto that night, he pleaded with the captain to get him back to *Illustrious*. Respecting his enthusiasm, the captain had him flown back to the carrier in *Gloucester's* WALRUS amphibian.

Piloted by LIEUTENANT CLIFFORD, George GOING's aircraft L5F was one of the last aircraft to launch as part of the second strike. Unfortunately, its wingtip was damaged when it hit L5Q as both aircraft moved to the centre of the flight deck. Optimistically, it was struck down into the hangar for repairs at 2145 while, for the second time that day, GOING made his way to the bridge to plead with senior officers for the chance to take part in the battle. Supported by COMMANDER James ROBERTSON, the Commander 'Flying', he won his case. Repairs to replace two broken wing ribs and patch torn fabric took only 20 minutes and CLIFFORD and GOING took off alone and set heading for the target.

They arrived over Taranto as the last aircraft of the second strike were departing and selected a target for their bombs amid the chaos below them. They carried out a classic dive bombing attack on the cruiser *Trento*, straddling it and scoring at least one hit which penetrated the armoured deck. Unfortunately, their bombs were defective and none of them detonated. They made it safely back to *Illustrious*.

On 10 January 1941, dive-bombers of the German Fliegerkorps X attacked *Illustrious* east of Malta, causing severe damage and heavy casualties including 83 dead and more than 100 wounded. George GOING went to help fight fires in the hangar and, finding the officer in charge of the damage control party dead, he at once took charge and was assisted by many pilots and observers. LIEUTENANT CLIFFORD, his pilot in L5F, was among the dead and GOING lost a leg as a result of the injuries he received.

LIEUTENANT GOING was awarded the DSO in the second list of awards for the Battle of Taranto, published in May 1941. When writing his book on Taranto in later years, ADMIRAL SCHOFIELD described how an officer who knew GOING at the time described him as.

"The bravest man I ever met."

He died in July 2001.²³

To say that the Japanese 'learnt' from Taranto underestimates the progress made by the Imperial Japanese Navy. It would have strengthened their resolve but pre-emptive strikes had been a feature of their war against Russia in 1905. 'Attack at source' had been a widely used feature of naval warfare since DRAKE's fireships and before. The Japanese may well have taken the idea of offensive action from the Semphill Mission, and they were certainly aware that carriers were vulnerable to air attack if they were caught with aircraft re-fuelling and re-arming on deck, as happened to them at Midway. How much more sensible, therefore, to strike the first blow against an unprepared enemy in harbour at dawn than to risk battle on the high seas. The Japanese executed the attack on Pearl Harbour because it was their best option for a quick war against a superior enemy. It was very much the result of their own painstaking planning.

Early war experience changed the perception that carriers were an adjunct to the battle fleet. The following led the Admiralty to review its carrier policy:

- The unexpectedly wide range of tasks they were called upon to perform.
- The loss of *Prince of Wales* and *Repulse* to air attack.
- The failure of aircraft to defeat the 'Channel Dash'.
- The failure of the RAF to deliver capability to match its pre-war claims.

The resultant Future Building Committee of 1942 recommended a massive increase in carrier construction. They also relaxed the restrictions on aircraft size that had limited aircraft manufacturer's ability to deliver aircraft up to the quality of those procured by the USN.²⁴

The recommendations were taken up enthusiastically and large-scale carrier orders were placed to new designs at the expense of battleship and cruiser construction. These included seven new fleet carriers and twenty four light fleet carriers built to a novel design incorporating mercantile features to allow faster construction by a wider range of shipyards. The full package proved to be beyond the scope of British Industry and five of the fleet carriers, including the three massive ships of the MALTA class, plus four of the light fleets were cancelled at the end of hostilities. In truth, these ships made little impact on the war, but operated with great success in the post war navies of the British Commonwealth and others.²⁵

Escort carriers had been considered and rejected in Britain before the war because the scale of likely Open Ocean U-boat warfare had been underestimated. Wartime plans to build or convert such ships based on mercantile hulls failed, at first, because of opposition from the Ministry of War Transport which would not release hulls from the merchant building programme. HMS *Audacity*, a former German prize converted to the first escort carrier, showed the dramatic impact of such a ship on the protection of a convoy (FIG.7). The lessons learned are seen most clearly in the RN Fighting Instructions. Those for 1939 discounted naval aircraft for ocean convoy defence, recommending instead small escort forces and evasion. In 1945, revised Instructions stated.

"Carriers with a convoy provide a tactical air force for its defence".

MAC Ships supplemented the escort carriers.²⁶

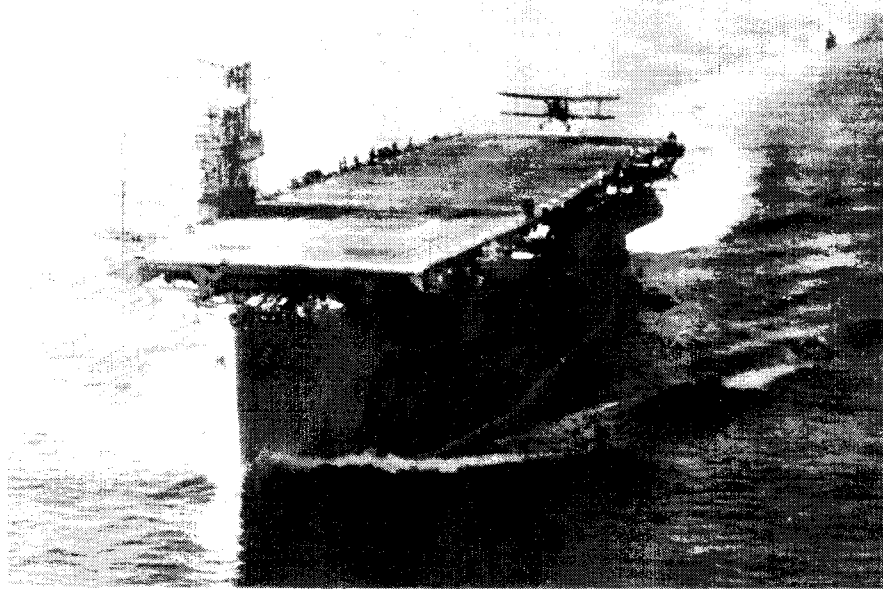


FIG.7 FAIREY SWORDFISH LANDING ON AN ESCORT CARRIER.
(NOTE THAT THE WARTIME CENSOR HAS BLANKED OUT THE RADAR AND HF/DF AERIAL.)

The Pacific War gave the most powerful demonstration that aircraft had come to dominate naval warfare. Fought across an ocean that covers about half of the earth's surface, it involved logistic support distances vastly in excess of those in the European war. Japan and the United States had seen each other as potential enemies for nearly twenty years and had planned accordingly. Both were constrained by the same treaties and the USN more so by the potential need to fight in the Atlantic as well as the Pacific. Japan was able to concentrate on one main adversary and, whilst inferior in battleships, had deliberately built up powerful air striking forces, both sea and land based, working to a common doctrine. Their aim was to upset the old fashioned reckoning of naval strength and they succeeded.

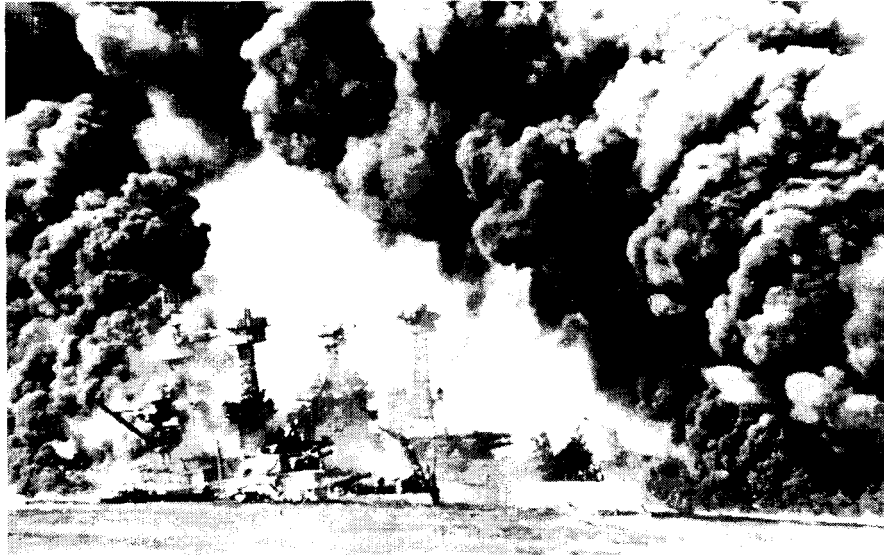


FIG.8 'BATTLESHIP ROW' AT PEARL HARBOR

Both navies had developed carrier flying to a high degree of tactical efficiency by 1940, the Japanese given a keener edge by operational flying over China. The six carriers that attacked Pearl Harbor embarked 450 aircraft; against this, the USN had seven carriers capable of embarking up to 600 aircraft. To conserve their carriers' strike potential the Japanese embarked large numbers of scouting floatplanes in their cruisers, up to 10 in each of the TONE class and a total of up to 60 in the Combined Fleet by 1941. These had a search radius in excess of 500 miles and an endurance of up to nine hours. In both the RN and the USN carrier aircraft carried out this task with a consequent reduction in strike potential. Japanese fighters such as the ZERO had a distinct edge at the outbreak of war although US industry rapidly produced a number of excellent designs with which the enemy could not hope to compete. Nor could Japanese shipbuilders rival the dozens of superb ESSEX class and literally hundreds of escort carriers that began to leave builders' yards from 1943.²⁷

After the period of rapid Japanese expansion, carriers played a crucial role in the consolidation of allied resources, before the period of unremitting offensive action that began in mid 1944. The Royal Navy, having defeated the German and Italian opposition in Europe, was able to participate in this stage by deploying carriers to form a British Pacific Fleet to fight alongside the USN. Never more than a quarter the size of the US Pacific Fleet, the British had been used to operations from an extensive chain of bases. They struggled to build up the logistic support fleet they needed in this type of warfare. It took over a year to create and relied heavily on main bases and airfields set up in Australia.²⁸

At first the US carriers had been unable to concentrate as there were too many strategic assets to defend, but at the Coral Sea and Midway battles they did so with decisive strategic results. Fast carrier task forces, together with the 'Jeep' carriers that supported amphibious landings, made the 'island hopping' campaign possible. American industry delivered material at a rate, which the Japanese could not match. With the material came many thousands of trained men at all levels. American aircrew and sailors learnt quickly in action and their leaders rose swiftly to command on their merits. The quality of the whole fleet rose with dramatic speed in consequence and, as historian David BROWN has observed, the US

Fifth/Third Fleet with its associated Marine Corps formations was probably the most efficient and effective instrument of war in the pre-nuclear age.

Cold War to present day

After 1945, the British and US Navies rapidly ran down their wartime carrier fleets. Carrier aircraft were, however, recognized as the core of a modern fleet's effectiveness and, as a result Canada, Australia and other nations created carrier squadrons of their own, leaning heavily on British experience. They found the light fleet carriers, many of which were now surplus to British requirements, as ideal units. Ships were exported to Canada, Australia, France, Holland, India, Argentina and Brazil. Britain saw difficulty in operating the post war generation of jets from its relatively small carriers but overcame the problem with the invention of the steam catapult, angled deck and mirror landing sight; ideas subsequently adopted by every carrier navy.²⁹

Despite the key role played by carrier fleets in the recent war, the advent of atomic weapons led many to say that these were the catalyst that would make strategic bombing effective and that now, bombers really would make fleets obsolete. The creation of the US Air Force in 1947 added weight to the argument as it sought to procure the B36 bomber to carry the deterrent atomic bombs. The rival navy plan to operate P2V atom bombers from super carriers of the UNITED STATES class was defeated in Washington and the lead ship cancelled only weeks after it was ordered following bitter political arguments.³⁰

Korea was to prove the theorists wrong yet again. The American *Philippine Sea* and the British *Triumph* were both in Far Eastern waters, and were able to bring tactical aircraft to bear in the conflict before land based aircraft could be deployed. They brought their own logistic train with them; were able to find their own good flying weather and concentrate force when and where it was required (FIG.9). They were also able to cover Formosa while fears lasted that communist attacks might spread further than Korea. The communists proved incapable of finding the allied carriers, let alone attacking them. One third of all tactical air missions in the three year war were flown from the decks of American, British and Australian carriers. Korea proved that carrier navies continued to have a critical role in 'minor' wars and both the USN and RN deployed modernized carrier battle groups with second-generation jets. The RAN deployed an efficient operational carrier, HMAS *Sydney*, only three years after setting up an embryo Fleet Air Arm. This was an outstanding achievement.³¹

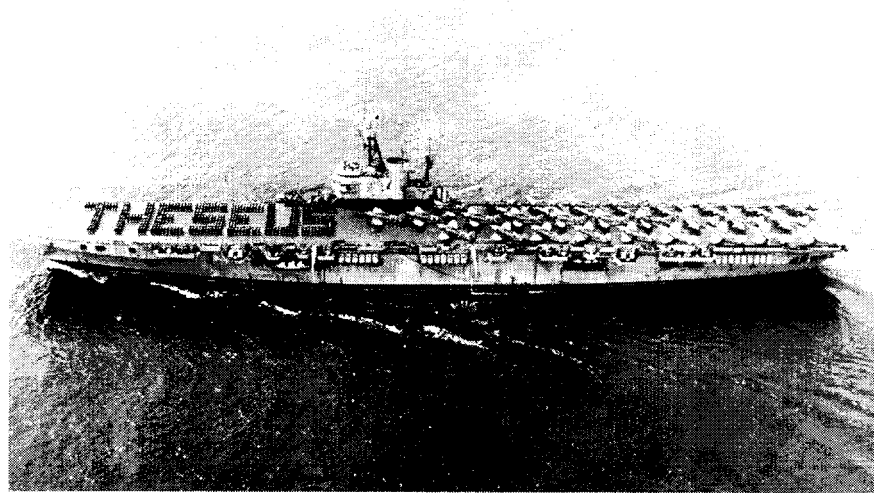


FIG.9 - HMS THESEUS LEAVES THE KOREAN THEATRE OF WAR

After Korea, US and British carriers maintained strike potential in the Mediterranean and Atlantic fleets. At Suez in 1956, RN fighters flew two thirds of the strike sorties and helicopters carried out the first 'live' vertical envelopment in history. French carriers saw action off Indo-China and US carriers saw extensive service throughout the Vietnam War. Less well-known actions include the use of *Vikrant's* battle group during the Indo-Pakistan war of 1971. Besides conflict, there have been numerous occasions where the presence of a carrier has deterred aggression. Examples include the Lebanon in 1958, Kuwait in 1961 and Aden in 1967.

The value of the West's strike carrier forces was, perhaps, best appreciated by the Soviets who expended considerable resources in trying to counter their potential. Bombers, surface ships and submarines, all armed with missiles were intended to combat NATO operations in the North East Atlantic. Once the USN had 'super carriers' of the FORRESTAL and subsequent classes, culminating in the magnificent NIMITZ class, it was able to deploy aircraft like the F4 PHANTOM and F14 TOMCAT in a forward strategy aimed at defeating this soviet capability. Bombers from the same ships could have struck at bases, if necessary with nuclear weapons. Had deterrence not worked, these battles in the northern seas would have been on a scale greater than Midway and the Philippine Sea.³²

By the 1970s, attention was focused on the cost of defence, with carriers and their air groups attracting particular attention. As a result, nations such as Canada and the Netherlands opted out. In Britain the cost of ownership was, at first, held down by the modernization of wartime hulls such as *Victorious* (FIGS 10 & 11) and *Eagle*.

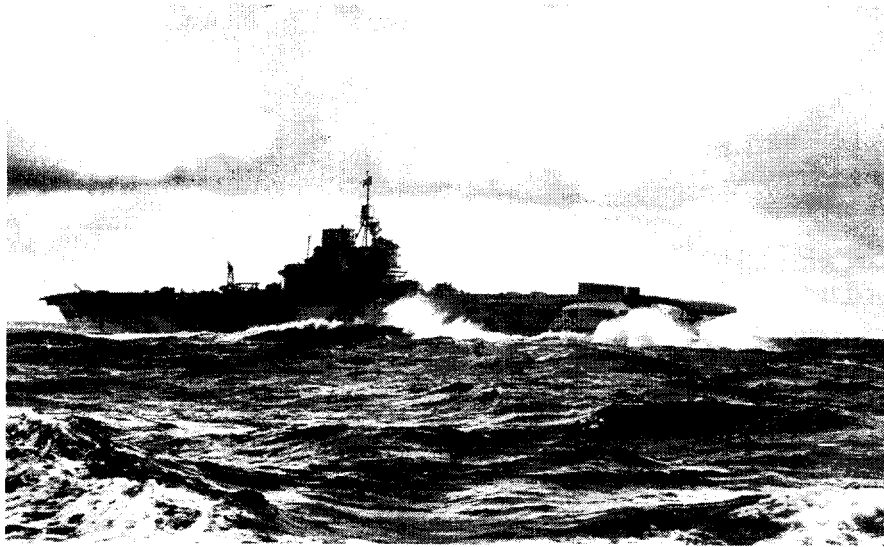


FIG.11 - HMS VICTORIOUS AS BUILT

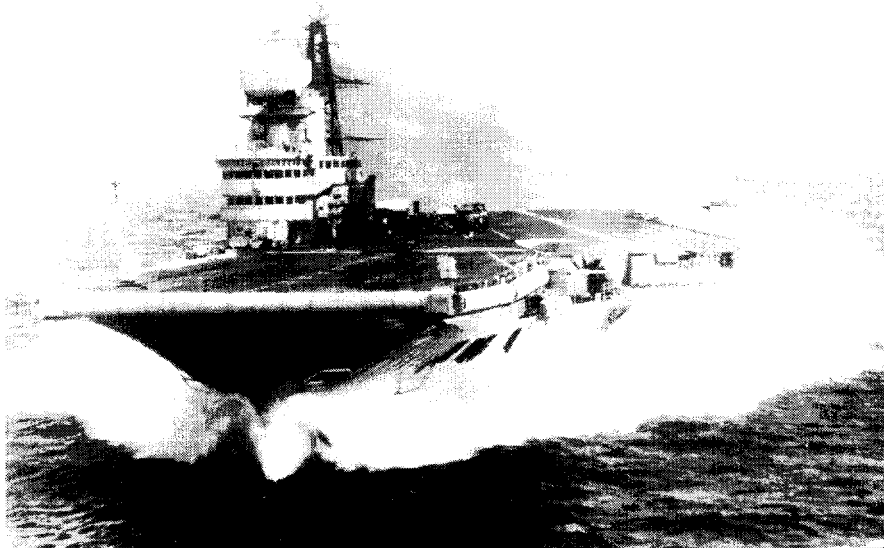


FIG.12 - HMS VICTORIOUS AFTER RECONSTRUCTION

Successive attempts to build new ships culminated in the TSR2 versus CVA01 debate of 1966 which was reminiscent of the US B36/*United States* battle twenty years earlier. Both were instances of land-based air forces and navies with their carrier borne squadrons competing to achieve traditional maritime objectives. The British Naval Staff had added to their own difficulties by stressing the importance of carrier 'escorts' including a cruiser, thus heightening political fears that such ships were vulnerable. The use of the term 'Battle Group' by the USN to describe ships and aircraft with complementary functions is a much more astute use of the English language. Worse, the same staff had overplayed the need for early

replacement of all existing carriers emphasising their importance east of Suez. Thus the decision to withdraw from the Far East obscured the true importance of aircraft carriers and weakened the political will to build the QUEEN ELIZABETH class. With the run down of the British strike carrier force, aspirations to contribute to the forward strategy were ended, and the USN was left as the arbiter of sea control using the full range of capabilities offered by its carrier battle groups.

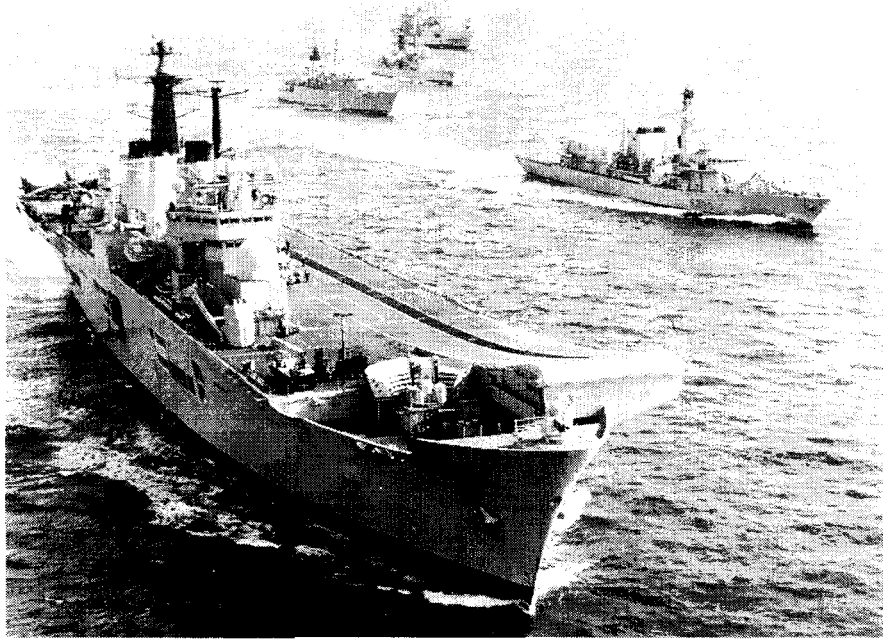


FIG.13 HMS INVINCIBLE AND HER BATTLE GROUP

Fortunately for the Royal Navy, it was able to build three small carriers of the INVINCIBLE class (FIG.13) capable of operating a few V/STOL SEA HARRIER fighters as well as helicopters although, short-sightedly, they lacked AEW capability. Together with the former CVA *Hermes*, *Invincible* made the Falklands Campaign possible. Retention of even this small capability had been a close run thing. In 1981, Britain offered to sell *Invincible* to Australia as a replacement for *Melbourne*, ending years of Australian debate that mirrored arguments in the UK and USA. After the Falklands War, Australia did not hold the UK to the deal and *Melbourne* was scrapped without replacement. Had the sale gone through, it is interesting to speculate what steps Australia would now be considering for a replacement ship.

There is a myth that 'HARRIER Carriers' need not be as large as their conventional cousins. In fact, HARRIERS carry less and have a smaller radius of action than CTOL aircraft so ships need to be bigger to carry more of them to perform the same tasks. Whilst V/STOL aircraft do not require catapults or wires, they are individually more expensive and use small engine production runs which lack logistic support partners. They are, therefore, more expensive to operate on a through life cost basis.

Participation in intervention operations after the end of the cold war has re-awakened British interest in large carriers. In fact, dozens of similar operations had been carried out in the post World War 2 era, almost all of which involved

joint, littoral, power projection operations, in which carriers proved ideal with their global reach, combat persistence and flexibility. Politicians discounted such operations as peripheral at the time and focused on the potential for major land war in Europe. Now that that threat is lifted, operations similar to those carried out for the last fifty years are regarded as new! Revived interest in carriers has led to British investment in the JSF Programme as a full partner. A decision on whether to fund the USN 'tailhook' version of the design or V/STOL has yet to be taken but it is interesting to reflect that the former meets both the RN Future Carrier Borne Aircraft requirement and the RAF Future Offensive Aircraft System. Other than the more limited ability of air forces to deploy, what is the future difference between navies and air forces?

The New British carriers are to be 'Joint' ships, capable of operating Army and RAF aircraft, mirroring plans for *Queen Elizabeth* thirty years ago. Indeed, the similarity is even more marked since the JSF programme resembles the British Hawker P1154 project of the same period. Both RN and RAF versions of which were intended to go to sea as 'de facto' Joint Strike Fighters. The loss of the QUEEN ELIZABETH class in 1966 damaged the RN more than any hostile force has done in sixty years.

The USN continues to operate the world's largest carrier fleet (FIG.14), but with a reduced number of general-purpose aircraft types centred on the F/A16. As far as one can tell, its future is secure, whereas the RN has many hurdles to cross before the new carriers recommended in the Strategic Defence Review become reality.

Since the decommissioning of *Melbourne*, the RAN has been an all helicopter force but these are world class, capable of operating from the majority of platforms and in a wide spectrum of roles.³³ Like other navies, the RAN needs aircraft to perform its tasks and is, in effect, a mobile air force. For the second time, the 'carrier club' is expanding with both Brazil and India buying viable second hand ships and expanding their fixed wing capabilities.

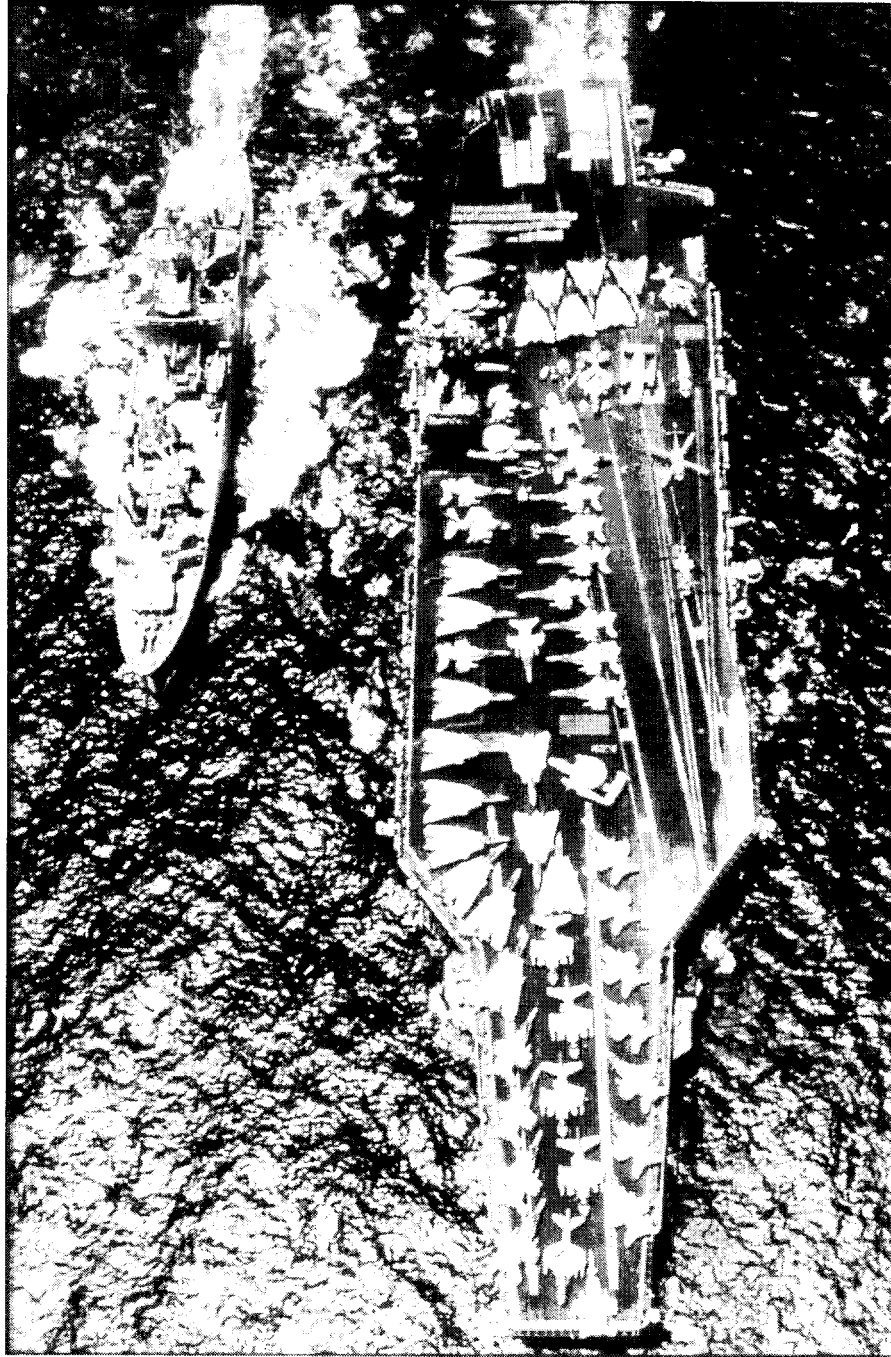


FIG.14 USN NIMITZ CLASS CARRIER

Summary

The battle group centred on an aircraft carrier has the broadest range of capabilities across the spectrum of naval and air power. It is a self-contained, self-supporting system ready for action and is independent of overseas bases, infrastructure or the permission of foreign governments. In a period of tension the carrier group can wait out of sight in the vastness of the ocean but capable of striking instantly when called on to do so.³⁴ In peacetime the presence of a CV on a port visit gives an awesome vision of national power as those who have stood on the coast to watch a USN carrier arrive would agree.

During the twentieth century only three navies, those of Britain, the United States and Japan demonstrated the ability to design, build, man, equip with aircraft and take into action a significant carrier force. Other navies operated carrier fleets but relied on purchases and training from overseas. Some navies failed to achieve viable carrier forces at all.

Nothing dates an article faster than a prediction of the future but I believe that an intelligent human operator in an aircraft capable of a variety of uses operating from a mobile base has a more certain future than many other weapon systems. Navies have proved, indisputably, that they carry out this task efficiently and emerging network technology will make them even better. Command and control already comes from Joint National Headquarters and the way carriers are controlled is changing and will inevitably continue to do so as forces are integrated nationally and internationally. The time has now come to expose the fallacy expressed by protagonists of 'air power' that aircraft can only operate within their own narrow remit. If rational arguments prevail, the Twenty First Century will see three-dimensional capability spread to every facet of warfare operating from both fixed and mobile bases by whatever name the politicians allow the latter to be known. Aircraft carriers, unlike other weapons systems, which have become outdated, thrive on new technologies, which enhance their capabilities still further. The fusion of naval and air warfare that they represent will cause several navies, like the Royal Navy, to look again at their requirements for future warfare.

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