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# Kokubokan: Japanese aircraft carrier development, 1922-1945

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**Kokubokan:  
Japanese Aircraft Carrier Development, 1922-1945**

**A Thesis  
Presented to  
The Faculty of the Department of History  
San Jose State University**

**In Partial Fulfillment  
Of the Requirements for the Degree  
Master of Arts**

**By  
David Lawrence Hanley**

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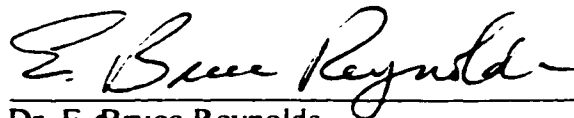
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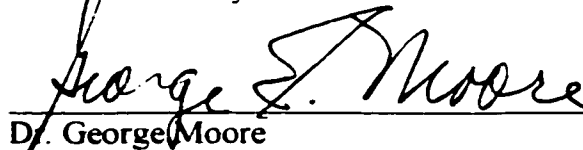
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## **ABSTRACT**

**Kokubokan:**

**Japanese Aircraft Carrier Development, 1922-1945**

**By David L. Hanley**

**This thesis addresses the development of the aircraft carrier force of the Imperial Japanese Navy and its subsequent impact on the Pacific War. It examines the major influences and patterns of Japanese carrier design as well as the ability of the Japanese Navy to begin the Pacific War with the most powerful naval strike force known at that time. This study will analyze the ultimate defeat and destruction of the Japanese aircraft carrier force during the war.**

**The development of aircraft carriers in Japan closely paralleled the progress made by the United States. By 1941, the Japanese Navy had achieved a superior number of aircraft carriers and had developed a highly effective naval air force. The superiority of the Japanese carrier force was only temporary, however, due to difficulties in wartime construction and replacement of pilots and the slow development of new models of naval aircraft.**



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## INTRODUCTION

The successful application of sea power has been a decisive factor in the development of many nations throughout the centuries. A decisive naval engagement could very well herald the decline and fall of an empire; such events as the defeat of the Spanish Armada and the battle at Trafalgar had momentous consequences for the societies involved. Smaller island nations, often poor in natural resources, were particularly vulnerable to maritime aggression. Great Britain, for example, had been able to exercise enough control over the world's waterways to ensure the survival not only of the island nation itself, but also one of the largest and most far-flung empires the world has ever known. In the case of Japan, the nation's ruin was the result of its inability adequately to protect itself and to guarantee the safe importation of essential materials.

The science of warfare is always being advanced and new trends are being developed. For several hundred years the principal trend was that the largest warships with the greatest number of guns would gain the upper hand. This pattern saw the emergence of the man-of-war, armored cruisers and eventually the modern battleship. The size and armament of these ships had, by the twentieth century, reached a very impressive scale. For a time the battleship was most certainly a source of national pride and strength. But as the turn of the century had marked a new era for the armored battleship, so it also ushered in a new brand of warfare. Although the debut of the airplane was modest, the potential of that invention was recognized rapidly. It was still true that the nation which gained the greatest degree of control over the seas enjoyed the greatest power and

security, but control of the oceans now also depended on being able to gain mastery of the skies as well. The vastness of the world's oceans posed limitations on the application of air power until a new breed of ship was developed that would offer the possibility of mastering both sea and air. The aircraft carrier allows a naval force to command both sea and the air, and in so doing can ensure the safety of friendly forces and the destruction of the enemy. However, the aircraft carrier was, and is to this day, a paradox; it is at once the most powerful and most vulnerable ship of the fleet.

This study will examine the development of aircraft carriers by the Imperial Japanese Navy and their employment in conflicts from 1922-1945. This study will also address the developments relating to the aircraft carrier as a complete combat system, including advancements in the design of aircraft and their weapons, as well as significant changes in the military-industrial complex. The pattern of influences that affected carrier development and construction in Japan will be examined, including the important early influences of the British Royal Navy, as well as the effects of the Washington Treaty of 1922 and the London Treaty of 1930. The development of the Japanese aircraft carrier force will be gauged against the progress of Japan's principal antagonist, the United States. Finally, a detailed analysis will be made of Japanese disposition of carrier forces in the Pacific War, the strategies and tactics employed, and the prevailing wartime situation that dictated those strategies.

It is truly remarkable that the Japanese Navy was able to assemble the most potent naval striking force the world had ever seen in a relatively short time. The influence of the Royal Navy as a role model and benefactor of the Japanese Navy was strong and some

might argue that the Japanese could not have made such an achievement so soon had it not been for the great help of the British. The Royal Navy had indeed been the leader in advancing naval aviation during World War I, but by the mid-1920s constructive influences from Great Britain were no longer significant in Japanese carrier development. The Washington Treaty of 1922 provided the greatest influence on the design and construction of aircraft carriers throughout the 1920s, and the London Treaty of 1930 extended that influence until 1936. During the 1930s Japan's international relations were deteriorating and the political influence of the military cliques were rising, making it increasingly difficult for the diplomats and civilian leaders to maintain positive relationships with Great Britain and the United States. During this time the Japanese were forced to rely on their own experiences, and, after the lapse of the Washington and London treaties, they were free to implement designs and ideas that had been formulated during the early 1930s.

It must be noted that during the entire period of aircraft carrier development, the United States was the designated arch-enemy of the Japanese Navy. This was officially established in the Imperial Defense Policy of 1907, which was an overall national defense policy held to be a state secret of the highest order. The policy was intended to be a grand strategy that would unify the efforts of the army and navy in time of war, but in the end it was simply a compromise between two conflicting policies. The army had identified Russia as the nation's primary foe and pushed for a strategy focusing on the continent. The navy, in an attempt to maintain its independence from the army and to justify its own share of appropriations, needed to emphasize a strategy in which it could play a major

role. In order to justify large material and monetary requests, the navy needed to find a foe that posed a significant naval threat to Japan, at least hypothetically. Since the Anglo-Japanese Alliance was but five years old, the Royal Navy was unsuitable as a target for the Japanese grand war plan. Although few officers truly expected to go to war with America, that country was the most logical and potentially the most powerful naval foe that might face the Japanese Navy.

As potential foes, the Japanese Navy and the United States Navy shared much in common as they began developing aircraft carriers. The Japanese and the Americans began their first aircraft carrier projects at roughly the same time, so they in fact began the building race together. The Americans had pioneered flight, but during World War I the naval air program of the United States had suffered from arrested development, while the British gained a great deal of experience in a variety of naval air operations. Aircraft carriers in Japan and the United States developed along parallel tracks. Both countries began serious work at about the same time, and both had accumulated little practical experience in naval aviation during World War I. While the Washington and London disarmament treaties were in effect, Japan and the United States developed the same types of aircraft carriers at roughly the same times.

The difference between the two countries lay in the fact that the United States was far less influenced by Great Britain than was Japan. The Americans might have followed the British lead had it not been for a financially conservative Congress. As it was, the Americans were forced to experiment on their own and the result was a number of very fundamental design elements that made American carriers more efficient than those of

Japan. Thus, while Japan had managed by 1941 to have a larger aircraft carrier fleet, its ships were qualitatively inferior to those of the United States. The inferiority of Japanese aircraft carriers in general was but one problem during the Pacific War, and it was not noticed at the outset. Other problems included merchant shipping, limited industrial capacity and the sheer vastness of the frontlines to be defended. Once the enormous industrial might of the United States mobilized for war, the Japanese were absolutely overwhelmed.

The involvement of aircraft carriers in the Japanese efforts to win an empire was essential. Without the aircraft carrier the Japanese would not have been able to seriously contemplate the aggressive and far-reaching program they launched in December 1941. Japanese carrier development included some significant innovations, but also omitted certain basic design elements that prevented their ships from being as effective as the carriers built by the United States. Although Japan had managed to create what was, at that time, the most powerful carrier strike force ever, this dominance proved fleeting. Even had the Japanese won every carrier battle, they still would have been overwhelmed by the industrial capacity of the United States. Most of the Japanese leaders understood this, yet they proceeded with an unthinkable war, pinning their entire hope on the unwillingness of the American people to continue the fight.

## CHAPTER 1

### THE GENESIS OF JAPANESE NAVAL AIR POWER (1912-1922)

During the early period of Japanese naval aviation, there was a heavy reliance on the British model. From 1912 to 1922, the Royal Navy provided the greatest source of inspiration for Japanese aircraft carrier design and operation. This proved to be most beneficial to Japan, as the Royal Navy had become the world leader in the field of naval aviation. The United States, Japan's principal naval foe, made little or no progress during this time. Although the Americans seemed to have had little to offer to the Japanese, the early reliance on the British method, to the exclusion of other ideas, would eventually prove to be detrimental to the Japanese carrier force. Although the Japanese had easily maintained a one-to-one carrier parity with the United States during this early period, there were already important design and doctrinal differences that were becoming manifest. These differences would ultimately prove critical in future decades, but at such an early juncture the role of the aircraft carrier had not yet been fully realized. The Japanese had no reason to believe the British model was not the best.

The Imperial Japanese Navy began to explore the field of naval aviation in 1912, the year that the Meiji Emperor died and closed one of the most remarkable eras in modern Japanese history. It was at such a juncture that the Japanese Navy created a commission to study the feasibility of using airplanes with the fleet. At that time the Japanese were not very far behind the navies of Great Britain and the United States in exploring naval aviation. Only one year before those two navies had purchased their first aircraft, and in



1912 nobody was quite sure how the aircraft might be applied to fleet operations. As it happened, the United States Navy and the British Royal Navy followed very different paths over the course of the next decade, with the Royal Navy becoming the undisputed leader in the field of naval aviation. Thus the Japanese Navy was fortunate in this early period in having selected the British Navy as its developmental role model. Since the official formation of the Imperial Japanese Navy in 1887, the Japanese had recognized Britain's naval supremacy and made efforts to model the fledgling Imperial Navy after the Royal Navy. With capital ships purchased from, or designed by, Great Britain, the Imperial Japanese Navy defeated the Chinese naval forces during the Sino-Japanese War of 1894-1895. A decade later the Imperial Navy was again victorious against the Russian fleet in the Russo-Japanese War of 1904-1905. The Anglo-Japanese Alliance of 1902 further cemented the relationship between the two navies.

The Japanese benefited from the cordial relations between the Imperial Navy and the Royal Navy during the 1910s, and the strides that the Japanese made toward developing a naval air service tended to mirror British efforts. As the British made great advances in the practical application of air power in fleet operations, the Japanese observed and made progress at their own pace. The United States Navy, the designated rival of the Japanese Navy, did not follow British example. In fact, the development of naval aviation in the United States was somewhat arrested during World War I, and so very little progress was made by the initial pioneer of aviation. It seemed that the Japanese Navy had indeed selected the best possible role model.

### The Japanese Experiment

Japanese naval aviation had its origins in 1912 with the formation of the Committee on Naval Aeronautical Research, which was subordinate to the Imperial Navy's Technical Department. The initial focus of the commission was on non-rigid airships, but it was not long before it began to explore the use of airplanes.<sup>1</sup> It was decided that a handful of junior naval officers would be sent abroad to learn the operation and maintenance of aircraft. Three officers were sent to the Glenn Curtiss factory in Hammondsport, New York, and another two officers were dispatched to France.<sup>2</sup> To fund these efforts and the subsequent purchase of foreign-built flying machines, an amount of ¥100,000 was allocated.<sup>3</sup> By the end of 1912 the new airmen had returned to Japan with the Imperial Navy's first aircraft and the maiden flight over the Japanese homeland occurred at Oppama on Yokosuka Bay.<sup>4</sup>

It is quite probable that the Japanese Commission on Naval Aeronautical Research was initially moved to consider non-rigid airships and then quickly abandoned the idea for airplanes as a result of the British experience. Although the Americans had pioneered

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<sup>1</sup> David Evans and Mark Peattie, *Kaigun: Strategy, Tactics, and Technology in the Imperial Japanese Navy, 1887-1941* (Annapolis, MD: Naval Institute Press, 1997), 178.

<sup>2</sup> *Ibid.*, 179; Norman Polmar, *Aircraft Carriers: A Graphic History of Carrier Aviation and its Influence on World Events* (Garden City, NY: Doubleday & Company, 1969), 35. There is some disagreement between sources over how many officers were sent to France and the United States; Norman Polmar states that two officers were sent to the U.S. and three went to France. The version that Evans and Peattie advance is the more likely, considering their sources. Both sources note that one of the officers sent to the Glenn Curtiss facility was Lieutenant Nakajima Chikuhei, later founder and president of the Nakajima aircraft industry.

<sup>3</sup> *Jane's Fighting Aircraft of World War I* (New York: Military Press, 1990), 210.

<sup>4</sup> Evans and Peattie, *Kaigun*, 180; Polmar, *Aircraft Carriers*, 36. Again there is some disagreement as to how many of each type of aircraft were purchased. Evans and Peattie claim that two seaplanes were purchased from Glenn Curtiss and two Maurice Farman seaplanes were bought from France. According to Norman Polmar, two French Maurice Farman seaplanes that were built in Britain were purchased along with a single Curtiss plane.

heavier-than-air flight in 1902, the Royal Navy had the opportunity to develop military aviation before the United States. After improving the original Wright aircraft, the brothers offered their machine to the British government in 1907. Both the War Office and the Admiralty turned down the invention, and the Admiralty stated that the flyer would be “of no practical use to the Naval Service.”<sup>5</sup> Instead, the Royal Navy directed its efforts toward the employment of airships (blimps) with the fleet. Early in 1909 the Royal Navy authorized £35,000 for the development and construction of a rigid-type airship to be known as the *Mayfly*. The Royal navy devoted two years to the project only to discover that the airship lacked sufficient lift to become airborne. After some modifications were made, another launch was attempted, but the 502-foot long airship was severely damaged by a strong wind as she emerged from its shed.<sup>6</sup> After that setback the Admiralty decided to disband its air section.

The loss of the *Mayfly* and two years of work was a serious setback for naval aviation in the Royal Navy. Fortunately for Great Britain, there were flying enthusiasts who helped provide the impetus for continued development. There were some officers in the Royal Navy who had taken flying lessons at their own expense, and one had actually raised enough money to purchase an aircraft. Two flying enthusiasts, Francis McClean and George Cockburn, offered to loan the Royal Navy a pair of aircraft and said they would instruct naval officers in the art of flying. Four men were selected, and these men

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<sup>5</sup> Polmar, *Aircraft Carriers*, p.8.

<sup>6</sup> *Ibid.* p.6.

persuaded the Royal Navy to purchase the two machines they had trained with. Thus, in September 1911, the Royal Navy acquired its first aircraft.<sup>7</sup>

The influence of the Royal Navy on the early development of Japanese naval aviation is apparent. Only months after the Royal Navy had lost the *Mayfly* and had moved on to aircraft, the Japanese Commission on Naval Aeronautic Research was formed and had reached the same conclusion as had the Royal Navy, except without expending the money and the time. The Japanese Navy acquired its first aircraft and trained pilots just a little more than a year after the Royal Navy had. In 1912 the Royal Navy converted the old light cruiser *Hermes* into a “parent ship for naval aircraft” equipped with two seaplanes. The planes were launched on trolleys down a short flight deck built over the bow. The British experience with *Hermes* was successful enough that in late 1913 the Royal Navy decided to take over a merchant ship during construction and finish the hull as a dedicated seaplane tender with ten planes.<sup>8</sup> The Japanese decided in the fall of 1913 that they too would convert a merchant ship into a seaplane tender, although their ship had already been serving as a naval transport.

The *Wakamiya Maru*, built in 1901 by the WR Rea Shipping Company of Belfast, was originally completed as the 4421-gross ton freighter *Lethington*.<sup>9</sup> Three years after its

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<sup>7</sup> Ibid.

<sup>8</sup> Ibid. p.13.

<sup>9</sup> Hansgeorg Jentschura, Dieter Jung and Peter Mickel. *Warships of the Imperial Japanese Navy, 1869-1945* (Annapolis, MD: Naval Institute Press, 1986) 62-63. The *Wakamiya Maru* had been part of the Imperial Japanese Navy since 12 January 1905, when it had been taken as a prize west of Okinawa by a Japanese torpedo boat. Presumably this ship was under a Russian flag. This source states that the *Lethington* was in the service of WR Rea Shipping Company, but does not specifically mention any Russian service. If the *Lethington* was indeed captured near Okinawa by Japanese *Torpedo Boat 72*, as Jentschura, Jung and Mickel claim, then it was probably in Russian service, carrying cargo consigned to a

acquisition by the Imperial Navy in 1905, it was renamed *Wakamiya Maru* and leased to the NYK Line, with which it served until it was taken in for conversion by the Imperial Navy. The *Wakamiya* (the merchant ship designator “*Maru*” having been dropped from its name upon entering naval service) was given canvas hangars and simple derricks with which to handle two assembled seaplanes and two that were unassembled.<sup>10</sup> Being an older merchant ship, *Wakamiya* had a very modest performance. The single vertical triple expansion plant and three boilers were coal burning and supplied the single shaft with 1,600 units of shaft horsepower, enabling the ship to make 9.5 knots. *Wakamiya* was fitted with a pair of 3-inch/40-caliber (80mm) low-angle guns and a pair of 1.82-inch (47mm) low-angle guns.<sup>11</sup> The conversion work was completed on 17 August 1914, and *Wakamiya* was able to participate in the fleet exercises off Sasebo that year.<sup>12</sup>

The Japanese Navy did not have long to wait before the *Wakamiya* was tested in battle. In August 1914 the world became embroiled in a global contest between the imperialist powers. Although the center of action was the European continent and its environs, the powers involved had many colonial possessions across the world. For Japan this was an unprecedented opportunity to gain a stronger position in Asia, one of the principal

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belligerent (the Russians), or it was found in waters considered restricted by the Japanese. It might also have been an unjustified seizure on the part of the Japanese.

<sup>10</sup> Ibid.

<sup>11</sup> John Campbell, *Naval Weapons of World War Two*. (London: Conway Maritime Press, 1985), 197-98. The 3-inch guns were of the 3<sup>rd</sup> Year Type (1914) and could fire a 13.2-pound projectile with a muzzle velocity of approximately 3000f/s up to 14,870 yards. This type of gun was used on many lesser warships. There are no guns of 47mm size listed by Campbell for the Japanese Navy; it is quite probable that these weapons were copies or original British Hotchkiss quick-firing 3-pounder guns, which were originally introduced in 1886. Many of these guns were later used as sub-caliber or saluting guns. The Hotchkiss 3-pounder fired a 3.3-pound projectile with a muzzle velocity of 1884f/s out to a maximum range of about 6,500 yards (Campbell, *Naval Weapons of World War Two*, 66).

<sup>12</sup> Evans and Peattie, *Kaigun*, 180.

concerns of the Japanese leadership. The Anglo-Japanese Alliance had been renewed by mutual consent, and Great Britain requested naval assistance from the Japanese for the purpose of defeating German surface raiders. The Japanese responded with more than the British desired, and proceeded to seize German holdings in China and the Pacific.

As part of the Japanese involvement in World War I, the *Wakamiya* was sent to the Kiaochow Bay region to support landings around the port city of Tsingtao. The Germans had built a sizable fortress there and kept a garrison of 4,000 marines. The Japanese declared war on Germany on 23 August 1914, a mere five days after the conversion work on *Wakamiya* was completed. Just after the war declaration had been made, the Japanese began landing troops around Tsingtao. Together with a contingent of British troops from Hong Kong, the Japanese laid siege to the German port city. *Wakamiya* arrived in Kiaochow Bay in September carrying four improved Maurice Farman three-seater seaplanes.<sup>13</sup> The Japanese naval aircraft made fifty reconnaissance and bombing sorties over the German base, in addition to conducting search operations at sea.<sup>14</sup> Using bombs fashioned from 16-inch armor-piercing naval shells, Japanese aircraft also sank a German minelayer.<sup>15</sup> The *Wakamiya* was struck by a mine during these operations, and was forced to return to Japan for repairs; the seaplanes were left behind to continue operations. Bombardment from the air was a startling innovation for that time, and when coupled with a land siege and naval bombardment, proved to be more than the Germans would

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<sup>13</sup> Antony Preston, *Aircraft Carriers* (New York: Gallery Books, 1979) 36.

<sup>14</sup> Evans and Peattie, *Kaigun*, 180.

<sup>15</sup> Preston, *Aircraft Carriers*, 36.

tolerate.<sup>16</sup> The garrison surrendered on 7 November 1914, and the *Wakamiya* returned from Japan during that month to collect her aircraft.

The *Wakamiya* proved to be a successful experiment for the Japanese Navy. The efforts of the early Japanese Naval Air Service during World War I had been limited, but they were still greater than the efforts made by the United States Navy. Although the Americans had developed an effective steam catapult system during the prewar years, they had made no real progress toward utilizing aircraft with the fleet and abandoned all such work when they joined the war effort in 1917. In stark contrast, the Royal Navy had conducted many experiments with aircraft during the war and had become the undisputed leader in naval aviation. The British had built a small fleet of seaplane carriers and, by the end of the war, had started working on a number of true aircraft carriers.

#### Domestic Development of the Japanese Naval Air Service

The capture of Tsingtao and the seizure of German islands throughout the Pacific marked the extent of Japanese wartime operations in the Far East. For the remainder of the war, the Japanese Navy concentrated on expanding the naval air units and bases in Japan proper. Before Japan entered the war, the armed services had been having difficulty gaining appropriations in the sluggish economy. There had been a general trend of financial retrenchment after the Russo-Japanese War and the rivalry between the Army and the Navy had been growing increasingly bitter. The death of Emperor Meiji in 1912

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<sup>16</sup> James Stokesbury, *A Short History of World War I* (New York: William Morrow & Company, 1981)

seemed to herald the change of an age as the parliamentary branch of the Japanese government grew more influential. The *genrō* (elder statesmen) were passing from the scene and the power of the political parties seemed to be on the rise. After the Taishō Political Crisis, it seemed that the Navy would gain a definite advantage when its most senior officer, Admiral Yamamoto Gonnohyōe, was selected to head a new cabinet. Under pressure to reduce the budget, Yamamoto eliminated 10,000 bureaucrats and other government employees, effectively reducing the budget for 1913 by 11 percent.<sup>17</sup> It was Yamamoto's intention to use these savings for naval expansion, but he never had the chance to do so. Unfortunately for Yamamoto and the Navy, in January 1914 a number of naval officers were implicated for bribery in the Siemen's Scandal.<sup>18</sup> The Army faction, led by one of the *genrō*, Field Marshal Yamagata Aritomo, seized the opportunity to overthrow the cabinet by having his followers reject the Yamamoto budget in the House of Peers.<sup>19</sup> Yamamoto was forced to resign amid scandal at a time when the general public was already incensed at the apparent interference of military-*genrō* cliques in the democratic process.

The Navy's difficulties with the Army faction caused the Navy's budget to be held up for a time, but during the premiership of Ōkuma Shigenobu, a supplementary naval budget

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<sup>17</sup> Mikiso Hane, *Modern Japan: A Historical Survey* (Boulder: Westview Press, 1986) 194.

<sup>18</sup> Joyce Lebra, *Okuma Shigenobu: Statesman of Meiji Japan* (Canberra: Australian National University Press, 1973) 115.

<sup>19</sup> Roger F. Hackett, *Yamagata Aritomo in the Rise of Modern Japan, 1838-1922* (Cambridge: Harvard University Press, 1971) p.267 Hackett notes the original budget proposal was for 160 million yen, and this had been reduced by 30 million yen in the Lower House of the Diet. After reducing a further 40 million yen to please the House of Peers, the budget was denied when put to a vote. (Hackett, *Yamagata*, p.267 note).



of 6.5 million yen was approved by the Diet.<sup>20</sup> Japan's entry into World War I was a welcome event for the military, as it served to loosen the purse strings of the Diet at a time when there was a general feeling of resentment over military spending. It is estimated that in 1914 an amount equal to ¥100,000 was allocated for naval aviation, which was no more than in 1912.<sup>21</sup> In 1916, however, ¥35,000 was appropriated for the establishment of an air group at Yokosuka and another ¥630,000 was granted as an equipment and construction fund, to be spread over five years.<sup>22</sup>

Development of naval aviation in Japan had been relatively slow until the money began flowing in 1916. In March 1914 the naval air force consisted of only ten seaplanes (5 Farmans, 3 Curtisses and 2 Deperdussins) and the total number of qualified aviators was twenty.<sup>23</sup> In 1916, the aircraft used by the Japanese military had been shown to be generally inferior when a pair of American aviators gave stunt exhibitions in Japan.<sup>24</sup> By 1917, however, the Japanese were beginning to create their own designs, and the aircraft industry as a whole began to mature. Officers at the Yokosuka Naval Arsenal designed and built the first Japanese seaplane, the *Ro-Gō Kō-gata* reconnaissance seaplane, which was more useful at sea and safer than the Maurice Farman seaplanes then in use.<sup>25</sup> In October 1917, the aircraft branch of the Mitsubishi Heavy Industries combine was established at Nagoya. The works at Nagoya were the largest and most advanced

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<sup>20</sup> Lebra, *Okuma Shigenobu: Statesmen of Meiji Japan*, p.118.

<sup>21</sup> *Jane's Fighting Aircraft of World War I*, p.210.

<sup>22</sup> *Ibid.* p.211.

<sup>23</sup> *Ibid.* p.210.

<sup>24</sup> *Ibid.* 211. The motors used by the Japanese were described as very poor, with the best power output rated at 75-hp.

<sup>25</sup> Evans and Peattie, *Kaigun*, p.180.

facility of its kind in Japan.<sup>26</sup> In December Captain Nakajima Chikuhei founded the Nakajima Aircraft Company at Ōta, a firm which was unique among Japanese aircraft manufacturers because it used only Japanese engineers and designers.<sup>27</sup> In 1918 the Japanese Naval Air Service consisted of more than 250 airplanes and 50 qualified aviators.<sup>28</sup> By the end of the war Japanese factories were beginning to fabricate engines and fuselages based on foreign designs.<sup>29</sup>

By the end of World War I the Japanese Navy was prepared to explore the field of naval aviation further and requested huge appropriations in the naval expansion program of 1918. Accordingly, for the 1918-19 fiscal year, the Diet approved a ¥1,580,000 budget for naval aviation that included the cost of creating an additional air group and base at Sasebo.<sup>30</sup> The Imperial Navy had also secured land around Lake Kasumigaura in Ibaraki Prefecture, northeast of Tokyo. In 1919 a naval air base was established there and naval air training was transferred there from Yokosuka, making Kasumigaura the principal flight-training center for the Navy.<sup>31</sup>

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<sup>26</sup> *Jane's Fighting Aircraft of World War II* (New York: Military Press, 1989) p.187.

<sup>27</sup> Evans and Peattie, *Kaigun*, p.302.

<sup>28</sup> *Jane's Fighting Aircraft of World War I*, p.212. There were 150 Farman biplanes in two or three seat configuration with various engines ranging in output from 75-hp to 120-hp. In addition, there were 50 Short two-seater biplanes with Sunbeam engines (150-hp or 225-hp), 40 single and double seat Sopwith biplanes with Gnome 100-hp and 160-hp engines and 10 Curtiss Flying Boats and biplanes. Another fifteen planes are listed as being various types, which probably include some native designs.

<sup>29</sup> Evans and Peattie, *Kaigun*, p.180.

<sup>30</sup> Charles Burdick and Donald Detwiler, eds, *War in Asia and the Pacific, 1937-1949* (New York: Garland Publishing, 1980) volume 4, part I, monograph 145, p.5.

<sup>31</sup> Evans and Peattie, *Kaigun*, p.180.

### The British Role Model

By the end of World War I, the British Navy had amassed a wealth of experience in the field of naval aviation. Although the Japanese Naval Air Service did not see very much action during the war, the case was different for the Royal Navy. The British had gained a great deal of experience during the war and became the undisputed leader in naval aviation. During the war the Royal Navy had converted nearly one dozen vessels of different types and had tried using seaplanes and wheeled aircraft for a variety of roles. The Royal Navy had used its ship-borne air fleet in the North Sea and the Mediterranean Sea, and had learned a number of important lessons regarding seaplanes and wheeled aircraft. For instance, where early in the decade seaplanes seemed to be the better type of vehicle, it was discovered that the pontoon floats caused the seaplanes to suffer poor performance in comparison to their wheeled counterparts. This was evident as the seaplanes were used in roles such as attacking ground forces in the Dardanelles Campaign and pursuing German Zeppelins in the North Sea. Seaplanes were too slow to evade ground fire and they could not climb fast enough to catch a fleeing airship. Further, it was realized that seaplanes could not be handled in rough seas, and it was also undesirable to have a ship stop to collect aircraft when a submarine threat was present. For all of these reasons the British were compelled to keep experimenting with using wheeled aircraft at sea.

Over the course of World War I the Royal Navy experimented with a variety of vessel types. Altogether six small cross-channel steamers had been converted to work with a

small number of seaplanes, but they were found to be inadequate for more than coastal operations.<sup>32</sup> The merchant ship project that had been started before the war was completed with the 7,020-ton *Ark Royal*, but at 10.5 knots she was too slow for fleet work.<sup>33</sup> The old 18,000-ton Cunard liner *Campania* was also converted, having been given a 120-foot flying-off deck over her bow. *Campania* could make 22 knots and was therefore fast enough for fleet operations, although she could only recover seaplanes.

In addition to converted seaplane carriers of various types, the British also tried fitting light cruisers with ramps for one-time launches of the agile Sopwith Pup fighters for reconnaissance and Zeppelin attacks. In all twenty-two light cruisers were fitted with the ramps. The Commander-in-Chief of the British Grand Fleet, Admiral Sir John Jellicoe, refused to have the ramp installed on capital ships because it was necessary to turn the ship into the wind to launch the aircraft. In a combat situation such a maneuver might place the ship in jeopardy. To overcome that problem, a small turret-mounted platform was created which enabled the larger ships to merely rotate the turret into the wind.<sup>34</sup> Another scheme for bringing wheeled aircraft into naval action was to place an aircraft on a barge that was towed behind a destroyer; if the barge were moving fast enough, the aircraft would be released and almost leap into the air.<sup>35</sup> Unfortunately, these measures all required the loss of the wheeled aircraft, unless the flight occurred near land. It was eventually determined that a ship dedicated to the handling and operation of wheeled

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<sup>32</sup> These were the *Empress*, *Engadine*, *Riviera*, *Ben-My-Chree*, *Manxman* and *Vindex*. The *Ben-My-Chree* was the largest of the steamers, displacing 2,651 gross tons. Polmar, *Aircraft Carriers*, p.20.

<sup>33</sup> *Ibid.* p.16-17.

<sup>34</sup> *Ibid.* p.23-24.

<sup>35</sup> *Ibid.* p.30.

aircraft was the preferable solution. Seaplanes were too limited in their abilities and the other methods of handling wheeled aircraft were too wasteful.

There were a number of ideas about the proper configuration of the ideal aircraft carrier. Experiments conducted by the British with light cruisers *Furious* and *Cavendish* provided a great deal of practical data. *Furious* was initially given a flying-off deck over the forward section of the ship. *Furious* was given four seaplanes and six wheeled aircraft, and it was first intended that the wheeled aircraft would have to ditch alongside the ship when they returned. After it was decided that wasting aircraft in that manner was not acceptable, *Furious* was taken back in and given a landing deck over the after section of the ship. The cruiser superstructure remained between the two decks, and two small trolley-ways were run along both sides of the superstructure in order to connect the decks. It was realized immediately that the superstructure and the hot exhaust gases from the funnel created dangerous and unpredictable wind eddies over the landing deck. Almost all attempts to land ended in accidents of varying severity. Shortly afterward *Furious* ceased aircraft operations and for the remainder of the war was relegated to working with captive balloons for observation. When the cruiser *Cavendish* was converted she was renamed *Vindictive*. *Vindictive* presented the appearance of a scaled-down *Furious*, with funnels and superstructure separating flying and landing decks. The same trouble was experienced with *Vindictive* and after a brief career as a carrier she was reconverted to cruiser configuration.<sup>36</sup>

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<sup>36</sup> Ibid. p.31.

The experience with *Furious* and *Vindictive* made it clear that to be effective as an aircraft carrier a ship must have a full length, uninterrupted flight deck. Although there was general agreement on that point, a great debate began in the Royal Navy over the merits of including a small “island” superstructure at one side of the flight deck. The detractors of island superstructures cited the difficulties experienced on *Furious*. Islands, though small, were essentially unyielding obstacles to planes. If an island structure and the ship's exhaust funnel were placed at such a forward location on the flight deck, they would create dangerous wind eddies over the deck. Moreover, islands would lessen the width of the flight deck at a critical point. Proponents of island structures argued that the structures would be necessary for steering the ship and that more hangar space would be afforded by having the bridge placed above the deck. There were some pilots who defended the idea by claiming the structures helped them to judge distances.<sup>37</sup>

The last carriers started by the Royal Navy were not finished in time to have an impact on the war. The three ships that were being built did have some impact on the first aircraft carrier built by the Imperial Japanese Navy. In 1917 the Royal Navy acquired the unfinished hull of a liner that was being built for the Italian Lloyd Sabauda Line. The ship was completed as the 14,450-ton *Argus*, and it had a 550-foot long, 68-foot wide flight deck that was uninterrupted save for a small chart house that could be lowered during flight operations. The exhaust gases of the ship were led aft through trunks with fans and

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<sup>37</sup> Richard Humble. *United States Fleet Carriers of World War II 'In Action'* (Dorset: Blandford Press, 1984) p.30.

expelled at the rear of the ship.<sup>38</sup> For short intervals *Argus* could make nearly 21 knots, which was sufficient to get her twenty aircraft into the air. Landing on a flush decked carrier was different than on *Furious* and *Vindictive*, and this required new arrangements to be made for bringing aircraft to a stop. On *Furious* and *Vindictive* a system of arresting gear had been employed which consisted of wires stretched across the landing deck that were attached to sandbag weights. In the event that a planes tail hook failed to catch one of the wires, safety nets were raised before the superstructure was hit. These devices were not employed on *Argus*, but one of the two electric elevators were left a few inches below the level of the flight deck to act as an airplane trap. Although this method successfully brought the planes to a halt, in twenty-eight percent of the cases the planes were damaged.<sup>39</sup>

*Argus* was the last carrier completed by the British before the end of the war. Two other projects had been started. The *Eagle* was being built from the unfinished hull of the *Almirante Cochrane*, a battleship that was being built for Chile. When completed in 1920, the *Eagle* displaced 22,600-tons and incorporated a number of battleship features, including a wide, reinforced and compartmentalized hull. Heavily armed, the *Eagle* was equipped with nine 6-inch guns, five 4-inch anti-aircraft guns and three dozen smaller types.<sup>40</sup> There were two aircraft elevators, one rectangular and the other cross-shaped. The most notable feature of *Eagle* was the massive island superstructure, which incorporated the bridge, mast and a single funnel. The island was one-third the length of

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<sup>38</sup> *Jane's Fighting Ships of World War II* (New York: Military Press, 1989) p.37.

<sup>39</sup> Polmar, *Aircraft Carriers*, p.32-33.

<sup>40</sup> *Jane's Fighting Ships of World War II*, p.35.

the *Eagle*, and was placed on the starboard side of the flight deck since the natural torque of aircraft engines at that time tended to pull to the port side. Another innovation on *Eagle* was the two-story hangar space that enabled her to carry twenty-one aircraft. The *Eagle* could make 24 knots when completed for trials in 1920, but the initial performance of the vessel warranted further modification and the ship did not enter service until 1923. The other carrier started before the end of the war was the *Hermes*, the first ship to be designed as an aircraft carrier. Work was started on *Hermes* in January 1918 and she was launched in September 1919. In form *Hermes* was much like *Eagle*, with a very prominent island superstructure. With the urgency of the war past, however, the ship was not completed until 1923.<sup>41</sup>

The British wartime experience with naval air power was indeed varied. A number of air raids were launched from the seaplane carriers against German Zeppelin sheds at Cuxhaven and Tondern, which eventually caused the Germans to relocate certain of their units to less advantageous locations for fear of further air attacks. This strategic benefit of air power was only one of the potential applications of the airplane that were realized. During the war successful torpedo attacks were carried out against Turkish shipping, ground units were spotted and attacked by aircraft, the Zeppelin scourge was successfully countered by aircraft, and German submarines could be spotted and attacked from the air. By the end of the war the airplane had evolved enough to prove that it could be used as a weapon as well as a reconnaissance aid.

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<sup>41</sup> Polmar, *Aircraft Carriers*, p.34.



In stark contrast to the British experience, the United States failed to make any appreciable progress toward the application of aircraft in fleet operations. Although the first practical airplane was developed in the United States, the United States Navy was no quicker to adopt the invention than had been other major navies of the world. In the years just prior to World War I the U.S. Navy ordered Captain Washington Irving Chambers to keep abreast of developments within the field of aviation and to explore the possible applications of the new technology for the Navy. From 1908 to 1911 Captain Chambers, aided by aircraft manufacturer Glenn Curtiss and exhibition pilot Eugene Ely, conducted a number of experimental ship-borne launches and landings. Based on a positive progress report by Chambers, Congress allocated \$25,000 in 1911 to be used for further experimental work with aviation.<sup>42</sup> Chambers used this money to purchase the U.S. Navy's first aircraft in July 1911, acquiring two Curtiss seaplanes and one Wright airplane. Like the British, Chambers had considered using turret-based ramps on cruisers and battleships to launch aircraft, but he did not want to impair the fighting ability of those warships. In 1912 Captain Chamber invented a steam catapult system that he hoped would leave the guns unencumbered and still provide a means of launching aircraft in as little space as possible. The catapult system was tested ashore for three years before it was ever installed on a ship for testing. It was believed at the time that seaplanes were safer, so it was planned to supply capital ships with seaplanes and catapult systems. Once installed aboard the battleship *North Carolina* and other capital ships, it was found that the catapults interfered with the after turrets. When the ships were to be assigned to

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<sup>42</sup> Polmar. *Aircraft Carriers*, p.2.

convoy duty in 1917 all of the devices were removed. As the United States became further involved in World War I, all experimentation ceased while the warships engaged in conventional duties. The United States had made little real progress in the field of naval aviation.

### *Kokubokan: The First Japanese Aircraft Carrier*

The Imperial Japanese Navy was moved to build its first true aircraft carrier after observing British operations on the converted cruiser *HMS Furious*. The British had done much to pioneer the field of naval aviation during the course of World War I. It was quite clear that Great Britain remained the leader in that field and the Japanese followed with interest the various developments and experiments that the British made during the fight with the Germany and the Central powers. After working with seaplanes during the early years of the war, the British eventually concluded that they were inferior to wheeled aircraft in a number of ways. Seaplanes lacked the speed and agility to execute ground attacks or Zeppelin interceptions. Seaplanes could not be launched or recovered in rough sea conditions, and when they could be recovered, it necessitated that the parent ship come to a full stop, opening itself to submarine attack. After a great deal of trial and error with the *Furious*, the British had decided that in order to launch and recover wheeled aircraft, the parent ship must have a flight deck that ran the full length of the ship and was

uninterrupted by obstacles.<sup>43</sup> This realization was the product of many trials of varying success and major rebuilds (which would continue until 1925).

Interest in the operations of the *Furious* had led the Japanese Navy to include the country's first aircraft carrier in its "eight-six fleet project" of 1918. The "eight-six" program embodied the Imperial Navy's efforts to build eight modern battleships and six modern battle cruisers as the nucleus of the nation's battle fleet. Originally the navy had desired to build eight battle cruisers, but the plan had to be changed due to financial restrictions. Although aircraft carriers were far from replacing the battleship in naval doctrine, it is noteworthy that the Imperial Navy thought highly enough of carrier potential to include such a ship in the "eight-six plan."<sup>44</sup>

By December 1919 the keel of a tanker was taken over by the Imperial Navy as the basis of its new aircraft carrier project. Work on the keel had been started by the Asano Ship Building Company of Tsurumi, which was located south of Tokyo.<sup>45</sup> Although the ship had originally been intended as a tanker, it was essentially designed from the keel up as an aircraft carrier. The tanker was to be called *Hiryu*, but in 1920 it was renamed *Hōshō*, and in October of the following year it was designated by the navy as an aircraft carrier (*kokubokan*). On 13 November 1921, the *Hōshō* was launched and construction was completed on 7 December 1922 at Yokosuka Naval Arsenal.<sup>46</sup> The *Hōshō* had the

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<sup>43</sup> Humble, *United States Fleet Carriers*, p.13.

<sup>44</sup> Evans and Peattie, *Kaigun*, p.180.

<sup>45</sup> Jentschura, Jung, and Mickel, *Warships of the Imperial Japanese Navy, 1869-1945*, p.41.

<sup>46</sup> Ikuhiko Hata and Yasuho Izawa, *Japanese Naval Aces and Fighter Units in World War II* (Annapolis: Naval Institute Press, 1989), p.17.

distinction of being the first “built for the purpose” aircraft carrier to be put into service.<sup>47</sup> The *Hāshō* was a small vessel, displacing only 7,470 tons (nearly 3,400 tons less than Britain’s first “designed from the keel up” aircraft carrier, *Hermes*). Being one of the smallest aircraft carriers ever to be built, the *Hāshō* had a very modest aircraft complement. Nominally the ship could carry twenty-six planes, although in practice the *Hāshō* seldom operated with more than fifteen.<sup>48</sup> The conventional armament of the *Hāshō* consisted of four 5.51-inch low angle guns.<sup>49</sup> Two sets of Parsons geared turbines and eight *kampon* boilers gave *Hāshō* a shaft horsepower of 30,000 units for a speed of 25 knots.<sup>50</sup> Exhaust from the engines was directed out of the ship through a trio of hinged funnels on the starboard side of the flight deck; the funnels were lowered during flight operations. *Hāshō* had a “through-deck design” and Sperry gyro-stabilization.<sup>51</sup> The flight deck did not run the full length of the 540-foot hull, but was only 519-feet long and 74.5-foot wide (38,665 square feet).<sup>52</sup> *Hāshō* was given two elevators for handling aircraft.

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<sup>47</sup> Jentschura, Jung and Mickel, *Warships of the Imperial Japanese Navy*, p.41-42. Note that *Hermes* was the first built-for-the-purpose aircraft carrier begun, but postwar construction delays in Britain allowed the Japanese to complete *Hāshō* before *Hermes*.

<sup>48</sup> Humble, *United States Fleet Carriers*, p.29 In spite of her small size, *Hāshō*’s aircraft complement of twenty-six planes meant that she carried more planes for her size than any other carrier produced by Japan.

<sup>49</sup> Jentschura, Jung and Mickel in *Warships of the Imperial Japanese Navy* claim that these guns were 40-caliber guns (p.40), but the only 5.51-inch/40 gun was the 11<sup>th</sup> Year Type of 1922 which was only used on certain I-class submarines. According to Campbell in *Naval Weapons of World War II* (p.190-91), the guns on *Hāshō* were actually the 5.51-inch/50-caliber guns of the 3<sup>rd</sup> Year Type (1914) having a farther range (21,600 yards) and a higher muzzle velocity (~2800f/s). Both guns fired an 83-pound projectile.

<sup>50</sup> The term *kampon* is an abbreviation of *Kansei Honbu*, or Technical Department (of the Imperial Navy). The type of boiler equipment this term is applied to was designed or approved by the Navy’s Technical Department.

<sup>51</sup> Jentschura, Jung and Mickel, *Warships of the Imperial Japanese Navy*, p.41.

<sup>52</sup> *Ibid.* p.40.

The influence of Great Britain can also be seen clearly in the Japanese design of the *Hāshō*. Cognizant of how the debate over island structures had been progressing in England, the Japanese built *Hāshō* with a small island structure. *Hāshō* was also built with a flight deck that sloped downward fore and aft, an obvious clue to the Japanese reliance on British experience, as this was a feature common to all British carriers.<sup>53</sup> The purpose of such an arrangement had been to aid aircraft in attaining the best posture for taking off (with the tail raised) and to use gravity to assist in gaining speed. Shortly after commissioning, however, the flight deck was made level as the sloped configuration was not particularly helpful for the newer aircraft.<sup>54</sup> Another indication of the British influence on Japanese carrier operations was the method for handling returning aircraft. The British were not consistent in their employment of arresting gear until the mid-1930s, when faster aircraft made such equipment essential. It was standard practice on British carriers to stow each plane below before allowing another plane to land, and the Japanese adopted this practice. The Japanese did not employ barriers, so it was important to keep the flight deck clear during landings. The Americans, in the interest of speeding flight operations, normally parked aircraft on the forward section of the flight deck after they landed. Thus arresting gear was always employed along with a barrier net (in case the arresting wires failed) in order to protect parked planes from the incoming aircraft.<sup>55</sup> This

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<sup>53</sup> Humble. *United States Fleet Carriers*, p.29.

<sup>54</sup> Roger Chesnau. *Aircraft Carriers of the World, 1914 to the Present: An Illustrated Encyclopedia*. (London: Arms and Armour Press, 1984), p.158.

<sup>55</sup> Chesnau. *Aircraft Carriers of the World*, p.23.

doctrinal difference between the Japanese and American carrier crews would make a significant difference in the battles of the Pacific War.

One aspect of *Hāshō* that was not copied from the British was the lighted mirror system for landing aircraft. Although it was not utilized in later Japanese carriers, this type of system would become a necessity with the advent of the Jet Age. Only when a plane was lined up properly for a landing would the image displayed by the mirrors look complete. This eliminated the role of the deck landing control officer (or “batsman”), who would hold out flags as an aircraft approached and mimic the attitude of the plane for the pilot’s reference. The batsman was employed throughout World War II, but as aircraft became faster, there was less time for such a relay of information.<sup>56</sup> The Japanese never adopted the deck landing control officer used by the British and Americans, but instead relied on a simple, yet challenging, system whereby Japanese pilots relied on their own judgement. The only assistance for Japanese pilots was a row of lights down the flight deck and a jet of steam at the forward end to indicate the wind direction. For launching aircraft, the air operations officer would raise a white flag from the bridge and the planes would commence taking off at twenty second intervals. On American and British carriers the batsman had a counterpart on the flight deck to signal each take off.<sup>57</sup>

One of the principal expectations held by the Japanese Navy for the emerging field of naval aviation was that it would provide greater reconnaissance capabilities for the fleet. It had been realized that the technology of naval warfare was in many ways surpassing the

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<sup>56</sup> Humble, *United States Fleet Carriers*, p.136.

<sup>57</sup> Preston, *Aircraft Carriers*, p.53.

abilities of the commanders. Warship speeds and gunnery ranges had reduced the amount of time naval commanders had to react to encounters with the enemy, and the advantage would go to the side that first detected its foe. Although many officers at that time did not believe that aircraft of the day could ever jeopardize a battleship directly, it was hoped that an eye in the sky might affect the outcome of a battle. It was expected that the *Hāshō* would be able to fill this role for the fleet.

As the *Hāshō* was nearing completion, one of Japan's fledgling aircraft manufacturers, Mitsubishi, was contracted by the navy to design, develop and produce three different types of aircraft for use on the *Hāshō*. This was a great opportunity for Mitsubishi, and the company was even more fortunate in obtaining the services of a British design team which helped produce a fighter plane, a reconnaissance plane, and an attack plane for the Japanese Navy.<sup>58</sup> The Mitsubishi Type 10 carrier fighter was the first domestically produced fighter used by the Imperial Navy, officially entering service in 1921.<sup>59</sup> On 22 February 1923, two months after the *Hāshō* was commissioned, the first landing aboard the *Hāshō* was made by a British test pilot working for Mitsubishi. On 16 March, the second landing aboard was made by Lieutenant Kara Shunichi, and so began a twenty-three-year career for the *Hāshō*.<sup>60</sup> The completion of the *Hāshō* signaled new possibilities for the Japanese fleet, but it also marked the beginning of a carrier building competition that would span two decades.

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<sup>58</sup> Evans and Peattie, *Kaigun*, p.302.

<sup>59</sup> Hata and Izawa, *Japanese Naval Aces*, p.3.

<sup>60</sup> Polmar, *Aircraft Carriers*, p.37.

### American Carrier Development

The United States Navy began expressing an interest in building an aircraft carrier about the same time that the Imperial Japanese Navy had made plans for its own carrier. The concept of basing fighters on surface combatants had been abandoned, primarily because a seaplane's floats reduced the speed and maneuverability of the aircraft, making it unsuitable for some combat missions. When the United States Navy had begun to experiment with steam catapult systems in 1912, it all but abandoned efforts to use wheeled aircraft with ships. By the end of the war, the Navy General Board, which included the president of the Naval War College, was sold on the idea of aircraft carriers. Lacking any practical experience with such matters, the U.S. Navy turned to the Royal Navy for technical advice. During the last year of World War I the United States enjoyed very cordial relations with Great Britain. During a lengthy visit by the British Naval Director, Stanley Goodall, the American Bureau of Construction and Repair was given full details and plans of the *Hermes*.<sup>61</sup> The British were also obliging when the American Director of Naval Aviation asked for suggestions on a prototype aircraft carrier. These plans incorporated all of the misconceptions about aircraft carriers still held at that point.<sup>62</sup>

At the close of the decade, the role of the aircraft carrier was still to be determined. Although the British had created the separate ship category "aircraft carrier," they did not have an appreciation of the true potential of that type of ship or the aircraft that it carried.

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<sup>61</sup> Ibid. p.14.

<sup>62</sup> Humble, *United States Fleet Carriers*, p.14.



At that time the ideal British carrier design incorporated many cruiser features, which can be seen in the style of the hull. In most cases the British ships carried a full complement of cruiser-sized guns, and, in the case of the *Furious*, a gun suitable for a battleship. In the British experience, a carrier was likely to push deep into enemy waters in order to launch a strike, and thus would probably encounter opposing cruisers. Goodall suggested to the Americans that guns of at least six inches were preferable, with one or two lighter caliber guns included for defense against aircraft.<sup>63</sup>

The United States Navy took the British advice about aircraft carriers into consideration in the plans for their first project. For the fiscal year program in 1919 the Navy General Board requested a carrier that could make 35 knots and would carry 24 fighters and six bombers. The proposed vessel would also act as an aircraft depot ship for 15 light reconnaissance aircraft that would be based on battlecruisers. In keeping with British philosophy, armament was to include four 8-inch, six 6-inch and four 4-inch guns, as well as a twin torpedo tube on each beam.<sup>64</sup> This proposal was handed over to the Preliminary Design Bureau and by rough estimates it was calculated that such a ship, based on an existing battlecruiser design, would displace over 29,000 tons.

All plans and wargaming aside, the United States Navy had as much difficulty obtaining money as any other navy in the world. In fiscal years 1920 and 1921 Congress refused to authorize any carrier construction because the navy was still working through the large

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<sup>63</sup> Ibid. p.14-5.

<sup>64</sup> Norman Friedman, *U.S. Aircraft Carriers: An Illustrated Design History* (Annapolis: Naval Institute Press, 1983), p.35.

wartime building for capital ships.<sup>65</sup> Instead of the large carriers proposed by the General Board, Congress authorized the conversion of a fleet auxiliary. The ship selected was the *Jupiter*, a slow collier that had holds and hatches suitable for storing aircraft and hoists already in place. Although in no way a warship, with Japan's first carrier already under construction, the U.S. Navy at least had something to start working with.

The *Jupiter* did have some merit as a candidate for conversion. She was the U.S. Navy's prototype turbo-electric ship. Unlike standard geared turbine equipment, the *Jupiter's* turbo-generators were placed in large, centerline compartments with the boilers along either side. This equipment was more compact and compartmentalized than conventional power plants. An additional benefit was that this equipment enabled the *Jupiter* to run astern at full power.<sup>66</sup> The *Jupiter* entered Norfolk for conversion in March 1920 and emerged two years later as the aircraft carrier *Langley*.

As an aircraft carrier, *Langley* proved to be a valuable test ship for the United States Navy. The original six cargo holds were retained and four of them were used for aircraft stowage. The *Langley* could store as many as 55 disassembled aircraft in the cargo holds (the largest number ever embarked up to that time).<sup>67</sup> Assembled planes had to remain up on the flight deck, since there was no true hangar space. Disassembled planes had to be put together on the former collier's upper deck and then loaded onto the eight-foot high elevator and hoisted to the flight deck. A former *Langley* pilot recalled that it took about twelve minutes to get an airplane off the elevator and onto the main deck for

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<sup>65</sup> Ibid.

<sup>66</sup> Ibid. p.35-36.

<sup>67</sup> Humble, *United States Fleet Carriers*, p.32.

disassembly.<sup>68</sup> A 94-foot long catapult was installed in the flight deck that was capable of launching a 6,000-pound aircraft at 55 knots. Within a few years the *Langley* received a second such catapult.<sup>69</sup> Unlike the original carrier designs proposed by the General Board, the *Langley*'s armament consisted of only four 5-inch guns.<sup>70</sup> Smoke disposal proved a problem on the *Langley*. The flight deck was raised high above the main deck, and the main deck, lacking siding, was mostly open air. A single hinged funnel was fitted on the port side, and there was an alternate opening on the starboard side, below the level of the flight deck. This arrangement was found to be unsatisfactory and within a short time the *Langley* had been refitted with a pair of hinged funnels on the portside.

The *Langley* was never more than an experimental ship, and was the only carrier of the 1920's that never participated in combat. Her engines, though innovative, were small: three boilers plus an auxiliary enabled the electric turbines to generate a mere 7,000 units of shaft horsepower – only enough for the ship to make 15 knots.<sup>71</sup> The *Langley* had features that seemed to betray influences from British and Japanese carriers. The *Langley* was only the second ship after the *Argus* to have a flush flight deck, and the hinged funnels along the side were suggestive of the *Hōshō*. There were also features that were of distinctive American design. The flight deck extended nearly the entire length of the ship and was wide, flat and rectangular, affording the maximum deck area. The radio masts were not lowered outboard as in British and Japanese examples, but telescoped downward

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<sup>68</sup> Friedman, *U.S. Aircraft Carriers*, p.36 The "main deck" of the *Langley* was the original collier's main deck, while the flight deck was built over the main deck.

<sup>69</sup> Ibid.

<sup>70</sup> Polmar, *Aircraft Carriers*, p.731.

<sup>71</sup> Ibid.

to clear the flight deck. The *Langley* also came equipped with a pigeon coop on the fantail for carrier pigeons.<sup>72</sup>

### Conclusion

The United States had been home to the first successful aviators at the turn of the century, yet by the time the Imperial Japanese Navy began exploring naval aviation, the United States Navy had not made any appreciable progress in that field. As a result, the Japanese and Americans started the naval aviation race on an equal footing. Both countries completed their first true aircraft carrier projects after World War I, and both carriers proved to be useful test ships for that emerging class of vessels. Aside from the outward similarities, there were remarkable differences in the functional aspects of the two ships. The *Hōshō* was slightly longer than the *Langley*, but the American ship displaced over 3,000 tons more than the *Hōshō*. This was due to a common difference between the sleek Japanese hull forms and the American hulls: the *Langley* was more than ten percent wider at the beam than her Japanese counterpart. In addition, the *Langley* was nearly twice as deep. The *Hōshō* had more powerful equipment than the *Langley*, and was able to make 25 knots as opposed to the *Langley*'s 15 knots. For what the American ship lacked in speed, it made up for in aircraft complement. Again, it must be understood that the very high capacity of the *Langley* was due to the particular deep-hold arrangement of the ship, as well as the American practice of leaving the assembled aircraft up on deck.

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<sup>72</sup> Friedman, *U.S. Aircraft Carriers*, p.36.

There had been a great deal of British influence in the design of the *Hāshō*, and there might have been more of British influence on the American ship had it not been for a fiscally conservative Congress. As it was, the United States Navy was left to experiment with a ship that was uniquely American. In a nominal way, both the Imperial Navy and the United States Navy enjoyed parity in aircraft carriers in 1922. Even at that early stage of development, however, there had already arisen significant design and doctrinal differences between the American and Japanese carriers that would have profound implications in future decades. These differences were not realized at the time, as both ships were experimental and the role of carriers and carrier planes had not yet been fully determined.

## CHAPTER 2

### THE EARLY TREATY ERA (1922-1930)

The influence of British naval aviation on Japanese carrier development remained evident during the years after World War I, but a much stronger influence began to affect Japanese design and construction of this new type of warship. World War I had brought many changes to the world, including a dramatic shift in the balance of power in Asia. Due to their recent gains at the expense of Germany, the Japanese had become the strongest military presence in the Far East, a fact that caused concern among the other powers, not least of all Great Britain and the United States.

The enthusiasm with which the Japanese conducted their operations during the First World War had aroused some suspicion and ire among the British and Americans. Although technically the Japanese were responding to their obligation under the Anglo-Japanese Alliance, they helped more than the British had really desired, in particular in the capture of German-held areas in China as well as German-held islands in the Pacific. The "Twenty-One Demands" made on the Chinese government in 1915 and the manner in which the Japanese military participated in the Siberian Expedition caused the other powers to consider the Japanese as opportunistic and aggressive.

Japanese rapacity during the war was not the only troubling postwar issue. In the years following World War I, the naval construction programs of Japan, Britain and the

United States threatened to set off an expensive and dangerous arms race.<sup>73</sup> Before the war the size of the United States Navy had been relatively modest. The Wilson administration sought to expand the American battle fleet nearly four-fold. Although Wilson's term ended before he could see the program come to fruition, it nevertheless caused great alarm among the Japanese and British. Wilson's successor, Warren Harding, recognized that a naval arms race would not benefit any of the powers, and he actively promoted the idea of an international agreement on arms limitation.

The Japanese were particularly concerned by the American building program. The Japanese had spent the previous decade working toward the minimum level of strength believed necessary for national security, using a formula devised by one of the Imperial Navy's most respected theorists, Lieutenant Commander Satō Tetsutarō. These beliefs had been promulgated in the years before World War I and continued to be the basis for Japanese naval doctrine over the following decades. The ideas of Satō had come to be accepted as absolute wisdom in the Imperial Navy. Included in Satō's doctrine was the goal of creating the "eight-eight" battle fleet, which was to be built around eight modern battleships and eight battlecruisers. Satō also devised the 70 percent ratio, the relative strength Japan had to maintain in comparison with its hypothetical enemy, the United States Navy, as the minimum strength necessary to defend Japan. It was realized by some members of the Imperial Japanese Navy that if the United States ever did undertake a massive building program, Japan would have no way of maintaining that minimum strength. Thus, the invitation issued by the Harding administration provoked a serious

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<sup>73</sup> Evans and Peattie. *Kaigun*, p.191.

split in the Imperial Navy between those proponents of arms limitation and those who favored a naval expansion program.

### The Washington Conference

There were two schools of thought that emerged in the Imperial Navy over the idea of naval arms limitation. One school, led by Navy Minister Admiral Katō Tomosaburō, argued that Japan would be unable to win an arms race against the United States. In the face of a massive expansion program by the United States the “eight-eight” fleet would be useless and the 70 percent ratio would be unattainable. It was best, they argued, that Japan work with the other powers to formulate an arms limitation agreement. The opposing school was led by the president of the Naval Staff College, Vice Admiral Katō Kanji (who was not related to Katō Tomosaburō). Opponents of naval arms limitation argued that even if the United States capped its expansion, in the event of war, given the country’s industrial might, America would be able to build as many warships as it needed. Japan, on the other hand, needed to build as much as it could before the inevitable conflict with the United States occurred. The Japanese decided to accept the invitation to attend the arms limitation conference and appointed Admiral Katō Tomosaburō to head the delegation, with his outspoken rival Katō Kanji as his assistant.

The Washington Treaty of 1922 is considered by some to be one of the most successful arms limitation treaties of all time. In addition to the Japanese delegation, there were representatives from Great Britain (and the Commonwealth countries), France and Italy. Although the main target of the treaty was the battleship, the Washington Conference also



had a profound influence on the post-1920's development of the aircraft carrier.<sup>74</sup> The Washington Treaty contained a number of articles that dealt specifically with aircraft carriers and together they offered the first official definition for that category of warship. Article VII of the Washington Treaty specified the aggregate tonnage to which each of the contracting powers would be limited. These totals followed the same ratio that was laid out for capital ships: Great Britain and the United States were each allowed 135,000 tons, Japan was permitted 81,000 tons, and Italy and France could each build up to 60,000 tons. Article IX of the treaty set the effective limits on aircraft carrier size at 27,000 tons standard displacement (carriers under 10,000 tons were exempt from the treaty). The article also provided that each signatory was permitted to take any two vessels, either built or under construction, and convert these into carriers with a maximum allowable tonnage of 33,000 tons (provided that the total tonnage limit for the country was not exceeded). Article X of the agreement limited the size and number of guns that could be carried by any carrier to a maximum size of eight inches and a maximum quantity of ten guns above six inches (there were no limitations placed on guns of less than five inches). Although not one of the primary provisions relating to aircraft carriers, Article XIV of the treaty forbade preparations for the purpose of converting merchant ships into vessels of war. The stiffening of decks for the purpose of mounting guns of not more than a six-inch bore was an exception to Article XIV.

The Japanese delegation came very close to breaking up over the proposed terms of the Washington Treaty. Only skillful maneuvering enabled Katō Tomosaburō to maintain

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<sup>74</sup> Humble, *United States Fleet Carriers*, p.26.

the support of the High Command for his handling of the mission. Although Katō Kanji failed to disrupt the proceedings, upon his return to Japan he agitated quite successfully against the whole treaty situation. Katō Tomosaburō had been urged by his colleagues to push for the 70 percent ratio deemed so vital to Japanese national security. Katō was willing to compromise on that point, however, accepting a 60 percent ratio in exchange for the assurance that the signatories would agree not to fortify their holdings in the Pacific and the Far East. The ranking Katō was able to gain this proviso and it was outlined in Article XIX of the treaty.

The Washington Treaty considered those aircraft carriers already built or under construction by the time of the conference as experimental in nature and did not judge them counting toward the total tonnage permitted. *Hōshō* was exempt, as was *Langley* for the United States. The British had at that time *Furious* and *Argus* completed, while *Eagle* and *Hermes* were still under construction. Each power was also given a list of battleships and battlecruisers that it would be allowed to keep. In order to bring more bargaining chips to the conference, the Japanese Navy had started a number of projects just in advance of the meeting. Two battlecruisers, *Akagi* and *Amagi* had their keels laid in December 1920, while two battleships were launched and two other battlecruiser keels were laid during the conference.<sup>75</sup>

With so many large projects on the blocks, the Imperial Navy decided to exercise its right under Article IX of the treaty and retain the hulls of the battlecruisers *Amagi* and *Akagi* for conversion into aircraft carriers. The United States Navy also had a number of

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<sup>75</sup> Jentschura, Jung, and Mickel, *Warships of the Imperial Japanese Navy*, p.35-36.

projects in the works and the Americans decided that they would also keep two battlecruiser hulls for conversion. With *Argus* in service, *Hermes* and *Eagle* nearing completion and *Furious* scheduled for conversion to a flush-decked carrier, the British chose not to keep any hulls scrapped under the treaty.<sup>76</sup>

### The Battlecruisers

The Washington Treaty caused the Japanese and the Americans to pursue a parallel course in carrier design over the next decade. The battlecruiser hulls provided both navies with an opportunity to develop a large carrier, in contrast to the small vessels that each had just completed. The *Amagi*-type battlecruisers were intended to be 40,000 ton vessels with ten 16-inch guns and over two dozen smaller weapons. It was planned that these 826-foot long ships would be able to make 30 knots and have the capability to burn both oil and coal. By the time of the Washington Conference, the *Amagi* and the *Akagi* were roughly 40 percent completed and therefore were suitable candidates for conversion.<sup>77</sup>

The following year a great disaster befell the people of Tokyo and the entire country was strained as a result. On the first day of September 1923, just after noon, the entire Kantō region around Tokyo was hit by one of the worst earthquakes in Japanese history. The earthquake was followed by a major conflagration that turned Tokyo into an inferno, with thousands of people seeking to flee the fires that raged over the next two days.

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<sup>76</sup> Humble, *United States Fleet Carriers*, p.20.

<sup>77</sup> Jentschura, Jung and Mickel, *Warships of the Imperial Japanese Navy*, p.36.

Landslides and tidal waves added to the destruction. There were more than 106,000 people killed and another 502,000 casualties. Property damage was estimated to be ¥10,000,000,000.<sup>78</sup> Japanese heavy industry, as dependent on military procurement as it was, had already been dealt a heavy blow by the Washington Conference. The earthquake brought economic activity in that region to a virtual halt, and for years after people dated major personal events in relation to the disaster. One particular result of this calamity was the damage to the hull of the *Amagi*, which was still on stocks at the Yokosuka Navy Yard. With the hull damaged beyond repair, it became necessary to select another from among those ships to be disposed of. In November 1923 the hull of the battleship *Kaga* was selected to replace the *Amagi* and was therefore spared the inglorious fate of becoming a target hulk.<sup>79</sup>

The battleship *Kaga* was one of two ships ordered under the 1918 Program as an improved version of the *Nagato*-class battleships. The two ships were to displace 38,500 tons and be able to make 26.5 knots. They were going to be armed with ten 16-inch guns, twenty 5.5-inch guns, four 3.1-inch guns and eight 24-inch torpedo launchers. The *Kaga* had been launched on 17 November 1921, five days into the Washington Conference. The *Kaga*'s sister-ship *Tosa* was launched one month later. In accordance with the treaty, building on the *Kaga* ceased on 5 February 1922.

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<sup>78</sup> Hane, *Modern Japan*, p.231.

<sup>79</sup> Polmar, *Aircraft Carriers*, p.67.

In November of the following year work resumed on the *Kaga*, while sister-ship *Tosa* was used for gunnery practice.<sup>80</sup>

When the completed *Kaga* emerged from Yokosuka Dockyard on 31 March 1926, she was 770-feet long, 97-feet at the beam and displaced 26,000 tons. The *Kaga*'s four shafts were powered by four sets of Brown-Curtiss geared turbines and twelve *kampon* boilers, giving a shaft horsepower yield of 91,000 units and a speed of just over 28 knots. The *Kaga*'s exhaust was vented through a huge, trunked funnel that ran along the starboard side of the ship, just below the flight deck. Having the funnel angled over the side was a common design element in Japanese aircraft carriers and it was repeated in almost every carrier to follow. The *Kaga*'s battleship hull had 11-inch belt armor that was inclined fifteen degrees and armor that was from 9 to 11 inches thick on the bulkheads. The hull also had armored casemates for the guns, and the main armament consisted of ten 8-inch guns mounted singly along the sides of the hull, similar to early British battleships. For defense against aircraft the *Kaga* was equipped with a dozen 4.7-inch high-angle guns which were mounted on platforms around the edge of the flight deck (resembling flying buttresses), as well as two light machine guns.<sup>81</sup>

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<sup>80</sup> Jentschura, Jung and Mickel, *Warships of the Imperial Japanese Navy*, p.35. *Tosa* would provide the Japanese Navy with valuable ballistics data before being sunk in the Bungo Straits in 1925 (Evans and Peattie, *Kaigun*, p.263).

<sup>81</sup> Jentschura, Jung and Mickel, *Warships of the Imperial Japanese Navy*, p.42. Campbell notes that the 8-inch guns were actually 7.874-inch/50-caliber (Model I) guns of the 3<sup>rd</sup> Year Type (1914). At that time the guns were only mounted on *Kaga* and *Akagi*. They could fire a 242.5-pound projectile with a muzzle velocity of 2845f/s and achieve a maximum range of 24,700 yards. The 4.724-inch/45-caliber 10<sup>th</sup> Year Type (1921) high angle guns were used in twin mountings and had electrically powered oil-hydraulic gear for elevating and training from +75 degrees to -10 degrees. Ammunition supply was done by dredger hoists, while loading and fuze setting was done by hand. These guns could fire a 45-pound projectile with a muzzle velocity of over 2700f/s to a range of 17,500 yards. Rate of fire was 10-11 rounds per minute. The light machine guns were most likely .50-caliber Vickers or .303-caliber Lewis or Vickers water-cooled. (Campbell, *Naval Weapons of World War II*, p.187,194,202).

The *Kaga* was true to the British example, emerging from the yards with striking similarity to *Furious*. The *Kaga* was given not only a flush deck with no island structure, but also had two flying-off decks at the bow, one above and behind the other. The *Kaga*'s primary flight deck measured 562-feet by 100-feet, giving the carrier a deck area of 56,200 square feet. The manner in which the anti-aircraft armament was mounted on buttress-like platforms was also reminiscent of the *Furious*.<sup>82</sup> As an aircraft carrier the *Kaga* could make 28.5 knots and steam for 8,000 miles on oil and coal. The most important aspect was the 60-plane aircraft complement, which was four times the number normally operated by the *Hōshō*.

When *Kaga* joined the fleet, the Americans were quite interested to know how the Japanese would integrate her with the fleet. Both navies monitored the other's radio signal traffic in order to learn about fleet composition and movements. One American officer, Lieutenant Commander Ellis Zacharias, was stationed at the U.S. Consulate General in Shanghai. Zacharias noted a sudden increase in Japanese radio traffic and concluded that they were preparing for some large fleet exercise. Zacharias notified his superiors in Washington, who were aware that the *Kaga* had just joined the fleet. Zacharias was duly ordered to take his equipment and join the crew of the cruiser *Marblehead*, a ship in the U.S. Asiatic Fleet. The *Marblehead* was due to pay a courtesy call at Kobe and sailed through the area of the Japanese fleet exercises. Most signals

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<sup>82</sup> Humble, *Aircraft Carriers*, p.37.

intelligence was gathered from strategically placed intercept stations, but whenever an opportunity arose to get closer it was exploited.<sup>83</sup>

Japan continued to honor international obligations, although for many in the Japanese Navy the treaty was observed grudgingly. All efforts were made to build the Japanese fleet up to the maximum limits provided for in the Washington Treaty. On 17 November 1923, two days before the *Kaga* was launched at the Kawasaki Dockyards in Kobe, work had resumed on the hull of the *Akagi* at the Kure Naval Yard. The *Akagi* was launched on 22 April 1925 and was completed on 25 March 1927. Since the *Akagi* was originally designed as a battlecruiser, she had a longer but narrower hull than the *Kaga*. When she left Kure, the *Akagi* displaced 26,900 tons, slightly heavier than the *Kaga*. This added weight was due to ballast that was added to increase her stability. The *Akagi* also had more machinery: four sets of Bihon geared turbines and nineteen *kampon* boilers drove her four shafts with 131,200 units of shaft horsepower. This power, coupled with a sleeker hull form, enabled the *Akagi* to make 31 knots. The *Akagi* was given the same triple flight deck arrangement that had been installed on the *Kaga*. The *Akagi*'s main flight deck measured 624-feet by 100-feet, giving her an area of 62,400 square feet.<sup>84</sup>

As with the *Kaga*, the *Akagi* retained the armor that had been installed on her battlecruiser hull. The belt armor was 10 inches thick and the bulkhead armor was between 9 and 11 inches thick. The *Akagi*'s armament included ten 8-inch guns, twelve

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<sup>83</sup> Evans and Peattie. *Kaigun*. p.418.

<sup>84</sup> Jentschura, Jung and Mickel. *Warships of the Imperial Japanese Navy*. p.44.

4.7-inch guns and twenty-two light machine guns.<sup>85</sup> The increasing number of small caliber weapons for anti-aircraft defense was indicative of the gradual increase in appreciation for naval air power. The *Akagi* also had a large exhaust funnel off the starboard side, though it was shorter and did not extend halfway down the length of the ship as did the funnel of the *Kaga*.

By the time the *Akagi* entered service, Japan enjoyed a brief period of carrier superiority over her principal foe, the United States. The *Kaga* had since joined with the *Hōshō* in forming Carrier Division One, and the formation of that unit meant a new era for Japanese naval air power. No longer merely scouts or a curious tag-alongs, the ships of Carrier Division One could put dozens of aircraft into the air and presented the fleet with new possibilities.

#### The Sempill Air Mission

It had been expected by many in Japan that the effect of the Washington Treaty would be to greatly weaken the Imperial Navy. With a degree of resignation to this fact, it was determined that the Japanese Navy must seek strength by developing vessel types that were outside of treaty limitations and by building air strength. Although the navy submitted annual requests for budgetary allocations, the country continued to scrap or modify vessels in accordance with the treaty. The Kantō earthquake placed additional hardship on the nation and, subsequently, the long-term naval building plans that

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<sup>85</sup> Ibid. The weapons carried by *Akagi* were the same models as those carried by *Kaga*; see footnote number 81 for specific details concerning these weapons.



extended from 1911 to 1927 were repeatedly reduced and postponed for financial reasons, and rarely got past the planning stage.<sup>86</sup>

Although the air program was sharing the same financial difficulties that plagued the other naval projects, there was a great boost to the effort that started in 1921. After the Japanese Navy had sent a representative to observe operations on the *Furious* in 1920, it was concluded that the British were still leading in the development of naval aviation. As a result, the Japanese government requested that the Royal Naval Air Service send a team to Japan to help provide a professional edge to the Japanese Naval Air Service. The British were most obliging and sent a team led by Sir William Francis-Forbes Sempill.<sup>87</sup>

The Sempill Mission arrived at Kasumigaura in 1921, and was composed of 27 men with experience in naval aviation, including pilots and engineers from several British aircraft manufacturers. Training was offered in the latest technology used in torpedoes, bombs, machine guns, cameras and communications gear. In addition, over 100 aircraft, comprising 20 different models, were brought to Japan. Study of these aircraft provided great knowledge and inspiration to Japanese aircraft designers.<sup>88</sup> The Sempill Mission was by no means the first contact the Japanese had had with foreign firms; engines and fuselages had been built in Japan under license for several years. The mission did, however, provide the Japanese with a good understanding of the latest technology available at that time.

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<sup>86</sup> Burdick and Detwiler, *War in Asia and the Pacific, volume 4, part I, monograph 145*, p.1.

<sup>87</sup> Evans and Peattie, *Kaigun*, p.181.

<sup>88</sup> *Ibid.* p.301.

Although Japanese relations with the Royal Navy were proving to be quite beneficial, there were still many agitators in the Navy who did not agree with the cooperative spirit fostered by the “treaty faction.” Katō Tomosaburō had made great efforts to promote improved relations, especially with the United States, as the best means of avoiding war. He desired to have this sentiment incorporated into the revision of the Imperial Defense Policy drafted in 1922, but such was the influence and persistence of Katō Kanji and his supporters that the opposite happened. When approved in 1923, the Imperial Defense Policy reaffirmed the United States as the most likely hypothetical enemy for the nation. In the latest version of the policy, the army allowed the selection of the United States but insisted on inserting a clause considering the possibility of war against two or more foes at once. While the 1907 policy targeted the United States for budgetary reasons, bitterness dictated the selection of America in the 1923 policy.<sup>89</sup> The policy of 1923 was an acknowledgement of the inevitable conflict with the United States that Katō Kanji and the members of the “Fleet Faction” believed would occur. Katō Tomosaburō died shortly afterward, before he could counter the damage that had been done.

### The American Battlecruisers

Japan’s marked edge over the United States was short-lived, however, as the American counterparts to the *Kaga* and the *Akagi* were nearing completion. The United States completed the carrier *Lexington* seven months after the *Akagi* was commissioned. One year later the carrier *Saratoga* was completed as well. Both ships, like the *Akagi*, had

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<sup>89</sup> Evans and Peattie, *Kaigun*, p.201.

been converted from battlecruiser hulls. Unlike the *Kaga* and the *Akagi*, the *Lexington* and the *Saratoga* were perfectly matched. Both ships displaced 33,000 tons, taking full advantage of treaty allowances. The machinery of these vessels was the most powerful to be installed on a warship up to that time, and it was all controlled, so far as the main engines were concerned, from a central location. Each ship had eight propelling motors of 22,500 horsepower (two for each of the four shafts) that could make 317 revolutions per minute. These motors were General Electric turbines, and in the *Lexington* they were supported by sixteen Yarrow boilers, while the *Saratoga* was fitted with sixteen White-Forster boilers. The designed shaft-horsepower output was 180,000 units, although once the *Saratoga* generated 210,000 units for one hour while making 34.5 knots.<sup>90</sup>

The debate over island structures did not have an effect on the American designers, as evidenced by the *Lexington* and the *Saratoga*. The most dominating feature of these ships were their smoke stacks, which were nearly 80-feet tall and almost as wide. This may be due to the fact that the original battlecruiser design had seven funnels, placed in close proximity.<sup>91</sup> Leftover from the original battlecruiser hull was the armor and torpedo protection consisting of 6-inch belt armor, triple hulls and torpedo bulges. The American ships incorporated an important element in these two vessels and those that would follow by armoring the flight deck. Approximately 3-inches of armor reinforced the flight deck, while the decks on Japanese carriers were of planking. The flight deck was 880 feet long

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<sup>90</sup> *Jane's Fighting Ships of World War II*, p.268.

<sup>91</sup> *Ibid.*

and at least 85 feet wide (74,800 square feet), and there was a catapult at the bow sufficient for launching the heaviest aircraft at flying speed in 60 feet.<sup>92</sup>

The Americans did follow the same British theories about armament that the Japanese had adhered to. Both ships were armed with eight 8-inch, 55-caliber guns, twelve 5-inch, 25-caliber anti-aircraft guns, and four 6-pounder saluting guns.<sup>93</sup> The 8-inch guns were placed in twin mountings, with two pair located forward of the superstructure-island and the other two placed aft of the large smoke stack. The placement of the 8-inch guns was one of the few serious flaws in the design of the *Lexington* and the *Saratoga*. It was realized some time after completion that if the guns were ever fired at a target off the port beam the muzzle blast would blow everything off the flight deck. Worse still, the blast could conceivably ignite volatile aviation gas fumes and ammunition, turning the whole ship into an inferno. Equipment and stowage for these guns also occupied space, costing aircraft capacity. The 8-inch guns had been included in the design because the aircraft carriers' role with the fleet was still not clearly defined and the tactical considerations of naval air operations were not yet understood. Ironically, although the Japanese and

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<sup>92</sup> Ibid.

<sup>93</sup> Ibid. Campbell notes that the 8-inch guns were Mark 9/2 models, which were in twin mounts. They could each fire a 260-pound projectile with a muzzle velocity of 2800f/s out to a range of 31,860 yards. Campbell also says that these were 55-caliber guns, while *Jane's* records them as being 50-caliber. The 5-inch, 25-caliber guns were capable of firing a 53.85-pound projectile with a muzzle velocity of 2110f/s out to a range of 14,500 yards. "Instead of being designed for the highest practicable muzzle velocity, they had one adequate for the AA role in the 1920s combined with the lowest possible moment of inertia to allow high training and elevation speeds in a hand-worked mounting." (Campbell, *Naval Weapons of World War II*, p. 137) The 6-pounder guns dated back to the 1890s and early 1900s; they could fire a 6-pound projectile with a muzzle velocity of 2300f/s or less for a maximum range of about 8,000 yards. (Campbell, *Naval Weapons*, p. 147).

Americans were acting on the earlier advice of the British, the *Furious* was not given any guns larger than 4.7-inches.<sup>94</sup>

When the *Lexington* and the *Saratoga* entered service, the United States and Japan were once again at parity in aircraft carrier strength – at least in quantitative terms. There was still a significant difference in the number of aircraft carried by the American ships and the Japanese ships. The new carriers of the United States Navy were putting to sea with up to 50 percent more aircraft than their Japanese counterparts. One reason for this was the difference in aircraft handling methods on American carriers, where planes were often left parked on the flight deck. The chief reason for the different capacities, however, lay in the peculiar arrangement of the *Kaga* and the *Akagi*, with their triple flight deck scheme. The British carrier *Furious* had been given a dual flight deck arrangement with the idea that flight operations would be enhanced. What the British and the Japanese failed to gauge properly was the rate of advance in aircraft development. By the time that the *Kaga* and the *Akagi* entered service, the planes were already becoming faster and heavier than their predecessors of World War I. The lower take-off decks were too short and too close to the waves to be safely used by the newer aircraft. The only operational impact made by the multiple flight deck configuration was that potential hangar space was lost. By the mid-1920s the British Naval Air Service was beginning to stagnate, burdened as it was with reduced funds and organizational difficulties with the Royal Air Force. The lead in carrier development passed to the Americans and the Japanese, and the Japanese almost fell behind by adhering to British doctrine.

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<sup>94</sup> Humble, *Aircraft Carriers*, p.36.

### The Consideration of Non-Restricted Vessels

As the Imperial Japanese Navy and the United States Navy were working on the battlecruiser conversions, planners in both navies began considering how best to use the remaining tonnage allocations permitted by the treaty. The Japanese had relatively little tonnage left after the *Kaga* and the *Akagi* were factored in, so the Japanese planners began considering a vessel that would not be regulated by the treaty restrictions. The idea was to utilize a clause in the Washington Treaty that exempted vessels below 10,000 tons. In the 1927 Program (also called the First Naval Replenishment Program), Japanese planners called for the construction of a light carrier to test the economic and practical feasibility of such a ship.

The Japanese were not alone in considering vessels that fell outside of treaty restrictions, and for that reason another arms limitation conference was held at Geneva in 1927. Unrestricted vessel categories had been one of the more controversial items on the docket, and the Japanese delegation were determined not to allow the lesser warships categories to fall under the same 5:5:3 ratio that had been imposed on Japanese capital ships and carriers. The conference was not successful, however, because the American and British delegations had a heated dispute regarding cruiser limitations. The Washington Agreement had failed to limit cruisers, and the resulting cruiser race had been

alarming. Although the Japanese were willing to consider any proposals regarding cruisers, the Anglo-American dispute ended the conference.<sup>95</sup>

The United States Navy had much more carrier tonnage left to it than the Japanese Navy, so American planners were considering how to use the remaining amount. The plans for the *Lexington* and the *Saratoga* were scarcely finished before American naval planners had set out to design a variety of plans for the next ships. It was recognized that the remaining carrier tonnage could be divided between three to five new ships, and it was finally decided that five ships should be built. The American planners had come to the conclusion that it would be better to disperse aircraft forces to minimize loss.

### The End of an Era

In December 1926 the Taishō Emperor passed away, and as in times before, the passing seemed to herald sweeping changes in the lives of the Japanese people. The Shōwa Emperor, Hirohito, had been acting as regent for the ailing Taishō Emperor for some years. In contrast to the mentally deficient Taishō Emperor, Hirohito was highly educated and of keen mind. He adopted the reign name Shōwa, meaning enlightenment and peace, which would seem a tragic irony in the years to follow. As it happened, the ascendancy of the new emperor occurred just as Japan was on the verge of financial ruin. The Great Kantō Earthquake had caused great economic strain to the nation in 1923, and the effects of the disarmament treaty on heavy industry added to the trouble. When the Great Depression hit late in the 1920s, Japan was badly affected. In particular, the

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<sup>95</sup> Evans and Peattie, *Kaigun*. p.234.

common people of Japan suffered greatly during this time, with some rural families being forced to sell children so that their others might survive.<sup>96</sup>

The 1920s had seemed to be a promising time for democracy and commercial enterprise, yet before the decade was out, a different and darker time was looming. The division between the “Fleet Faction” and the “Treaty Faction” of the Imperial Navy had grown into a full-scale rift upon the death of Katō Tomosaburō. At a time when young military officers were being influenced by nationalistic jingoism and the suffering of the common people, the members of the “Fleet Faction” began to fraternize with the elements of the Japanese Army that favored action over diplomacy. This was a truly ominous development, since it was no longer an Army versus Navy situation, but a case of peace and diplomacy versus arms and conquest. It was in such an atmosphere that plans for the London Conference were being formulated.

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<sup>96</sup> Edwin Hoyt, *Yamamoto: The Man Who Planned Pearl Harbor* (New York: McGraw-Hill Publishing Company, 1990), p.85.



### CHAPTER 3

#### THE LATE TREATY PERIOD (1930-1936)

It had been eight years since the ratification of the Washington Treaty in 1922, and the impact on Japanese naval development had been great. The Washington Treaty had included the first definition of an aircraft carrier, at such an early point in the history of carriers that its proper role with the fleet had yet to be determined. The treaty had forced “big-gun” navies to explore alternatives, one of the most promising being naval aviation. The Japanese and Americans had begun serious exploration of aircraft carriers at about the same time, and the subsequent Washington Treaty kept both countries on a similar path in development. The early Japanese reliance on the British model began to give way to other influences by the mid-1920s, and none too soon since the British were losing their lead in naval aviation. The paramount influences on Japanese carrier development during the treaty period were the particular terms of the treaties, the advancement of naval aircraft, and the demands of the Navy General Staff as they prepared for a war that seemed inevitable.

A war with the West was certainly not inevitable, but the moderates of Japan in the 1930s seemed to lack the strength to stop Japan’s descent into militarism. The late treaty period was characterized by continued adherence to the international treaty limitations, but behind the scenes, the navy’s “Fleet Faction” was preparing for an unrestricted building program, and ultimately for the war that they knew would come.

### The London Conference of 1930

The delegates of the major naval powers once again convened for the purpose of considering further arms limitations in London in 1930. The head of the Japanese delegation was former Prime Minister Wakatsuki Reijirō and the chief naval officer with the delegation was Admiral Sakonji Seizō. The delegation included members from both the “Treaty Faction” and from the “fleet faction.” Admiral Katō Kanji had been asked to join, but he refused rudely, saying that it was his job to fight wars, not prevent them.<sup>97</sup> One rising star of the “Treaty Faction” was Captain Yamamoto Isoroku (no relation to Admiral Yamamoto Gonnohyōe), a junior member of the delegation. During the conference Yamamoto was promoted to Rear Admiral, thus increasing his status at the meeting. Yamamoto proved himself to be an able diplomat, a necessary skill at the London Conference.

There were a number of difficult issues at the London Conference of 1930. The Americans and the British wanted a complete moratorium on battleship construction, but the Japanese did not. The British proposed that submarines should be outlawed, but the Americans and Japanese did not want that. For their part, the Japanese desired at least a 70 percent ratio compared with the Americans and British, if not complete parity. The “Treaty Faction” members would have been perfectly satisfied to keep the 5:5:3 ratio as established by the Washington Treaty, but Yamamoto sought the change nonetheless. When it was clear the Americans and British would not yield on that point, the “Fleet Faction” members jeopardized the entire conference by refusing to withdraw the demand.

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<sup>97</sup> Hoyt, *Yamamoto*, p.86.

They would have been most satisfied if Japan had withdrawn from the whole treaty system. Finally, in a rare intervention, Emperor Hirohito said that it would be unthinkable for the conference to fail. He added that it would bring ignominy upon Japan to have destroyed the alliances and would disgrace the Shōwa era by controverting the contention that it was dedicated to peace and good will.<sup>98</sup> This quelled the “Fleet Faction” and allowed the delegation to secure an agreement, although it was not a particularly favorable one.

Having failed to obtain the desired ratio in battleships, Japanese naval strategists had come to rely heavily on the heavy cruiser. The London Treaty essentially did what the “Fleet Faction” feared most, as Japan accepted a ratio of 5:5:3 for heavy cruisers, which meant that Japan could not build any additional heavy cruisers because the limit had already been reached. Although granted a 70 percent ratio in light cruisers and destroyers, Japan had already surpassed the limit for destroyers and was forced to scrap some existing vessels. Light cruisers were considered by Japanese naval planners of the time to be without any great merit, but they had very much hoped to maintain their current tonnage in submarines. In the submarine category Japanese hopes were again dashed, and the Imperial Navy grudgingly accepted parity with the United States in that class of ships, again being forced to scrap existing vessels. This created smoldering resentment among many naval officers.

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<sup>98</sup> Ibid. p.87-88.

The net results of the London Conference were an extended and more comprehensive arms limitation agreement and a growing Japanese resentment over the unequal ratios and their inability to attain the minimum defense requirements. Admiral Katō Kanji, who was by then chief of the Navy General Staff, was determined that Japan should abrogate all limitation treaties by the time of their expiration in 1936. In the meantime, preparations were to be made for the anticipated naval buildup that would follow.<sup>99</sup>

### Army Politics and Government by Assassination

The 1930s proved to be one of the darkest decades in modern Japanese history. There was a rising level of chauvinism among the militarists and ultra-nationalists that threatened the government of Japan. Younger officers in the army and navy were swayed by the highly vocal right wing, were behind much of the mischief of the early 1930s. The London Treaty played into the hands of the militarists, who not only denounced the whole treaty system, but vainly tried to get the London Treaty rejected by the Emperor. Admiral Suetsugu Nobumasa, one of the “Fleet Faction” members, leaked a copy of the treaty to the press and caused a great stir among the public.<sup>100</sup> When the London Treaty was finally ratified by the Privy Council, Admiral Katō resigned in protest, which greatly upset many of the young officers in the navy. For his efforts in defending the treaty, Prime Minister Hamaguchi Osachi was shot at the main Tokyo train station by a young member of the Love of Country Association, just one of many such secret groups that were springing up

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<sup>99</sup> Evans and Peattie, *Kaigun*, p.237.

<sup>100</sup> Hoyt, *Yamamoto*, p.90.

across Japan.<sup>101</sup> Hamaguchi survived the attack, but he was forced to resign from office as a result. In May 1932 Prime Minister Inukai Tsuyoshi was shot dead in his home by young naval officers.<sup>102</sup> A real blow to the “Treaty Faction” occurred in 1933, when many of the senior officers who supported international cooperation were purged from the navy by being forced into early retirement. The democratic process in Japan was quickly being eroded.

Domestic affairs in Japan had taken a turn for the worse in 1930. By the following year it became clear that the Japanese government was losing control over its military and its foreign affairs. In 1931 the Japanese Kwantung Army moved into Manchuria and completely occupied that territory, against the initial wishes of the emperor, his council and the cabinet. The Japanese seizure of Manchuria prompted condemnation from the League of Nations. The Americans, in particular, felt their interests in Asia threatened by the aggressive behavior of Japan. After the naval maneuvers of 1932, the United States left the Scouting Fleet based on the west coast in order to make an unspoken statement to the Japanese.<sup>103</sup> After a commission from the League of Nations concluded that Japan had unjustly acted in its occupation of Manchuria and the subsequent establishment of the puppet state of Manchukuo, the Japanese delegation withdrew from the League. This was a period of elation for some of the members of Japan’s military, but for most it was a period of great anxiety. In 1932 the navy was brought into the conflict, as the First

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<sup>101</sup> Ibid. p.92-93.

<sup>102</sup> Ibid. p.102.

<sup>103</sup> Evans and Peattie. *Kaigun*, p.296.

Carrier Division (consisting of the *Hōshō* and the *Kaga*) was posted to the Third Fleet and ordered to conduct operations against the Chinese forces around Shanghai, China.

### The First Carrier Division at Shanghai

The Shanghai Incident began on 29 January 1932, and within a few days the *Hōshō* and the *Kaga* were dispatched to the area to support land operations. The First Carrier Division was under the command of Rear Admiral Katō Takayoshi.<sup>104</sup> The *Hōshō* arrived off the mouth of the Yangtze River on 1 February, accompanied by the Third Destroyer Division. Four days later the first aerial battle recorded in the history of the Japanese air forces occurred over the Shingu area, when five Japanese planes engaged nine Chinese fighters. This engagement went well for the Japanese, and two days later Japanese carrier planes began operating from the new Kunda airfield near Shanghai. On 22 February, three of *Kaga*'s Type 3 carrier fighters and three Type 13 attack planes operating from Kunda airfield shot down a Boeing 218 (the prototype for the American P-12) piloted by American volunteer flyer Robert Short.<sup>105</sup> This was the first officially recognized aerial victory by the Japanese Navy. On 3 March 1932 the Shanghai Incident ended with a cease-fire. The Japanese carriers returned to home waters and spent the next year engaging in training exercises. The Japanese carrier planes had made a good showing

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<sup>104</sup> Hata and Izawa, *Japanese Naval Aces and Fighter Units in World War II*, p.24 Katō Takayoshi was not related to Katō Tomosaburō or to Katō Kanji.

<sup>105</sup> *Ibid.*

against the Chinese planes, shooting down four Chinese planes and the Boeing aircraft while suffering no losses.<sup>106</sup>

### The Small Carriers

In their efforts to develop and build an aircraft carrier force, the Japanese and Americans ran a parallel course, the turns of which were largely dictated by the Washington Treaty. Each navy had started at about the same time with a small, experimental carrier that was more or less an auxiliary hull type. Subsequent to the Washington Treaty in 1922, both countries elected to build a pair of large carriers, based on the armored hulls of battlecruisers and battleships. Such developments were prompting naval strategists to question whether it was best to concentrate the carrier force and achieve maximum striking power, or to disperse the force so that all assets would not be lost at once. After building the large carriers, which were more or less successful, both the United States Navy and the Japanese Navy decided to experiment with smaller designs. By the early 1930s the Japanese were beginning to believe they would have to match the American fleet with quantity rather than quality – in other words producing as many flight decks as possible in order to maintain parity. The experiment with smaller carriers was performed with two purposes in mind. One was to take advantage of Article IX of the Washington Treaty that exempted vessels below 10,000 tons. The other purpose was to explore the possibility of converting auxiliary ships into aircraft carriers in times of need. Under this secret program the various auxiliary ships would be built in such a way

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<sup>106</sup> Ibid. p.17,24.

that they could easily be converted into aircraft carriers in the event of war. Such a program was in violation of Article XIV of the Washington Treaty, and such plans indicate the willingness on the part of some naval planners to see the treaty system abandoned.

With the Geneva Conference a failure, the Japanese resumed their plans to build a carrier below the restrictions of the Washington Treaty. The resulting ship, *Ryūjō*, was “a deliberate attempt to cram maximum aircraft into a small carrier below the lower treaty limit.”<sup>107</sup> The keel of the *Ryūjō* had been laid at Yokohama Dockyard in 1929, and she was designed to be a flush-decked ship with a large hangar space, but construction was delayed pending the outcome of the London Conference. From the time she was laid down, the *Ryūjō* was beset with problems. A Navy panel judged the aircraft complement to be too small, so a second hangar was added above the first one. This modification made the ship less stable and did little to improve her efficiency.<sup>108</sup> *Ryūjō* was powered with two sets of geared turbines and six *kampon* boilers that gave her twin screws an output of 65,000 units of shaft horsepower. At that level *Ryūjō* was capable of making 29 knots. The additional hangar enabled *Ryūjō* to carry up to forty-eight planes. The flight deck was 514-feet by 75.5-feet (38,807 square feet) and stopped about sixty-feet short of

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<sup>107</sup> Humble, *Aircraft Carriers*, p.38.

<sup>108</sup> Evans and Peattie, *Kaigun*, p.234. There is some difference among sources on the amount of weight added to the ship by these modifications. Evans and Peattie claim that the addition of the second hangar increased the displacement to 12,000 tons, which was a fact kept secret at the time. Jentschura, Jung and Mickel list the original displacement at 8,000 tons standard, 10,150 tons normal. They note that after the addition of ballast during the 1934 refit, the displacement rose to 10,600 tons standard, 12,732 tons normal. It seems clear that Evans and Peattie are citing the normal displacement, which in both cases would indeed be higher than the lower treaty limit of 10,000 tons. In the Washington Treaty, however, all weight measures are stated in terms of standard displacement tonnage. It seems likely that the carrier did



the bow. *Ryūjō* differed from the other Japanese carriers in having arresting wires amidships, instead of fore and aft, and barriers separated landing and parked aircraft. *Ryūjō* was a flush deck design and her bridge was located underneath the forward end of the flight deck. The small size of *Ryūjō* required her to have a more reasonable armament. A dozen 5-inch, 40-caliber guns and two dozen smaller machine gun types comprised the defensive armament.<sup>109</sup>

### The American Version of Economy

The United States naval planners had been working on the best use of the remaining carrier tonnage since 1922. It was finally decided to divide the remaining tonnage allowed by the Washington Treaty by five carriers of 13,800 tons.<sup>110</sup> Although this new type of ship had been in the planning stages since the early 1920s, one was not actually started until the next decade, largely due to financial restrictions imposed by Congress. The *Ranger*, as the ship was to be named, was the first American aircraft carrier designed as such from the keel up. The *Ranger* was completed in June 1934, one year after the *Ryūjō* was completed, and the same year *Ryūjō* was taken back in for a major overhaul. As previously noted, the naval planners in the United States had shared the concern about

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<sup>109</sup> Jentschura, Jung and Mickel, *Warships of the Imperial Japanese Navy*, p.45. The 5-inch guns were Type 89 (1929) in twin mountings and were standard naval heavy anti-aircraft armament. Capable of firing a 50.7-pound projectile with a muzzle velocity of around 2370f/s to a range of 16,075 yards. (Campbell, *Naval Weapons of World War Two*, p.192).

<sup>110</sup> Friedman, *U.S. Aircraft Carriers*, p.58.

concentration of air assets, and accordingly they planned to build more smaller carriers with which they could better disperse the aircraft.

Although the *Ranger* was not an attempt to utilize treaty exemptions, she was an experiment along similar lines as the *Ryūjō*. The *Ranger* was fitted with six hinged smoke pipes aft, similar to those of the *Hōshō*. The *Ranger* could only make about 29 knots, which was less than what was hoped for and barely enough to participate in fleet operations. At the time that the *Ranger* was taking shape, torpedo aircraft were not considered very effective compared to dive bombers, which had only recently been developed. As a result, the *Ranger* was not fitted to host torpedo aircraft or torpedoes. Like the *Ryūjō*, the *Ranger* was not considered a successful design. Both of these carriers were designed and built before any comparative data about the merits of large and small carriers could be understood. The large carriers built by Japan and the United States had only just entered service as the plans for the *Ryūjō* and the *Ranger* were being made, and any knowledge gained from operating the larger ships was learned too late to affect the new carriers.

There was one major difference between the *Ranger* and the *Ryūjō* that would help the Americans consistently embark more aircraft on their carriers than the Japanese could. The *Ranger* incorporated an elementary design feature called lateral hull extension whereby the beam of the ship was flared out above the waterline. This maximized internal space with a minimal change in displacement. The advantages of such a feature was obvious to an outside observer, yet the Japanese preferred to stay with their usual sleek hull form. The hull of the *Ryūjō* is a classic example of the Japanese style: a sheer line,

with the hull falling away from a flared bow to an almost level center section and then dropping again to the stern. Such a design was employed by the Japanese to save structural weight while giving the maximum freeboard where needed.<sup>111</sup> Such slim lines did little for storage space, however, and that would remain a particular point of inferiority for Japanese carriers. For all of the Japanese efforts to load the *Ryūjō* with 48 aircraft, the *Ranger* could carry 84 planes with no stability problems.

### Japanese Fleet Reconstruction

In 1934 the Japanese Navy began a massive refit and reconstruction program. In the case of the aircraft carriers, the decision for reconstruction was based on a number of factors. Faster and heavier aircraft made certain features on the early carriers unnecessary or undesirable. Sloped flight decks and multiple take-off decks were no longer needed to assist aircraft or speed flight operations, and in some ways they made flight operations more dangerous. Also, the increased size of newer aircraft meant the aircraft capacity of the carriers was less than it originally had been. In the case of the *Ryūjō* and many other warships, the need for reconstruction was based upon poor design.

As if to spotlight the deficiencies in recent Japanese naval construction, a pair of maritime accidents forced the Imperial Navy to question the seaworthiness of all Japanese warships. Since the Washington Treaty limitations were accepted in 1922, the Navy General Staff, responsible for formulating war plans and strategies, had been placing heavy

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<sup>111</sup> Jentschura, Jung and Mickel, *Warships of the Imperial Japanese Navy*, p.46.

demands on the designs for new warships. As in the case of the *Ryūjō*, these demands were based not on naval architecture, but on operational needs.

The *Tomozuru* class torpedo boat is one example of how operational requirements pushed the limits of naval architecture. The *Tomozuru* class was intended to be a light destroyer-type craft of 600-tons that could replace regular destroyers as guard ships for ports and bases. As with many ships of the period, the *Tomozuru* class boats were designed to carry the heaviest possible armament with the least possible displacement. In March 1934 the *Tomozuru* and several other small vessels were participating in maneuvers off Sasebo. Early in the morning the ships were caught in a strong gale and the *Tomozuru* took on a roll from which it did not recover. The ship was found later that day drifting keel up and was towed back to Sasebo by the light cruiser *Tatsuta*. After the *Tomozuru* was righted in port, it was discovered that only 13 of the original 113 crewmembers had survived.<sup>112</sup>

Lack of stability and seaworthiness was a problem suffered by many Japanese warships built during the treaty period. The *Tomozuru* Incident had prompted some naval officials to consider other warship designs suspect. In September 1935, another disaster confirmed their suspicions. During the annual grand maneuvers of the Combined Fleet, 58 warships of the "Fourth Fleet," organized for the maneuvers, were cruising in the northwest Pacific between northern Honshū and the Kuriles. The units of the Fourth Fleet were warned of a huge typhoon moving northward across a two-hundred-mile front. With no chance to avoid the storm, the ships attempted to ride it out. The fleet was battered by mountainous seas and winds of up to 79 knots.

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<sup>112</sup> Evans and Peattie, *Kaigun*, p.240-42.

The storm smashed the bridges of the carriers *Hōshō* and *Ryūō*, and the entire bow section of the destroyer *Yūgiri* broke off just before the bridge. Although none of the ships capsized or sank, nearly all of the vessels incurred damage, and fifty-four men were killed or missing.<sup>113</sup>

The *Hōshō* and the *Ryūō* were brought in for repair and reconstruction during 1934. The *Hōshō* had its hinged funnels fixed in the upright position, and the forward section of the flight deck was made level rather than sloped.<sup>114</sup> The principal defect of the *Hōshō* was small size, but there was no remedy for that. The *Ryūō* required more extensive modification, especially to overcome her inherent top-heaviness. The *Ryūō* had a ballast keel added, the front-face of the navigating bridge was modified, the forecastle was raised, and two of the 5-inch/40-caliber dual purpose guns were replaced by 25mm anti-aircraft guns.<sup>115</sup> The modification to the *Ryūō* took nearly two years and resulted in a higher displacement due to the increased ballast.

While the *Hōshō* and the *Ryūō* were brought in to repair damage and improve seaworthiness, the *Kaga* entered Sasebo in 1934 for extensive modernization. After a few years of operational experience, the multi-flight deck configuration that was inspired by the *Furious* had proven to be a liability. The *Kaga* was given a full-length flight deck, which allowed more hangar space.

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<sup>113</sup> Ibid. p.243.

<sup>114</sup> Jentschura, Jung and Mickel, *Warships of the Imperial Japanese Navy*, p.41.

<sup>115</sup> Ibid. p.46. The 25mm (.984-inch) anti-aircraft gun became the standard Japanese naval anti-aircraft weapon in 1936 and would be installed on most warships through 1945. The gun was gas-operated and based on French Hotchkiss designs. These guns could fire 8.82oz projectiles with a muzzle velocity of 2953f/s to a range of 8200 yards. The nominal rate of fire was from 200 to 260 per minute, with 220 rpm being standard, but the necessity of changing magazines made the actual rate about half this. The guns could be found in single, double or triple mounts. Japanese criticisms were that the twin and triple mounted guns could not be trained or elevated fast enough either by hand or by power. Also, the sights were inadequate for high-speed targets, there was excessive vibration, the magazines held too few rounds and the muzzle blast was too great. Campbell, *Naval Weapons of World War Two*, p.200.

As a result, the aircraft capacity was increased by 50 percent. In addition, torpedo bulge protection was added to the hull and the ship was given a starboard-side island structure.<sup>116</sup> Many of the British-inspired features had been removed or changed by the 1934-35 reconstruction. The same types of changes were planned for the *Akagi* as well, but she was not brought in for the refit until October 1935, and the work would not be completed until 1938.

#### Japanese Rearmament Plans, 1930-1936

Once the terms of the London Treaty became known, Japanese naval planners began drafting construction programs that would bring the Imperial Navy up to treaty limits as quickly as possible. The First Naval Replenishment Program of 1930 was presented by the Navy Minister in October 1930, and this plan received the approval of the Diet in 1931. The total budget for the program was set at ¥424,000,000. The program included a plan to build 39 vessels totaling 72,905 tons, at an expenditure of ¥247,080,000 over the six years from 1931 through 1936.<sup>117</sup> Another, smaller plan in 1933 passed the Diet and gained 15 million yen for the construction of the submarine tender *Taigei* and two submarine chasers. It was hoped that these programs would bring the Japanese Navy up to the maximum allowable size by 1936 and thereby maintain the highest degree of security that could be gained under the treaty limitations. There was to be no sense of security for the Japanese, however, when the United States Congress passed the Vinson-Trammell Act of 1934.

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<sup>116</sup> Jentschura, Jung and Mickel, *Warships of the Imperial Japanese Navy*, p.43.

<sup>117</sup> Burdick and Detwiler, *War in Asia and the Pacific, volume 4, part I, monograph 145*, p.11. The exchange rate for this period is cited as ¥2.5=\$1.0.

This bill was intended to bring U.S. naval strength up to treaty limits within eight years.<sup>119</sup>

The Vinson-Trammell Act also authorized the construction of two aircraft carriers. As a result of this American building program, as well as the poor state of international relations, the Japanese Navy General Staff began pushing for another construction program to be implemented. Although the first program was not yet completed, the Second Naval Armament Replenishment Program was passed in March 1934. The purpose of the Second Program was to accelerate efforts to bring the fleet up to treaty limits. The budget for this was set at ¥477,127,300, of which ¥431,688,000 was to be used for ship construction and ¥45,439,300 was for the creation of eight air units. The original request had been for 87 ships, but the Finance Ministry would not support that, so the program was reduced to 48 vessels over four years.<sup>120</sup> Included in this second plan were two aircraft carriers of a new fleet type.

The programs for bringing the Japanese fleet up to treaty limits placed a great strain on the shipyards. In addition to the construction projects of the First and Second Replenishment Programs, the various existing units of the fleet were undergoing refits and reconstruction, with the result that many planned projects were delayed. This was the first indication of the limit of Japanese dockyard capacity. The large building programs of the United States were well within its industrial capabilities. The Japanese, on the other hand, were beginning to realize very real limitations on the amount of naval construction that could be accomplished in a given period of time.

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<sup>119</sup> Evans and Peattie, *Kaigun*, p.296.

<sup>120</sup> Burdick and Detwiler, *War in Asia and the Pacific, volume 4, part I, monograph 145*, p.17-18. The exchange rate for this period is cited as ¥4=\$1.

### The New Fleet Carriers

The navies of Japan and the United States independently arrived at the conclusion that small aircraft carriers were not suitable for fleet operations. Both navies had, by the mid-1930s, operated both large and small carriers and comparative performance between the two types was being assessed. Such concerns as sea handling, aircraft capacity and speed were major considerations as the two styles were evaluated. The United States naval planners had intended to use the remaining carrier tonnage to build five small carriers, but before the *Ranger* was completed it was decided that the tonnage would be better spent on two large carriers.

The Japanese Navy had very little remaining tonnage left under the treaty limitations, and efforts were made to find ways to circumvent the restrictions by building vessels that fell outside of the limits. The *Ryūjō* was an attempt to build a carrier that was under the lower tonnage limit of the treaty, but the ship had many problems. It was also proposed that a hybrid cruiser-carrier be built that would be considered a new ship class and therefore not be restricted. The experimental plans for such a ship were drawn up in 1932 as the G.6 Project. There were also plans for a conventional carrier design known as the G.8 Project in 1933. The G.8 plans were replaced by the design that was finally chosen for the new carrier *Sōryū*, and the keel for the ship was laid down at Kure Naval Yard in November 1934.<sup>120</sup>

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<sup>120</sup> Jentschura, Jung and Mickel, *Warships of the Imperial Japanese Navy*, p.46-7.



The decision to abandon the hybrid cruiser-carrier version was made based on the Navy General Staff's belief that Japan would soon abandon its participation in the treaty system.<sup>121</sup>

In contrast to the *Ryūjō*, the *Soryū* was a highly successful design. Retaining cruiser hull configuration and machinery, the *Soryū* was capable of making nearly 35 knots. The *Soryū* had a main battery of twelve 5-inch guns and twenty-eight 25mm anti-aircraft guns.<sup>122</sup> The maximum aircraft capacity for the ship was 71 planes, though in practice the complement was normally less.<sup>123</sup> The *Soryū* had double deck hangars, with the lower hangar being placed within the hull for greater stability. In what was becoming a trademark of Japanese carriers, the boiler uptakes were trunked in two funnels over the starboard side amidships. Just before these, on the starboard side, was a small island structure.<sup>124</sup>

Two new carriers of the *Sōryū* class had been authorized under the Second Naval Armament Replenishment Program, and the second ship was named *Hiryū*. Due to a shortage of dockyard space, the *Hiryū* was delayed and the keel was not laid down at Yokosuka Naval Yard until July 1936. Although nominally of the same class, the *Hiryū*

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<sup>121</sup> Evans and Peattie, *Kaigun*, p.318.

<sup>122</sup> The 5-inch guns were representative of the standard naval heavy anti-aircraft armament. Placed in twin mountings, the 5-inch/40-caliber weapons were Type 89 (1929) guns that could fire a 50.7-pound projectile with a muzzle velocity of roughly 2,370f/s to a range of 16,075 yards. The relatively low muzzle velocity was considered this gun's main fault. The rate of fire was 14 rounds per minute, with 8 rounds sustained being average. (Campbell, *Naval Weapons of World War Two*, p.192-93). The 25mm guns were of the same type as those installed on the *Ryūjō* (see note #111).

<sup>123</sup> There is some disagreement among sources on the aircraft complement of the *Soryū*. Evans and Peattie cite 68 planes (*Kaigun*, p.318), while Polmar states the standard capacity as 53 planes (*Aircraft Carriers*, p.69) and Jentschura, Jung and Mickel list 71 planes as the maximum (*Warships of the Imperial Japanese Navy*, p.47).

<sup>124</sup> Evans and Peattie, *Kaigun*, p.318.

would ultimately incorporate lessons learned from the Fourth Fleet Incident of 1935, and was a slightly improved version. The hull of the *Hiryū* was strengthened, the forecastle was raised and the beam was increased in order to improve seaworthiness.<sup>125</sup> As a result of these changes, the displacement of the *Hiryū* was 20,250 tons. The *Hiryū* was given twelve 5-inch dual-purpose guns and thirty-one 25mm anti-aircraft guns.<sup>126</sup> Due to the slightly larger size, *Hiryū* was able to embark a few more aircraft and had nearly a 50 percent greater cruising range than *Soryū*.<sup>127</sup>

One of the most notable differences between the *Hiryū* and the *Soryū* was the arrangement of the small island superstructures. The island on the *Soryū* was placed on the starboard side of the flight deck, somewhat forward of amidships. The island on the *Hiryū* was also planned to be on the starboard side, but the Navy's Aeronautical Bureau observed that an island placed at the center of the carrier's length would afford the best flight deck control. The ship's funnels were also near that point on the *Hiryū*'s starboard side, so it was decided to place the island on the port side instead. It was thought that this mirror arrangement would enable the *Hiryū* and the *Soryū* to operate together, in a close box formation, and have flight patterns that would not interfere with each other. During the reconstruction of the *Kaga* and the *Akagi*, small island structures were added and the same mirrored arrangement was employed, giving the *Akagi* a port side island. Although this did improve flight patterns when the two paired ships operated together, the port side

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<sup>125</sup> Ibid.

<sup>126</sup> These were of the same types as the guns installed on the *Soryū*.

<sup>127</sup> Jentschura, Jung and Mickel, *Warships of the Imperial Japanese Navy*, p.47.

placement of the island structure had drawbacks for pilots attempting to land. It was found that the portside island of the *Akagi* created air disturbances aft of the flight deck.<sup>128</sup> Also, experience on British carriers had shown that pilots tended to veer left if anything went wrong during a landing approach. As it turned out, there were twice as many collisions with the island aboard the *Hiryū* than on *Soryū*.<sup>129</sup> The *Hiryū* was almost completed by the time trials aboard the *Akagi* had indicated cause for concern, so the *Hiryū* retained the port side configuration.<sup>130</sup> The Japanese practice of pairing their aircraft carriers for close cooperation was in contrast to the early American practice of operating carriers as part of independent battle groups.<sup>131</sup> The advantage of carrier air power would be demonstrated by the Japanese in the Pacific War and the Americans would eventually perfect the practice with fast carrier task groups.

#### The New American Fleet Carriers

Before the *Ranger* was completed, the planners in the United States Navy decided that it would be better to divide the remaining tonnage allowance between fewer, but more effective carriers. The design the Americans decided upon became the *Yorktown* class of carriers. The first of these ships, the *Enterprise* and the *Yorktown*, had their keels laid in 1934, along with the *Soryū*, and they were of comparable size. The *Enterprise* and the *Yorktown* displaced just under 20,000 tons. Lateral hull extension was employed in these

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<sup>128</sup> Polmar, *Aircraft Carriers*, p.69.

<sup>129</sup> Preston, *Aircraft Carriers*, p.52.

<sup>130</sup> Polmar, *Aircraft Carriers*, p.69.

<sup>131</sup> Humble. *United States Fleet Carriers*, p.79.

two ships and they became the first carriers to be able to carry over 100 aircraft.<sup>132</sup> The *Yorktown*-class ships were 809-feet overall and could make 34 knots. The initial armaments were eight 5-inch guns and numerous small caliber machine guns.<sup>133</sup> Both ships had a side patch of armor in the hull and a heavy protective deck.<sup>134</sup> To facilitate take-offs, two catapults were installed on the bow, and another that would launch planes directly from the hangar deck (although this was normally not used).<sup>135</sup> The *Yorktown* was in service by September 1937, but owing to serious mechanical defects involving the replacement of the reduction gearing and over 1,200 boiler tubes, the *Enterprise* was delayed until 1938.<sup>136</sup> The *Yorktown*-class was not intended to be a blueprint for later fleet carriers, but was rather an effort to utilize remaining carrier tonnage. As it happened, this solid design would be the savior of the American war effort in the Pacific.

The completion of the *Enterprise* and the *Yorktown* left the United States with enough tonnage to build another small carrier similar to the *Ranger*. There was still some hope in naval circles that a small design could be made to work. Such great care went into the planning of the new carrier that the ship was not launched until four years after it was ordered in 1935. The *Wasp* was the last “treaty restricted” American carrier, and as such

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<sup>132</sup> *Ibid.* p.40.

<sup>133</sup> The 5-inch guns were of the 38-caliber Mark 12 type. These were, according to Campbell, one of the best dual-purpose guns of the Second World War, largely owing to rate of fire, reliability, accuracy life and rates of training and elevation. The guns on the *Yorktown* class were in single mounts, and could fire a 55-pound projectile with a muzzle velocity of 2600f/s to a maximum range of 18,200 yards. Campbell, *Naval Weapons of World War Two*, p.139.

<sup>134</sup> *Jane's Fighting Ships of World War II*, p.269.

<sup>135</sup> Chesnau, *Aircraft Carriers of the World*, p.209.

<sup>136</sup> *Jane's Fighting Ships of World War II*, p269.

her designers made a gallant attempt at reconciling impossible requirements.<sup>137</sup> Displacing just 200 tons more than the *Ranger*, the *Wasp* was slightly broader in the beam and 18 feet shorter overall. When completed, the *Wasp* resembled the *Yorktown* in miniature, rather than an upgraded *Ranger*. The venting system of the *Wasp* was through the conventional bridge/funnel island structure. The *Wasp* had the same machinery as the *Ranger*, and therefore there was no improvement in speed, though, like the *Ranger*, the *Wasp* carried an impressive air group of 84 planes.

The *Wasp* did incorporate some notable improvements over the previous carriers built by the United States. The *Wasp* did not carry the unnecessary hangar deck catapult system that was installed on the *Yorktown*-class carriers. A true innovation was the inclusion of an outboard elevator, supplementing the two centerline elevators. With the outboard elevator extending over the water from the carrier's side, aircraft could be wheeled through an opening in the hangar deck to help deliver planes to the flight deck in a wider distribution, thus reducing congestion.<sup>138</sup>

#### The Development of Japanese Naval Aircraft, 1930-1936

The Japanese naval air forces made great progress during the early 1930s. After a boost in aviation technology from the Sempill Mission a decade earlier, and the addition of fleet-sized aircraft carriers, the Japanese Naval Air Service began to play a major role in the Imperial Navy. The aircraft used against the Chinese during the Shanghai Incident had

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<sup>137</sup> Humble, *United States Fleet Carriers*, p.35.

<sup>138</sup> *Ibid.*

enjoyed initial successes against the range of foreign-built planes of the Chinese airforce. It was not long, however, before newer types of aircraft were made available to the Chinese, most notably from the Soviet Union. During the early 1930s, Admiral Yamamoto Isoroku was appointed director of the technical division of the Navy's Aeronautics Department, a post that enabled him to promote many changes in the naval air service. Yamamoto had a keen interest in naval aviation and had made a point to learn all he could about it, to the point of entering the flight training program himself. It was during this time that new designs were created that would later take the world by storm. Later, as commander of the First Air Division of the Combined Fleet, he introduced discipline to what had become a self-styled elite section of the navy. What Yamamoto began was a program under which the carrier force supplanted the battleship force as the major striking unit of the navy. This was done in Japan at a time when the British and Americans continued to consider the battleship as the key naval weapon.<sup>139</sup>

The principal Japanese naval aircraft during the early 1930s were of Japanese design and manufacture, but still showed some foreign influences. The principal carrier fighter was the Nakajima A1N, which reflected some British inspiration. The A1N1 had maximum speed of about 150 mph and was armed with a pair of 7.7mm machine guns. In addition, two 66-pound bombs could be carried. The Japanese Navy's attack plane during the Shanghai Incident was the Mitsubishi B1M2, also influenced by British designs. Capable of 130 mph, the three-seat B1M2 could carry a torpedo or a pair of 530-pound

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<sup>139</sup> Hoyt, *Yamamoto: The Man Who Planned Pearl Harbor*, p.94.

bombs.<sup>140</sup> During the early 1930s dive bombing techniques were developed, adding a new element to the art of carrier warfare. In 1934 the Aichi D1A dive-bomber entered service. The D1A was largely inspired by German designs, marking a shift from the British influence.<sup>141</sup> The D1A had a maximum speed of 174 mph and could carry 613 pounds of bombs. The plane had two forward-firing 7.7mm machine guns as well as a flexible gun for the rear cockpit. These planes provided the Imperial Navy's air forces with solid capabilities, and indicated the gradual maturation of the Japanese aircraft industry. In contrast to the difficulties with warship construction, the progress of the Japanese naval aircraft development during this period was certainly rapid.

#### The Second London Conference and the Repudiation of the Treaty System

In the fall of 1934, the Japanese Navy sent Rear Admiral Yamamoto Isoroku to the preliminary talks being held for the upcoming naval arms limitation talks in London. Although Yamamoto would have favored continued participation in the treaty system, the more dominant "Fleet Faction" of the Japanese Navy was prepared to see it fail. The Japanese demands were for complete parity between the Japanese, American and British naval ratios and the total abolition of battleships, carriers and cruisers.<sup>142</sup> Naturally these demands were unacceptable to the Americans and British. The Americans claimed that the established 5:5:3 ratio was the best guarantee of security for all of the maritime powers involved. The British argued that a common, lower level of tonnage would be most

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<sup>140</sup> Polmar, *Aircraft Carriers*, p.78 note.

<sup>141</sup> *Ibid.* p.79 note.

<sup>142</sup> Evans and Peattie, *Kaigun*, p.297.

detrimental to Britain and would imperil the scattered territories of the British Empire.<sup>143</sup> With little accomplished at the preliminary talks, the Japanese government announced its renunciation of the treaties in December 1934.

When the formal conference began in December 1935, the hard-liner, Admiral Nagano Osami, replaced Yamamoto as the head of the naval delegates. The Japanese position remained unchanged, and the demands met with the same reaction as before. The Japanese delegation withdrew from the conference and ended the last program of cooperation with the Anglo-American powers.

### Conclusion

World War I had been a devastating conflict, and in its wake there was genuine hope that future wars could be averted through international cooperation. The League of Nations had been established with that ideal, and the Washington Conference offered real hope that the great powers of the world could reach a compromise that benefited all. The Washington and London naval disarmament treaties were very successful in limiting and guiding the development of certain warship classes, most notably capital ships. The treaties were signed in the hope that they would prevent a costly and dangerous arms race between the major navies. It is ironic that the treaty system promoted accelerated naval construction, although along non-traditional lines. Katō Tomosaburō and the other “Treaty Faction” members argued that adherence to the treaty terms and international

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<sup>143</sup> Ibid.



cooperation would save Japan diplomatically and financially in the long run. Although the terms of the treaty system were generally adhered to, the spirit of international cooperation was not there. The members of the "Fleet Faction" continued to approach the situation as a prelude to the war that they believed was inevitable, and, together with their army counterparts, eventually undermined the entire system. The civilian and diplomatic officials in Japan could not undo the damage that was being done to Japanese foreign policy by the militarists and ultra-nationalists.

As Japan entered this new era of military-dominated foreign policy, great pressure and anxiety attended the planning efforts of the Imperial Navy. Deteriorating relations and the exploits of the Japanese Army prompted a significant naval buildup in the United States. Although there were officers in the Imperial Navy who understood that Japan could not compete with American industry, the effort was made nonetheless to maintain the theoretical ratio calculated to insure Japanese security. During this time the Navy General Staff did not concern itself with the maintenance of national security through sound diplomacy. As the Americans unveiled the First Vinson Program, the Japanese planners were shocked, but not enough to abandon naval armament as a means to preserve the nation. The response was to enact another construction program on top of the program for 1931-1936.

The problem of inadequate shipyard capacity was compounded by the great number of refits and reconstruction projects during this period. In regard to aircraft carriers, the Japanese Navy spent considerable time and resources undoing features that had been inspired by the British. The influences of the Royal Navy had been most beneficial during

the 1910s and early 1920s, but by 1930 Great Britain had clearly lost its edge in naval aviation. It is significant to note that the American carriers built during the 1920s had not undergone any major reconstruction by the advent of the Pacific War. In addition, the great demands of the Navy General Staff planners adversely affected Japanese warship construction, causing many of the warships to lack stability. All of these projects added further strain on the shipyard situation to the point that the new construction projects were being delayed.

The naval construction difficulties experienced during this period should have been a clear warning to those members of the Japanese military leadership, particularly the Navy General Staff. The Imperial Navy was already clogging the dockyards with new projects and reconstruction efforts, often to the exclusion of vital merchant hull construction. In the face of the impressive Vinson Program of 1934, the members of the "Fleet Faction" still maintained their determination to compete with the industrial power of the United States. The reconstruction efforts, mostly a result of inordinate demands made by the navy planners, proved to be a significant setback for the Japanese naval buildup.

## CHAPTER 4

### THE ROAD TO WAR

During the last half of the 1930s, military bellicosity again affected the course of Japanese foreign policy. On 7 July 1937, Japanese troops clashed with Chinese troops at the Marco Polo Bridge near Beijing. The Japanese Army seemed determined to make a full-scale war out of the incident and to conquer China. As a result of the fighting in China, Japanese relations with the western powers grew steadily worse. The Japanese Army leadership believed the conflict with China would end quickly, but the fighting continued as Japan committed more soldiers and materiel. The fighting in China provided the Japanese Army and Navy with combat experience, but also served as a serious drain on the Japanese economy and industrial complex at a time when the Imperial Navy was engaging in an unrestricted building race with the United States.

Although the chauvinistic members of the Imperial Navy had been preparing for the inevitable conflict with America, the Japanese Army was advancing the timetable through their activities on the Asian continent. As a result of the diplomatic impact of the war in China, the Japanese found themselves fast approaching the conflict with America that the civilians and "Treaty Faction" members were desperate to avoid. During this period the Japanese Navy began to accelerate its building programs substantially, and it enacted emergency wartime measures that had been planned earlier in the decade.

### Japanese Construction Programs, 1937-1941

The abrogation of the naval arms treaties gave the Japanese Navy a free hand to expand the fleet. Unfortunately, the United States was also free from limitation, and the resulting construction programs initiated by the Americans forever dashed the Japanese hopes of achieving parity, or even the 70 percent ratio. During the late 1930s Japanese naval planners began to focus on qualitative superiority, the most audacious example of which was the *Yamato*-class super-battleships. The initial plans for these monster ships were laid in the early part of the decade, in violation of the spirit, if not the letter, of the Washington treaty. In October 1935 representatives from the Navy General Staff and the Navy Ministry met to discuss the Third Naval Armament Replenishment Program. At the heart of this program were two battleships of the *Yamato* class. The *Yamato* and its sister-ship *Musashi* embodied the lingering belief in the battle line: the belief of the majority of naval officers in the final, decisive battle that would be fought by the battleships. The *Yamato* and the *Musashi* required considerable resources to build, and the fact that the Japanese were able to build such ships at that time remains today a true wonder. The construction of these two ships was done with the utmost secrecy, and so effective were the efforts that their existence remained unknown to the Americans until late in the war. The careers of the *Yamato* and the *Musashi* in many ways parallel the entire approach of the Imperial Navy toward the conduct of the war.

The Third Program was enacted in 1937 and was to cover a period of five years. The budget for the plan was set at approximately ¥800,000,000 and included the construction

of a total of 66 ships and 14 new air units. The Third Program called for the construction of two new aircraft carriers. The *Shokaku* class carriers represented the pinnacle of Japanese carrier development. Unfettered by treaty restrictions, the *Shokaku* and the *Zuikaku* incorporated all of the lessons and experience accumulated by the Japanese.

The *Shokaku*-class was a progression from the *Hiryū*, and was one of the most successful designs of the war. The *Shokaku* incorporated a *Yamato*-style bow form. The lessons learned about island structures were applied to the *Shokaku* class and both ships were given starboard island structures.<sup>144</sup> The *Shokaku* was launched at Yokosuka Naval Yard on 1 June 1939, and she was completed 8 August 1941. The *Zuikaku* was launched five months later on 27 November 1939 and she was completed 25 September 1941 at Kawasaki Dock Yard at Kobe. Both ships were 844-feet long and had flight deck dimensions of 794-feet by 95-feet (75,430 square feet).<sup>145</sup> Four sets of geared turbines and eight boilers drove four shafts with 160,000 units of horsepower, giving the *Shokaku* and the *Zuikaku* speeds of 34 knots. On both ships exhaust was vented through two short funnels extending downward off the starboard side. They were initially armed with sixteen 5-inch guns and forty-two 25mm anti-aircraft guns.<sup>146</sup> The *Shokaku* and the *Zuikaku* could carry about 84 aircraft. It is notable that while the *Shokaku*-class carriers were built in response to the apparent success of the *Yorktown*-class, the Japanese

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<sup>144</sup> Polmar, *Aircraft Carriers*, p.69.

<sup>145</sup> Jentschura, Jung and Mickel, *Warships of the Imperial Japanese Navy*, p.51.

<sup>146</sup> Ibid. The 5-inch guns were of the same type as that installed on the *Soryū*-class. (Campbell, *Naval Weapons of World War Two*, p.192-93).

continued using slender hull designs with the result that the *Shokaku* could carry fourteen fewer aircraft than the *Yorktown*.

The *Shokaku*-class carriers were notable as being the first ships to be fitted with a sonar system. It was a simple passive system consisting of a large hydrophone mounted on the underside of the bow, but it was a plus nevertheless. The system was useful for detecting submarines (provided the carrier was moving slowly enough) and for detecting ships at night. All Japanese carriers built after the *Shokaku*-class were fitted with similar systems.<sup>147</sup>

However, Japanese attempts to keep pace with American rearmament efforts were doomed to failure. After the first Vinson Program of 1934, the United States passed a budget in 1936 that provided for two battleships and numerous smaller vessels and aircraft. For the fiscal year 1937 the Americans planned two more battleships, three aircraft carriers, eleven cruisers and sixty-five other vessels. In 1938 the Second Vinson Program was passed which included three battleships and 40,000 tons for the construction of aircraft carriers, the result of which was a third of the *Yorktown*-class, the *Hornet*. The Second Vinson Program was four times as large as the Imperial Navy's Third Replenishment Program.<sup>148</sup> In an effort to counteract the Second Vinson Program, the Japanese enacted the Fourth Naval Armament Replenishment Program in 1939. The Fourth Program called for two more *Yamato*-class battleships and an aircraft carrier of an

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<sup>147</sup> Preston, *Aircraft Carriers*, p.52.

<sup>148</sup> Burdick and Detwiler, *War in Asia and the Pacific, volume 4, part II, monograph 149*, p.18.

improved *Shokaku* design.<sup>149</sup> After the Second Vinson Plan had been unveiled, the Imperial Navy decided to begin conducting “intensive research and investigation into the progress of the United States naval armament, and, if necessary, in order to obtain parity, to requisition and convert first-class merchant ships into aircraft carriers.”<sup>150</sup>

After the Fourth Program was announced, the United States Navy submitted a Third Vinson Plan, which was approved in June 1940. The new Vinson Plan called for three aircraft carriers and 92 other warships.<sup>151</sup> The Navy Ministry and the Navy General Staff began discussions on the Fifth Naval Armament Replenishment Program. It was determined that in order to maintain parity in aircraft carriers, the conversion of the “shadow” fleet of auxiliaries would be beneficial. The requirements stated by the Navy General Staff included three more *Yamato*-class ships, three aircraft carriers and a host of nearly 80 other vessels. As the dockyards were still filled with orders placed under the Third and Fourth Programs, the Navy Ministry estimated it would take nine years to complete the new program.<sup>152</sup> A draft of the Fifth Program was prepared in May 1941.

As the Fifth Program was receiving its final modifications, the Japanese received intelligence about the latest building program of the United States. The Stark Plan called for a “two-ocean navy” and aimed at increasing the size of the American fleet by 70 percent. This would, in effect, allow the United States to field a full strength fleet in both the Atlantic and the Pacific at the same time. This was in part prompted by the rapid

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<sup>149</sup> Chesnau, *Aircraft Carriers of the World*, p.179.

<sup>150</sup> Burdick and Detwiler, *War in Asia and the Pacific*, volume 4, part II, monograph 149, p.5.

<sup>151</sup> Burdick and Detwiler, *War in Asia and the Pacific*, volume 4, part III, monograph 160, p.1.

<sup>152</sup> Evans and Peattie, *Kaigun*, p.359.

conquest of Western Europe by Germany. At this time the Japanese planners should have concluded that such a building competition was beyond the means of Japan. Instead, the plans of the Navy General Staff began to assume an air of unreality.

In response to the Stark Plan, the Navy General Staff began preparing the Sixth Naval Armament Replenishment Program. Whereas the Third and Fourth Plans called for four of the *Yamato*-class battleships, the Fifth and Sixth Plans required seven more of an improved type. Most of the ships in the Fifth Plan would never be built, and the Sixth Plan never passed the planning stage. Before these programs could ever be pursued, the Imperial Navy would be compelled to launch a war that would ultimately undo the work of all of the plans. The progression of American building plans was a prewar sample of the awesome industrial capacity that the United States could bring to bear. The series of Japanese building programs served to highlight the limits of Japanese shipyard capacity, as well as material and financial resources. The limits of Japanese industry were strained to the utmost by the reckless exploits of the Japanese Army and the unrealistic demands of the Navy General Staff.

### The Shadow Fleet

As part of the naval preparations of the late 1930s, Japan called upon a “shadow” carrier force that had been built up since the First Naval Armament Program. These ships were ostensibly built as various auxiliary vessels, but all incorporated elements in their designs which would make them easy to convert into aircraft carriers should the need



arise.<sup>153</sup> By the late 1930s the Japanese naval planners felt it necessary to mobilize this force in order to maintain parity in carriers with the United States. Accordingly, two submarine tenders, the *Takasaki* and the *Tsurugisaki* were selected to be converted into aircraft carriers as part of the 1941 Secret Mobilization Plan. The *Takasaki* had been launched, but she had not yet been completed as a submarine depot ship. On 27 December 1940 the conversion of *Takasaki* was complete and she was renamed *Zuihō*. The sister ship, *Tsurugisaki*, had been completed as a submarine tender in January 1939. After being taken in for conversion, the *Tsurugisaki* emerged from the dockyard in January 1942 as the *Shōhō*. Both of these ships displaced only 13,950 tons, and were 674-feet long overall, the flight decks measuring 590.5-feet by 75.5-feet (44,583 square feet).<sup>154</sup> The *Zuihō* and the *Shōhō* had a modest armament of eight 5-inch dual-purpose guns and eight 25mm anti-aircraft guns.<sup>155</sup> Both of these carriers fielded an aircraft complement of about thirty planes apiece.

A third ship of the “shadow” fleet was converted prior to the outbreak of hostilities. Also as part of the 1941 Secret Mobilization Plan, the submarine support ship *Taigei* was brought in for conversion to an aircraft carrier. The *Taigei* had been completed as a submarine tender on 31 March 1935, and she was found to be less than satisfactory. *Taigei* had a weak hull structure and poor internal subdivision. The lessons learned from *Taigei* had been implemented to improve the *Takasaki*-class ships. During the

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<sup>153</sup> Chesnau, *Aircraft Carriers of the World*, p.165.

<sup>154</sup> Jentschura, Jung and Mickel, *Warships of the Imperial Japanese Navy*, p.49.

<sup>155</sup> The 5-inch guns were the standard 40-caliber Type 89 guns. (Campbell, *Naval Weapons of World War Two*, p.192-93).

conversion process the diesel engines of the *Taigei* were replaced by destroyer turbines to increase power. On 28 November 1942 the ship left Yokosuka Dockyard as the light carrier *Ryūhō*. The *Ryūhō* displaced 15,300 tons and was 707-feet long. Unfortunately, even with two sets of geared turbines and four boilers, she could only make 26 knots. The flight deck of the *Ryūhō* measured 607-feet by 75.5-feet (45,829 square feet) and she carried thirty-one aircraft. The *Ryūhō* was armed with eight 5-inch dual-purpose guns and thirty-eight 25mm anti-aircraft guns.<sup>156</sup>

Although considerably larger, the *Ryūhō* looked very similar to the *Shōhō* and the *Zuihō*. All three carriers were low and sleek looking. The flight deck fell considerably short of the bow on each of them. These ships were all flush decked and each had two elevators. The antenna masts on each could be raised or laid outboard. Exhaust on the each of the ships was expelled through a single, short smokestack amidships on the starboard side.

Three liners that were intended to be part of the NYK Line were also earmarked for conversion. The 17,100-ton *Kasuga Maru* was the first civilian liner to be taken in for conversion. The *Kasuga Maru* was launched on 19 September 1940, and she was taken in for conversion on 1 May 1941. On 15 September she was completed as the carrier *Taiyō*. The *Taiyō* could make only 21 knots and carried but 27 aircraft. *Taiyō* was armed

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<sup>156</sup> Jentschura, Jung and Mickel, *Warships of the Imperial Japanese Navy*, p.49.

with six 4.7-inch guns and eight 25mm anti-aircraft guns.<sup>157</sup> The *Taiyō* was a flush decked carrier with a flight deck area of 43,447 square feet.

The ships of the “shadow” fleet were essentially escort carriers. They were all too slow to work with the fleet and it was decided they would operate as aircraft ferries, support minor operations and serve in an anti-submarine capacity. Although these were all very important functions, particularly the anti-submarine role, the Japanese Navy would never be able to build enough escort carriers to make a difference. The conversions made under the 1941 Secret Mobilization Plan did, however, enable the Japanese Navy to begin the war with ten carriers to the eight carriers of the United States Navy.

#### The China Incident: Carrier Operations, 1937-1941

In July 1937, Japanese foreign policy passed completely into the hands of the Japanese Army. The Japanese Army became involved in open conflict in northern China, and despite attempts to localize the dispute, the fighting soon spread throughout China. For the second time in a decade, Japanese carriers were dispatched to provide support for the Japanese Army. Each of Japan’s first five carriers participated in the China fighting to some degree. Carrier operations during this time consisted mainly of air superiority missions and ground attacks in support of army units. Quite often carrier planes would

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<sup>157</sup> The 4.7-inch guns were of the 45-caliber 10<sup>th</sup> Year Type (1921). These guns were of the same variety as those installed on the *Akagi*, though the mountings in *Taiyō* were single mounts. (Campbell, *Naval Weapons of World War Two*, p.194).

be dispatched to ground bases for a time in order to support offensives, and would follow along with advances farther into China.

The *Hōshō* and the *Ryūjō* were the first carriers to be sent to the Shanghai area, just five days after the Marco Polo Bridge Incident. Most of the early carrier operations occurred in the vicinity of Shanghai, but it was not long before carriers were sent to the Canton area to suppress Chinese airfields. During the first three months of fighting, the *Hōshō* and the *Ryūjō* operated together as the First Carrier Division. At the end of this time, the *Hōshō* transferred her aircraft to the *Ryūjō* and returned to Japan, where she was placed in reserve status. The *Ryūjō* continued operations independently for two months before she returned to Japan and engaged in training exercises.

After initially participating in training exercises at Ōmura, the *Kaga* escorted army transports for ten days and finally took up station off of Shanghai. Aircraft from the *Kaga* conducted raids into central China until September 1937, when she returned to Japan for two months in order to receive new aircraft. The *Kaga* returned briefly in November 1937, but in December she returned to Japan and was placed in reserve status while being overhauled.<sup>158</sup> The *Kaga* would have been paired with the *Akagi* to form another carrier division, but the *Akagi* was undergoing its major refit and did not see any action until April of 1939. When the *Akagi* did join the war, she spent ten months in the waters of the South China Seas and around the Hainan area before returning to Japan in February 1940 to participate in fleet exercises.<sup>159</sup>

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<sup>158</sup> Hata and Izawa, *Japanese Naval Aces and Fighter Units in World War II*, p.25-27.

<sup>159</sup> *Ibid.* p.20.

When the *Sōryū* was completed, she was paired with the *Ryūjō* to form the Second Carrier Division and sent to operate in the south China area. In the middle of March 1938, and again in October 1938, the *Sōryū* and the *Ryūjō* conducted air missions in support of the Kwangtung operation. By December the carriers had returned to Japan. Upon returning to the homeland, the *Sōryū* engaged in training activities. In November of 1939 the *Ryūjō* received a badly needed overhaul after operating more or less continually for six years.<sup>160</sup>

#### The Development of Japanese Carrier Aircraft, 1937-1941

The fighting in China proved to be a good test for Japanese carrier aircraft and an important developmental period. The standard carrier fighters during the summer of 1937 were the Nakajima Type 90 and the Nakajima Type 95. The Type 90 had been independently developed by the Nakajima firm and entered service in April 1932. Although it used the same Kotobuki Model 2 450-hp engine as its predecessor Type 3 fighter, the Type 90 could attain speeds of up to 181 miles per hour, over thirty miles per hour faster. The maneuverability of the Type 90 was widely acclaimed.<sup>161</sup>

The Type 95 fighter was destined to be the last biplane fighter in the Imperial Japanese Navy. It was equipped with the Hikari Model 1 670-hp engine and could reach speeds of up to 218 miles per hour. The Type 95 was adopted for service in 1936 and a total of 221 units were manufactured. The aircraft did not play a large part in the fighting over China

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<sup>160</sup> Ibid. p.31.

<sup>161</sup> Ibid. p.4.

as it was soon replaced by the Mitsubishi Type 96 carrier fighter. Afterward, the Type 95 was used as a trainer.<sup>162</sup>

The Type 96 Mitsubishi was the Japanese Navy's first cantilevered and all metal monocoque fuselage monoplane.<sup>163</sup> It was well ahead of its contemporaries across the world and incorporated innovative features such as flush rivets and washout type wings. The prototype models were introduced in 1935 and achieved an impressive speed of 280 miles per hour. Early in 1937 the Model 1 version was produced using the Kotobuki Improved Model 2 460-hp engine. The Model 2.1 version appeared with the Kotobuki Improved Model 2 600-hp engine. Model 2.2 followed with an enlarged fuselage and an enclosed cockpit. Nearly 1,000 units of the Type 96 fighter were produced in all, with the most numerous version was the Model 4. The Model 4 fighter incorporated the Kotobuki Model 4 680-hp engine. Armament for the Type 96 fighters consisted of two 7.7mm machine guns.<sup>164</sup>

Certainly one of the most famous of all airplanes ever produced was the Mitsubishi Type Zero fighter. Formally entering service in July 1940, the Mitsubishi Zero absolutely swept aside all opposition. The first Zero fighter had been completed in 1939, in accordance with a directive from the Navy made in October 1937 that required a fighter with a maximum speed of 312 miles per hour or higher. The directive also required a flight endurance of up to 1.5 hours and an armament of two 20mm cannon and two 7.7mm machine guns. The first models employed the Mitsubishi Zuisei 13 780-hp

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<sup>162</sup> Ibid. p.5.

<sup>163</sup> A monocoque fuselage is a type in which the outer skin carried all or a major part of the stress.

<sup>164</sup> Ibid. p.6-7.

engine. Only two such models were produced as the A6M1, before the engine was changed to the Nakajima Sakae 12 940-hp engine. The new version was dubbed the Mitsubishi A6M2 model 11, and the Navy sent Zeros of this type to China at the beginning of July 1940 before the formal adoption of this plane.<sup>165</sup>

In the meantime, Model 21 was introduced. It sported folding wingtips to facilitate handling and storage in carriers. The Model 32 (also known as the A6M3) was built in June 1941 and used the Nakajima Sakae 21 1130-hp engine with a two-speed supercharger.<sup>166</sup> The performance of the Zero was remarkable for its time. The A6M2 Model 21 had a maximum speed of 316 miles per hour and could fly over 1100 miles, enabling it to strike deep into central China. Due to its light weight, ESD (extra super-duralumin) fuselage, the Zero could out-climb any plane in service.

There were three different types of carrier attack planes operating with the carriers at the outbreak of the China conflict. The earliest planes were the Mitsubishi B2M (Type 89) which had entered service in 1932 and the Yokosuka B3Y1 (Type 92) which entered service in 1933. The most current model available at the outbreak of the China War was the Yokosuka B4Y1 (Type 96) carrier attack plane. All three of these aircraft were biplanes.<sup>167</sup> In 1937 a new monoplane was introduced that would be the new standard multi-role bombing and reconnaissance aircraft of the Japanese Navy. The Nakajima B5N (Type 97) attack plane was a cleanly designed three-seat craft that could run at 230

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<sup>165</sup> Aireview, *General View of Japanese Military Aircraft in the Pacific War* (Tokyo: Kanto-Sha, Company, 1958) p.38.

<sup>166</sup> Ibid.

<sup>167</sup> Hata and Izawa, *Japanese Naval Aces and Fighter Units in World War II*, p.xv.

miles per hour and carry a 1,763-pound torpedo or an equivalent bomb load. The B5N1 reported directly to the China theater after its adoption and operated in conjunction with A5Ms to support ground forces.

The first dive bomber to enter service with the Imperial Navy was the German-inspired Aichi D1A1 (Type 94) of 1934. Two years later the Aichi D1A2 (Type 96) entered service and was the primary dive bomber serving with the navy during the China conflict. In 1940, however, the Aichi D3A (Type 99) bomber entered service. Based largely on contemporary Heinkel aircraft, the D3A was a rugged plane with a fixed undercarriage, large elliptical wings, and dive brakes. Though its bomb load was relatively light, it compared favorably with the American Douglas Dauntless and the German Stuka.<sup>168</sup>

On the eve of the Pacific War, the Japanese Navy had a very solid trio of carrier aircraft and a cadre of pilots who had combat experience over China. The aircraft and the pilot quality were two factors that gave the Japanese Navy a marked advantage during the first year of the war. The development of aircraft during this period had reached a high water mark, with the Zero surpassing all other fighters at that time.

### The Problem of Petroleum

While the diplomats in Japan became anxious about the growing international tension during the 1930s and early 1940s, the military planners were worrying about securing raw

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<sup>168</sup> Evans and Peattie, *Kaigun*, p.307.



materials. Oil was of particular importance as fuel for the Japanese Navy, and nearly all of Japan's oil supply was imported. The United States had replaced Great Britain as the principal market for silk export due to Japan's increasing dependence on American oil and strategic raw material imports.<sup>169</sup> Throughout the 1930s the Japanese Navy tried to alleviate the dependence on its potential foe. In 1932 the Japanese Navy established an experimental synthetic oil refinery at one of its largest reserve coal areas in northern Korea. The refinery was established near the Japanese-built town of Agochi, near a supply of the brown coal necessary for the production of synthetic oil.<sup>170</sup> Efforts were also made to stockpile oil. The Petroleum Industry Law, passed in 1934, required importers and refiners handling more than 630,000 barrels of oil per year to carry at all times six months of commercial reserve stocks in addition to current working stocks.<sup>171</sup>

Although efforts were being made to stockpile oil, the conflict in China was proving to be a major drain on Japanese resources. After the 1938 Materials Plan had been revised to take into account the Hankow campaign in China, and to correct unattainable goals, the civilian sector would bear the brunt of reductions. The original quota for the importation of fuels, ¥566,000,000, fell to ¥510,000,000 in the revised plan. This drastically curtailed the storage and use of oil, especially in civilian industries. The shipping industry was to cut back fuel consumption by 10 to 15 percent, while factories were to absorb a 37 percent reduction. Fishing boats, which provided an appreciable

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<sup>169</sup> John Costello, *The Pacific War, 1941-1945* (New York: Quill, 1982) p.41.

<sup>170</sup> Burdick and Detwiler, *War in Asia and the Pacific, volume 5*, p.11.

<sup>171</sup> *Ibid.* p.6. As a result of this new legislation, storage tank construction in Japan boomed and by 1941 enough storage was available for 60 million barrels.

amount of Japan's food, were forced to revert entirely to wind power.<sup>172</sup> The war in China demanded much of the Japanese economy and people.

The Japanese oil problem did not diminish by the late 1930s. Efforts to become energy independent were not yet satisfactory. Japanese domestic petroleum production during the late 1930s was still only 8,000 barrels a day – less than one-tenth of the country's needs.<sup>173</sup> Miniscule amounts of synthetic oil were being manufactured, but the Japanese were still far behind the leading countries in synthetic technology. The coal liquification plants in Manchuria were moderately productive, but the Japanese began to realize that the area was not the great source of fuel they had hoped it would be. The oil-rich island of Sakhalin might have helped the Japanese situation a great deal, but it was always a central bargaining chip in the ongoing Japanese-Soviet talks: as a result the Japanese were never able to derive much benefit from it. As Japan entered the 1940s, it found itself still highly dependent on the United States and the Netherlands East Indies for most of its oil.<sup>174</sup> Japanese dependence on the United States for oil was very great. Overall, Japan relied on America for 80 percent of its fuel needs. For special distillates, such as gasoline, the dependence ran over ninety percent.<sup>175</sup> There were no practical

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<sup>172</sup> Michael A Barnhart, *Japan Prepares for Total War: The Search for Economic Security, 1919-1941* (Ithaca: Cornell University Press, 1987) p.110.

<sup>173</sup> Russel Freeburg, and Robert Goralski, *Oil and War: How the Deadly Struggle for Fuel in World War Two Meant Victory or Defeat* (New York: William Morrow and Company, 1987) p.94.

<sup>174</sup> Ibid.

<sup>175</sup> Barnhart, *Japan Prepares for Total War*, p.146.

substitutes for American oil, and by 1940 the Japanese stockpiles were at their lowest in years due to the fighting in China.<sup>176</sup>

The preeminence of America in Japan's energy mix placed the country in just the sort of bind that the naval planners were trying to avoid. As Japan embarked on its path toward self-sufficiency, it was growing more and more dependent on its most likely adversary. Even if Japanese actions in China had not been antagonizing to the United States, projected increases in Franco-British demand for oil would dry up much of Japan's share, which before 1939 had been first or second in American exports of major crude and its distillates.<sup>177</sup> But Japanese aggression on the Asian continent did agitate the Americans, and by 1939 American dominance in oil and other key materials was so great that any economic pressure applied by Washington could not be mitigated.<sup>178</sup>

### The Diplomatic Stalemate

The growing dependence on American and Dutch oil should have compelled the Japanese military planners to seek international reconciliation. Instead, the plans and exploits of the Japanese Army made diplomatic solutions all but impossible. During the first part of the decade the Japanese displayed their willingness to leave the cooperative fold of the League of Nations and the treaty system to pursue a course of empire. The signing of the Anti-Comintern Pact of 1936 marked a shift from alignment with the Anglo-American powers to the Axis sphere.

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<sup>176</sup> Ibid.

<sup>177</sup> Ibid. p. 149.

<sup>178</sup> Ibid. p. 156.

The outbreak of the China War in 1937 was a critical turning point in Japanese foreign relations, and placed Japan on a collision course with the West. Early in the conflict the Japanese Army had been confident of swift victory, but as the fighting continued, the China War eventually dominated Japanese affairs at home and abroad. The unwillingness of the Japanese Army to yield ground or give up the campaign for the sake of compromise doomed the efforts of Japan's diplomats. While increasing pressure on the Chinese, the Japanese began to agitate the Americans, British and the Dutch. The apparent lack of Japanese regard for the possessions and interests of the other powers caused Japan to be viewed as a rogue nation, and Japanese atrocities in China offered evidence to support claims of barbarism and naked aggression.

As Japanese operations in China grew, so did the Japanese requirement for raw material imports. Although the other powers were not prepared to engage the Japanese militarily, economic sanctions were implemented gradually by the United States and generally supported by the British and the Dutch. The Japanese were dependent on a wide variety of materials, as well as on foreign shipping, but it was Japanese dependence on oil that effectively set the time limit on peace in the Pacific. In their efforts to cause the capitulation of China, in July 1941, the Japanese moved into southern Indochina, disregarding the warnings of the other powers. In response, the United States froze Japanese assets and began applying restrictions on oil exports to Japan. Japanese efforts to circumvent the oil blockade were fruitless, and it became apparent that the British,

Australians and Dutch were cooperating with the American sanctions. Now Japan was effectively surrounded by hostile powers and under an economic squeeze that would allow the Japanese to maintain naval operations for only 18 months before the fuel reserves were exhausted. Faced with this realization, the Japanese Army and Navy set a time limit on the efforts of the diplomats to secure peace through negotiation. In the meantime, preparations were made for war.

### Conclusion

The war with China provided the backdrop for this period, with the unyielding Japanese Army setting real limitations on the efforts of the diplomats. The war in China did as much to cause war with America as anything else. The conflict with China also proved to be a serious drain on the Japanese economy. The Japanese Navy was engaged in a building race with an industrial giant that had control of the majority of the Japanese fuel supply. Efforts to find alternatives to American oil had not borne fruit by 1941, and the Japanese Navy was forced to wage war against its principal supplier.

The development of Japanese aircraft carriers during this period reached a high point. Relying more on experience than foreign influences, the Japanese Navy began producing solid fleet carrier designs. The Japanese and American navies continued to follow a roughly parallel design track, even though the treaty system had been discarded. The carriers built by the United States continued to be superior to the Japanese carriers in terms of aircraft capacity, largely due to the Japanese penchant for sleek hull designs.

The Americans had developed carrier traits that would combine to make the wartime *Essex*-class carriers as great an asset as the atomic bomb for defeating Japan.

The Japanese naval planners recognized the limitations of the country's shipyards when plans were made to prepare special merchant hulls for wartime conversion into carriers. Strangely, however, this pragmatic appraisal of the country's limitations did not prevent the Navy General Staff from pursuing a naval construction race that grew more unrealistic by the year. The products of those secret preparations were essentially escort carriers with small aircraft complements and relatively slow speeds. Nominally the Japanese Navy enjoyed a margin of superiority in aircraft carriers at the outbreak of war. Although the Japanese carriers were adequate ships, the real advantage of the Imperial Navy came from innovative strategy, excellent aircraft and experienced aviators.

## CHAPTER 5

### THE PACIFIC EXPLOSION

The aircraft carriers of the Imperial Japanese Navy played a critical role in the Pacific War. No other type of warship could have executed the attack on Pearl Harbor that was the keystone of the Japanese Navy's offensive strategy. By 7 December 1941 the Japanese carrier strike force was the most powerful naval force ever assembled. Admiral Yamamoto discarded conventional naval doctrine and introduced a new type of naval warfare, staking the fate of Japan on its success. Although many naval officers still believed in battleship guns, the carrier was without a doubt in the van during the Pacific War.

The Japanese decision to go to war with the United States was prompted by the acute oil situation created by the embargoes following the occupation of Indochina. The Japanese felt encircled by hostile powers. Diplomacy was not showing any promise, as the two countries could not reach an agreement in regard to the withdrawal of Japanese troops from China. The Japanese Navy had not been able to overcome its dependency on the United States for oil. The synthetic fuel program was not producing enough, and talks with the Dutch proved disappointing. The restrictions placed on oil and the freezing of Japanese assets effectively placed a time limit on the Japanese negotiation and decision making process. Accordingly, the Japanese Navy was expanded as much as time and dockyard capacity would allow.

### Japanese Objectives in the Pacific War

The principal objectives of the Japanese war efforts were the conquest of China, the “liberation” of Asia from the western imperialists, and the acquisition of the southern resource area. The conquest of China would take time, since that conflict had been raging since 1937. The most pressing need was to secure a supply of oil before the Japanese Army and Navy lost the ability to conduct operations. The target was the Dutch East Indies (Borneo, the Celebes, Sumatra, and Java) and the surrounding areas, including Malaya. In order to advance to these areas, it would be necessary to neutralize the British fortress of Singapore and the American bastion in the Philippines. The Japanese war plans had for decades predicted that the American Pacific Fleet would sally forth across the Pacific to join in battle with the Imperial Navy in the event of war. Yamamoto believed that such a scenario would not be to Japan’s advantage. Time was on the side of the Americans, so any war with the United States would have to be as short as possible. The Japanese had no hope of conquering America, but Yamamoto believed a decisive Japanese victory at the outset of hostilities might encourage the Americans to negotiate a settlement. Otherwise, Japan would eventually succumb to the vastly superior resources and industry of the United States.

An attack on the American Asiatic Fleet in the Philippines had been a long-standing component of the Japanese war plan. What Yamamoto proposed was an audacious preemptive strike against the U.S. Pacific Fleet in Hawaii. Yamamoto had to overcome a great deal of opposition to this plan, but ultimately, through the threat of resignation, he



persuaded the Navy General Staff to approve it. Thus, in addition to the seizure of the southern areas, an attack was to be made on the U.S. Pacific Fleet in Hawaii. The final territories that would be necessary to secure the new empire were the British-held Marshall Islands, the Bismarcks, and the American-controlled islands of Guam and Wake. After the southern resource area was captured and the defensive perimeter was established, it would be necessary to consolidate and strengthen key areas. Any enemy units that attempted to penetrate the defensive perimeter would be intercepted and destroyed.

### The Origins of the Pearl Harbor Strike

The idea for a surprise carrier attack against the U.S. Fleet at Pearl Harbor came to Yamamoto as he watched the pilots of the First Air Fleet make practice attacks against the Japanese fleet. Of course such a scenario had been played through in fleet maneuvers and war games by both the Japanese and American navies as they experimented with their first large carriers. In 1940, however, the prospect of war with the United States loomed as a much greater possibility than it did during the 1920s. Although Yamamoto was steadfastly opposed to such a war, it would be his job to fight it if necessary.

In April and May of 1940 the effectiveness of a carrier-based torpedo plane attack against warships at anchor in a harbor was tested in the Japanese war games. The attack was judged to be a decisive victory for the attackers since the warships had no chance of evading the assault. In November 1940 the British proved this to be true when 21

English biplane torpedo bombers surprised and sank three Italian battleships in the harbor of Taranto.<sup>179</sup> Yamamoto ordered the Japanese naval attaches in London and Rome to study this attack. After receiving the reports, Yamamoto ordered the Chief of Staff of the Combined Fleet, Rear Admiral Fukudome Shigeru, to formulate a plan of attack using carrier planes armed with special short-range shallow-running torpedoes. With the help of Rear Admiral Ōnishi Takajirō, the Chief of Staff of the Eleventh Air Fleet, and Commander Genda Minoru, a highly experienced air officer, the plan was ready by January 1941.<sup>180</sup>

Although Yamamoto had decided that the attack plan assembled by Ōnishi and Genda should be the first blow struck by the Japanese Navy, there was much opposition. Only after vigorous debate did Yamamoto overcome the objections of the Chief of the Navy General Staff, Admiral Nagano Osamu. Late in the summer of 1941 Vice Admiral Nagumo Chuichi also reluctantly accepted the idea of a strike on Pearl Harbor.<sup>181</sup> In September, members of the Operations Section and selected members of the staffs of the Combined Fleet and the First Air Fleet commenced work on the details of the plan.<sup>182</sup> By November Admirals Nagano and Yamamoto decided that the attack on Pearl Harbor would be carried out in the event of war. Yamamoto had by that time overcome all opposition in the navy.

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<sup>179</sup> Dull, *Battle History of the Imperial Japanese Navy*, p:8.

<sup>180</sup> Ibid.

<sup>181</sup> Ibid.

<sup>182</sup> United States Strategic Bombing Survey, Naval Analysis Division, *The Campaigns of the Pacific War* (Washington DC: United States Government Printing Office, 1946) p.15.

Long before the Japanese government had decided on a course of war, Admiral Yamamoto had the Combined Fleet preparing for the initial operations. In August 1941 intensive training of the designated air groups had commenced, with emphasis being placed on shallow water torpedo drops, horizontal and dive bombing, and on strafing tactics. Surface vessels conducted many refueling exercises. In September Kagoshima Bay was chosen as the secret site for practicing a Pearl Harbor attack, and Japanese naval experts reproduced as closely as possible a miniature Pearl Harbor there. Japanese pilots flew over day after day, learning to recognize the features of the harbor.<sup>183</sup> Production of torpedoes with wooden fins, designed to run in Pearl Harbor's shallow waters, was undertaken.<sup>184</sup> By the end of November the task force was considered to be ready.<sup>185</sup>

In November the various units that would participate in the attack on Pearl Harbor began to mobilize. On 10 November an advance force of twenty-seven submarines left the Yokosuka and Kure naval bases. Most of these were I-class submarines and some were equipped with floatplanes for reconnaissance. On 18 November, five more submarines left, each carrying a secret weapon: a two-man midget submarine, designed to penetrate Pearl Harbor and add to the chaos of the general attack. These were the first units of the Pacific War to carry the designation of "Special Attack Units."<sup>186</sup> It was

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<sup>183</sup> Edwin Hoyt, *The Carrier War* (New York: Avon Books, 1972) p.2.

<sup>184</sup> Dull, *Battle History of the Imperial Japanese Navy*, p.8.

<sup>185</sup> United States Strategic Bombing Survey, Naval Analysis Division, *The Campaigns of the Pacific War*, p.15.

<sup>186</sup> Dull, *Battle History of the Imperial Japanese Navy*, p.14.

determined, however, that effort would be made to recover the midget sub crews should they survive their mission. unlike the *kamikaze* and *kaiten* pilots of later years.<sup>187</sup>

The various warships and supply ships assigned to the *Kido Butai* (carrier striking force) began making their way up to the cold, deep water anchorage in Takan Bay in the Kuriles. As the task force began to assemble there at Hitokappu on the island of Etorofu, warships in the Inland Sea began generating false radio traffic to lead American intelligence to believe the Japanese carriers were still in home waters. American intelligence had actually lost track of the carriers and deduced they were on the move, but never seriously considered Pearl Harbor as their destination.<sup>188</sup> By 22 November all of the necessary ships were at the rendezvous point, each one having come by a different course to avoid attention. The anchorage had been selected for its remote location, with the only sign of civilization there being a wireless station, a small concrete pier, and the houses of three fishermen.<sup>189</sup> Several thousand drums of fuel oil had been brought up to Hitokappu and were loaded aboard the carriers, in case the seas proved too rough for refueling from tankers. Preparations were accelerated once Admiral Nagumo received the orders to sail. Ships were fueled, aircraft checked, pilots briefed and ammunition loaded aboard the battleships, cruisers and destroyers. The force departed on 26 November, nosing eastward toward Hawaii.

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<sup>187</sup> As it happened, all five of the midget submarines were lost in the operation, and nine out of the ten men were killed. Ensign Sakamaki Kazuo, the sole survivor, had the dubious distinction of becoming the first U.S. prisoner of war.

<sup>188</sup> Dull, *Battle History of the Imperial Japanese Navy*, p.10.

<sup>189</sup> Hoyt, *The Carrier War*, p.4.

### Operation Z

The ships of the *Kido Butai* sailed in extremely foul weather: dense fog interspersed with winter gales. The route of the task force took it through the north Pacific, which was the least traveled lane during the winter season. The weather made it difficult to sail on schedule in formation, with the fog so thick at times it was impossible to see the ship ahead.<sup>190</sup> Lookouts suffered from frostbite in the cold sea spray, and men who were washed overboard had no hope of rescue in the stormy weather. Signal flags run up the shrouds tore and blew to pieces almost before they could be read. The force had orders to sink any American, British or Dutch ship encountered, and to board any neutral vessels to be sure they did not send radio messages.<sup>191</sup> No ships were encountered on the way to Hawaii, and the force was not seen in such heavy weather. On 3 December, the day designated for the refueling, the wind abated and the operation was concluded without serious mishap. Had it not been possible to refuel from the tankers, the destroyers would have left the task force and returned to Japan.<sup>192</sup> With the smoother seas, the force, which had been sailing at the economical speed of 13 knots, was able to increase its speed to 26 knots and maintain its schedule. The thick fog persisted.<sup>193</sup>

On board the *Akagi*, Admiral Nagumo worried about the success of the operation. It was not certain how much of the U.S. Pacific Fleet would be in Pearl Harbor at the time

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<sup>190</sup> John Toland, *Infamy: Pearl Harbor and its Aftermath* (New York: Berkley Books, 1983) p.9.

<sup>191</sup> Hoyt, *The Carrier War*, p.5.

<sup>192</sup> United States Strategic Bombing Survey, Naval Analysis Division, *The Campaigns of the Pacific War*, p.15.

<sup>193</sup> Dull, *Battle History of the Imperial Japanese Navy*, p.11.

of the attack. The Japanese consulate staff in Honolulu maintained constant surveillance of the harbor and tried to keep Tokyo informed of ship dispositions. When Nagumo sailed from Hitokappu, he had been led to believe there might be six carriers at Pearl Harbor. Subsequently, he was informed that the carrier *Saratoga* was at San Diego and the *Wasp* was in the Atlantic. Japanese intelligence had not yet discovered that the carriers *Hornet* and *Yorktown* were also in the Atlantic.<sup>194</sup> On 6 December Nagumo learned that there were no carriers present in Pearl Harbor. That news was disappointing, but all eight battleships were in port. American aerial reconnaissance was mainly directed toward the southwest, leaving Nagumo's launch point unobserved and Hawaiian radio broadcasts gave no hint of an alert. It seemed that surprise might be possible.

The *Kido Butai* reached a point 400 miles north of Oahu by the night of 6 December. At 2100 hours Admiral Nagumo summoned all off-duty crewmen to the flight deck and read to them a message received from Admiral Yamamoto. After Nagumo and the flight leaders said a few words, the famous battle flag that Admiral Tōgō Heihachirō had hoisted aboard his flagship *Mikasa* before the Battle of Tsushima Strait in 1905 was raised up the mast of the *Akagi*.<sup>195</sup> The force turned south and continued to run at 26 knots. The seas were heavy and it was not known whether launches would be possible. Before the first wave took off, the cruisers *Tone* and *Chikuma* each launched a Type Zero seaplane for a last-minute reconnaissance of the Pearl Harbor and Lahaina anchorages. In addition, the *Tone*, the *Chikuma*, and the battleships *Hiei* and *Kirishima* each launched a

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<sup>194</sup> Ibid.

<sup>195</sup> Hoyt, *The Carrier War*, p.7.

Type 95 seaplane to patrol around Oahu during the attack.<sup>196</sup> An hour later it was decided that the first wave should be launched immediately, in case the operation took longer than planned. The carriers turned north into the wind and the first attack wave was launched successfully.<sup>197</sup>

The Pearl Harbor attack was carried out by two waves of aircraft composed of three groups each. Commander Fuchida Mitsuo led the first attack wave of 183 planes. There were two contingency plans in effect, depending on the level of surprise attained. If the Americans had been alerted, the 51 Type 99 dive bombers would rush in first to create confusion, followed by the 40 Type 97 torpedo planes and the fighter cover. If surprise had been achieved the torpedo planes would move first, followed by the 49 high-level bombers with the dive bombers attacking the airfields. As they listened to the radio broadcasts, nothing seemed to indicate that they had been spotted. The only other aircraft in the air were a few small civilian planes that were forced down. It was Fuchida's responsibility to determine the degree of surprise achieved and fire one flare if the Americans were surprised, two flares if they had been alerted. All signs indicated that the level of surprise was complete, so Fuchida fired a single flare. The leader of the fighter group, Lieutenant Commander Itaya Shigeru, failed to see the flare, and continued flying on. Fuchida fired another flare and caught Itaya's attention, but the dive bomber group interpreted the two flares as a signal they were to go in first.<sup>198</sup>

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<sup>196</sup> United States Strategic Bombing Survey, Naval Analysis Division, *The Campaigns of the Pacific War*, p.16.

<sup>197</sup> Dull, *Battle History of the Imperial Japanese Navy*, p.15.

<sup>198</sup> Hoyt, *The Carrier War*, p.9-10.

Apart from the initial miscommunication, the attack went very well for the Japanese. The specially prepared torpedoes and shallow drop technique worked just as planned, and the destruction along Battleship Row was nearly complete. For the first 15 minutes of the attack Pearl Harbor was full of wave-skimming torpedo planes, plunging dive bombers, and high-level bombers, small specks in the sky – all discharging their lethal cargoes.<sup>199</sup> The battleship *West Virginia* was one of the first ships hit when two torpedoes slammed into her, followed by five more torpedoes and two bombs. The *West Virginia* took on a heavy list, but the efforts of the crew prevented her from rolling over and she settled down on an even keel with her decks awash. Two officers and 103 men perished aboard the *West Virginia*. Captain Mervin Bennion of the *West Virginia* was killed by bomb shrapnel from a hit on the *Tennessee*.<sup>200</sup> The *West Virginia* was berthed to the outside of the *Tennessee*, and thus protected that ship from torpedoes. The *Tennessee* had been hit by two bombs early in the battle, but the damage was not critical and only five men were lost.<sup>201</sup> The damage to the *Tennessee* was officially listed as serious fire damage aft in the officers' quarters, but moderate damage otherwise.<sup>202</sup>

The *Arizona* suffered complete devastation during the attack. The first hit was from a torpedo, but the fatal strike was made with a bomb that penetrated the deck and exploded in the forward magazine. In an instant the *Arizona* rose from the water, broke in half, and

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<sup>199</sup> Dull, *Battle History of the Imperial Japanese Navy*, p.17.

<sup>200</sup> Charles E. Pfannes and Victor A. Salamone, *The Great Battles of World War II, Volume II: The Pacific Naval Battles* (New York: Zebra Books, 1986) p.72.

<sup>201</sup> Ibid. p.73.

<sup>202</sup> Dull, *Battle History of the Imperial Japanese Navy*, p.18.



settled back as a tall column of flame and smoke hurtled skyward.<sup>203</sup> Seven other bomb hits added to the destruction, with the first bomb going down the smoke stack. Admiral Isaac Kidd and Captain Van Valkenburgh were killed instantly; in all 47 officers and 1,056 men perished aboard the *Arizona*.<sup>204</sup> Hundreds were trapped below decks for hours before rising water or fouled air killed them.<sup>205</sup> The awful majesty of the *Arizona*'s end was not lost on Fuchida and his crew as they watched the column of dark red smoke rise 1,000 feet into the air and felt a stiff shock wave rock the plane.<sup>206</sup>

The battleships occupying the outside positions bore the brunt of the attacks, and the *Oklahoma* took three torpedo hits in quick succession. With her portside torn open, the *Oklahoma* began to list heavily. Two more torpedo hits hastened the roll and the ship capsized leaving only a small part of her hull above water and trapping many of the crewmen below decks. Twenty officers and 395 men perished on the *Oklahoma*.<sup>207</sup> The battleship *Maryland* was berthed beside the *Oklahoma*, so was shielded from torpedo attack. The *Maryland* took two bomb hits from Fuchida's high-level bombing attack, with one causing relatively light damage.<sup>208</sup> While suffering the lightest damage of the battleships, the *Maryland* lost two officers and two crewmen.<sup>209</sup> Moored at the head of Battleship Row, the *California* was alone and exposed. The watertight doors on the *California* had been left open, so when she was hit by two torpedoes the flooding spread

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<sup>203</sup> Ibid. p. 17.

<sup>204</sup> Pfannes and Salamone, *The Great Battles of World War II, Volume II: The Pacific Naval Battles*, p.73.

<sup>205</sup> Thomas Griess, ed, *The Second World War: Asia and the Pacific* (Wayne: Avery Publishing Group, 1984) p.56.

<sup>206</sup> Costello, *The Pacific War, 1941-1945*, p.136.

<sup>207</sup> Pfannes and Salamone, *The Great Battles of World War II, Volume II: The Pacific Naval Battles*, p.74.

<sup>208</sup> Costello, *The Pacific War, 1941-1945*, p.137.

<sup>209</sup> Pfannes and Salamone, *The Great Battles of World War II, Volume II: The Pacific Naval Battles*, p.74.

rapidly. Quick efforts by the crew prevented the ship from capsizing, and the *California* sank gradually over the next three or four days, coming to rest solidly on the bottom of the harbor. The ship's mainmasts and the tops of the main batteries remained exposed, while the quarterdecks were under twelve feet of water.<sup>210</sup>

The battleship *Nevada* was the only capital ship to get underway during the attack. The *Nevada* was hit early in the attack by a torpedo that opened a 45-foot hole in the bow. Overcoming this injury and two bomb hits, the large ship made steam and began moving down the channel to the cheers of spectators. This brave action drew the attention of the Japanese pilots who hoped to sink the large ship in the narrow entrance to the harbor. When this possibility was realized by the senior American commander on the scene, the *Nevada* was ordered to beach herself. Aided by tugs, the old battleship was nudged ashore at Waipo Point.<sup>211</sup>

The battleship *Pennsylvania* was in drydock during the attack, along with destroyers *Cassin* and *Downes*. The *Pennsylvania* was not directly hit, but bombs blasted the *Cassin* and she rolled over onto the *Downes*. The *Pennsylvania* also suffered moderate damage from this, but not of a vital nature.<sup>212</sup> On the other side of Ford Island, the old battleship *Utah* was moored with the light cruisers *Raleigh* and *Detroit*. The *Utah* had been converted into a target ship and the Japanese pilots were warned not to waste their time

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<sup>210</sup> Ibid.

<sup>211</sup> Costello, *The Pacific War, 1941-1945*, p.139.

<sup>212</sup> Pfannes and Salamone, *The Great Battles of World War II, Volume II: The Pacific Naval Battles*, p.75.

on her, but the large ship proved too tempting a target. Two torpedoes hit the *Utah* and she capsized in short order.<sup>213</sup>

In addition to the battleship losses, many of the smaller ships in the harbor were hit. The cruisers *Raleigh*, *Helena* and *Honolulu* suffered moderate damage. The destroyer *Shaw*, in a floating dry dock, had her bow blown off in a spectacular explosion. The repair ship *Vestal* was moored next the *Arizona* and had to be beached to keep from sinking. The seaplane tender *Curtiss* was badly damaged by a crashing plane and a 500-pound bomb. The minelayer *Oglala* was torpedoed and capsized instantly.<sup>214</sup>

Meanwhile, in other parts of Oahu, American air power was being reduced by attacks on the various airfields. While Japanese planes were attacking the harbor area, Lieutenant Commander Takahashi Kakuichi divided his dive bombers into two groups. The main portion, under his command bombed Ford Island and nearby Hickam Field, while the second group struck inland at Wheeler Field. The damage to the air strength on Oahu was considerable, due in part to the element of surprise, but also due to the arrangement of aircraft ordered by Lieutenant General Walter Short, who feared saboteurs more than air attack. Accordingly, the army aircraft had been parked in clusters rather than being dispersed around the field. The arrangement compounded the damage caused by Japanese bombs. Within minutes the majority of first-line aircraft of the United States Army Air Corps were destroyed.<sup>215</sup> Of the Navy's aircraft at Ford Island, nearly half were heavily damaged or destroyed. Of the 36 Catalina flying boats at Kaneohe, 27 were

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<sup>213</sup> Ibid.

<sup>214</sup> Dull, *Battle History of the Imperial Japanese Navy*, p.18.

<sup>215</sup> Griess, ed, *The Second World War: Asia and the Pacific*, p.55.

destroyed and six more damaged. The Marines at Ewa lost 9 out of 11 Wildcat fighters, 18 of their 32 scout bombers and all six auxiliary planes. The Army fared no better.<sup>216</sup>

The planes of the first attack wave departed when their ammunition ran out and their fuel was low. The second attack wave of 181 planes arrived about one hour after the first bombs fell. Led by Lieutenant Commander Shimazaki Shigekazu, the second wave attacked with similar determination, but was less effective without the element of surprise. Smaller ships had already begun to exit the harbor and anti-aircraft guns had been supplied with more ammunition in the interim. The second wave remained for nearly an hour before withdrawing toward the carriers at 0945 hours.

The Japanese losses for the two attacks amounted to 29 planes and their crews, far fewer than Admiral Yamamoto had dared imagine. The American death toll continued to climb after the attack. Small craft dodged pools of burning oil, snatching fuel-blackened survivors from the water. Divers worked for two days trying to cut their way to reach the men who could be heard tapping desperately in the upturned hull of the *Oklahoma*. Only 30 of the more than 400 would be saved.<sup>217</sup> The final toll was 2,403 servicemen killed – 1,000 of them lost on the *Arizona* – and nearly 2,000 men wounded. Only 43 aircraft remained operational, with 188 planes having been destroyed on the ground and another 159 damaged.<sup>218</sup>

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<sup>216</sup> Ibid.

<sup>217</sup> Costello, *The Pacific War, 1941-1945*, p.140.

<sup>218</sup> Ibid.

When Lieutenant Commander Fuchida returned to the *Akagi*, he and Commander Genda urged that another strike be launched against the shore installations and oil tank farm. On the *Hiryū*, the aggressive commander of the Second Air Fleet, Rear Admiral Yamaguchi Tamon was already preparing for another strike. Despite the arguments of Fuchida and Genda, however, Nagumo's chief of staff, Rear Admiral Kusaka Ryūnosuke advised that the fleet should withdraw. Nagumo valued Kusaka's opinion, and he was worried about the location of the American carriers. Nagumo reasoned that the mission objective of disabling the Pacific Fleet had been met, and there was no point in subjecting the *Kido Butai* to possible counter attacks from carriers, submarines or the remaining land-based bombers. A withdrawal was signaled at 1335 hours. Admiral Yamamoto was extremely angry about this, considering it a decision typical of Nagumo. Although his staff suggested ordering Nagumo to turn back and finish the job, Yamamoto made it a point to leave the decision to the commander on the scene.<sup>219</sup> Still, Yamamoto had no use for Nagumo. Admiral Nagumo had a reputation for complaining, and he had been a sympathizer with the "Fleet Faction" during the 1930s. Unfortunately, even as commander-in-chief of the Combined Fleet, Admiral Yamamoto did not have the authority to select members of his staff or his subordinate field commanders. All appointments were made by the Navy Personnel Department. In contrast, Admiral Husband Kimmel, commander of the U.S. Pacific Fleet had been able to select the members of his own staff.

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<sup>219</sup> Hoyt, *Yamamoto: The Man Who Planned Pearl Harbor*, p.178.

Tactically speaking, Operation Z was an outstanding success. It had been standard naval doctrine that a fleet could not operate successfully more than 2,000 miles from its base. Furthermore, it was believed that a battle fleet would lose ten percent of its strength for every 1,000 miles it operated from its base.<sup>220</sup> Yamamoto introduced a new brand of naval warfare, and by doing so validated the arguments of American General Billy Mitchell. In the mid-1920s Mitchell had tried in vain to convince his peers that planes could sink battleships. For the first time in history a naval force went into action depending entirely on its aircraft carriers, and for a minimal loss of aircraft struck a devastating blow against the enemy's battle line.

In strategic terms Operation Z was poorly executed, however. The main purpose of the attack on Pearl Harbor was to buy time for the Japanese to capture and consolidate its new sphere of influence in Southeast Asia and China. Admiral Nagumo successfully destroyed the primary fighting elements of the United States Pacific Fleet, but he did not deny the Americans a major naval base in Hawaii. Had the advice of Fuchida and Genda been heeded, the Japanese would have destroyed millions of barrels of oil in the large tank farm as well as the repair shops and other shore facilities. As Admiral Chester Nimitz later observed, "All of the oil for the fleet was in surface tanks at the time of Pearl Harbor. We had about 4.5 million barrels of oil out there and all of it was vulnerable to .50-caliber bullets. Had the Japanese destroyed the oil, it would have prolonged the war another two years."<sup>221</sup>

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<sup>220</sup> Dull, *Battle History of the Imperial Japanese Navy*, p.8.

<sup>221</sup> Daniel Yergin, *The Prize* (New York: Simon and Schuster, 1991) p.327.

### Conquest of the Southern Resources

While the six heavy carriers of the Japanese Navy were attacking the American Pacific Fleet in Hawaii, the smaller carriers were supporting other elements of the fleet in the rapid conquest and consolidation of Southeast Asia. By the end of 1941 the Japanese had captured Wake Island, the Gilberts, Hong Kong and Davao on the Philippine island of Mindanao. Additional landings were made in Thailand and Malaya, and on the main Philippine island of Luzon. On 10 December Japanese aircraft caught and sank the British battleship *Prince of Wales* and the battle cruiser *Repulse* east of Malaya as they were making for Singapore, causing the loss of 47 officers and 793 men.<sup>222</sup> This deprived Great Britain of its main striking power in the Far East and robbed the Allies of the last two operational battleships in the Pacific.<sup>223</sup>

The carrier *Ryūjō* was operating with the southern force during the Japanese southern campaign. In order to participate in the southern operations, the *Ryūjō* had departed Saeki Bay on 27 November and entered the anchorage at Palau on 5 December. On the next day the *Ryūjō* sortied and was in position 100 miles east of Davao by early morning on 8 December (7 December at Pearl Harbor). Thirteen Type 97 torpedo planes and nine Type 96 fighters attacked Davao and met little resistance. This was followed by a second attack made by two torpedo planes and three fighters. The fighter of Petty Officer Second Class Kawanishi Hiroshi was brought down by anti-aircraft fire. After making an

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<sup>222</sup> Costello, *The Pacific War, 1941-1945*, p.159.

<sup>223</sup> Charles Messenger, *The Chronological Atlas of World War Two* (New York: MacMillan Publishing Company, 1989) p.78.

emergency landing, Kawanishi burned his plane and committed suicide.<sup>224</sup> On 12 December the *Ryūjō* supported the landings at Legaspi, and returned to Palau by 14 December. After three days at Palau, *Ryūjō* again sortied to cover the invasion of Davao on 19 and 20 December, and also the landings on Jolo Island (until 24 December). With the conclusion of the Philippine landings, *Ryūjō* was posted to Malayan forces. The *Ryūjō* moved to Cam Ranh Bay on 1 January 1942 and supported operations in Singapore and in the Dutch East Indies area. In April 1942, the *Ryūjō* moved into the Indian Ocean with Vice Admiral Ozawa's cruiser force to participate in commerce raiding.<sup>225</sup>

#### The Kido Butai Turns South

As the *Kido Butai* retired from the Pearl Harbor attack, it was ordered to execute a number of attacks in support of other operations. Admiral Yamaguchi's Carrier Division 2, with the *Sōryū* and the *Hiryū*, were ordered to support the Wake Island occupation forces, and attacks were made on 21-23 December. The carriers returned to Kure on 29 December and the crews enjoyed a period of rest. Meanwhile, Admiral Nagumo and Carrier Divisions 1 and 3 had been ordered to attack Midway Island on their way back to Japan. Following the attack on Pearl Harbor, Admiral Yamamoto and the Combined Fleet had prepared to set sail eastward to support the retiring carriers should the Americans attempt to pursue. On 14 December, six days after Yamamoto ordered Nagumo to hit Midway, there was no word of an attack. Finally, the next day Nagumo

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<sup>224</sup> Hata and Izawa, *Japanese Naval Aces and Fighter Units in World War II*, p.32.

<sup>225</sup> Griess, ed. *The Second World War: Asia and the Pacific*, p.100.



reported that the Midway attack was being abandoned due to foul weather and that the force was headed for Japan.<sup>226</sup> Disgusted, Yamamoto ordered Nagumo to attack Wake Island, but Nagumo stalled again.

By 23 December the *Kido Butai* had returned to the Inland Sea. The respite was short, for on 8 January the *Akagi*, the *Kaga*, the *Shōkaku* and the *Zuikaku* sailed southward to join in the attack on the Bismarck Archipelago. On 20 January the force attacked Rabaul, and the next day hit Kavieng. A second attack was made on Rabaul on 23 January. The Japanese carriers met no opposition in these raids and afterward retired to Truk. On 1 February 1942, in response to Vice Admiral Halsey's carrier raid on the Marshalls, the Japanese carrier force sortied from Truk but failed to engage the Americans. The ships then proceeded to Kendari and on 19 February staged a raid on Port Darwin. From Port Darwin the carriers proceeded westward and attacked Tjilatjap in support of the Java operations.<sup>227</sup> After raiding Tjilatjap, the *Kido Butai* headed west, less the *Kaga*, which returned to Japan with engine trouble.

### Operation C: The Indian Ocean Raids

Sir James Somerville, the commander-in-chief of the British Eastern Fleet, had received a warning that the Japanese might conduct a raid on the British bases at Trincomalee and Colombo on Ceylon. Somerville had received accurate intelligence about the size and composition of Nagumo's force, but his staff had believed the raid

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<sup>226</sup> Hoyt, *Yamamoto: The Man Who Planned Pearl Harbor*, p.181.

<sup>227</sup> Hata and Izawa, *Japanese Naval Aces and Fighter Units in World War II*, p.22.

would occur on or about 1 April. After preparing his forces and laying in wait, Somerville began to wonder whether or not there was going to be an attack. As his ships were running low on water and supplies, he ordered them to return to base. Afterward, Somerville divided his force. Two cruisers were sent off, one to resume refitting and the other to escort a convoy. The light carrier *Hermes* and the destroyer *Vampire* were sent to Trincomalee to resume preparations for the upcoming invasion of Madagascar. After the forces had been separated, Somerville received word that the Japanese carrier fleet had been sighted, and an attack on Colombo was likely the following day, on 5 April 1942.<sup>228</sup>

Reminiscent of the Pearl Harbor raid, Nagumo sent an attack force of 315 planes to attack Colombo on Easter Sunday, just before 0800 hours. This time, he instructed his flyers to attend to the harbor installations and oil tanks as well as the ships.<sup>229</sup> Unlike the Pearl Harbor or Port Darwin attack, the Japanese carrier planes met fierce resistance from British Hurricane fighters. Within an hour the attack was over: the Japanese had sunk the destroyer *Tenedos* and an armed cruiser, and damaged the submarine tender *Lucia* and a freighter. The machine shops were destroyed and the British lost 25 planes and two Catalina flying boats. The Japanese lost seven planes.<sup>230</sup>

Over the next couple of days, Nagumo caught the British units in a piecemeal fashion. After attacking Colombo, the Japanese caught the two heavy cruisers *Dorsetshire* and *Cornwall* and sank them. The *Hermes* and her escorts had been ordered to clear the

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<sup>228</sup> Dull, *Battle History of the Imperial Japanese Navy*, p.107.

<sup>229</sup> *Ibid.* p.108.

<sup>230</sup> *Ibid.*

harbor at Trincomalee in anticipation of a Japanese attack there. After the Japanese made the attack on 9 April, the *Hermes* reversed course and headed back. The Japanese located these ships and sank the *Hermes* along with the destroyer *Vampire*, the corvette *Hollyhock*, the depot ship *Athelstane* and the oiler *British Sergeant*.<sup>231</sup> With this final victory, Nagumo turned his force eastward and headed for Japan. The aircraft of Somerville's heavy carriers *Indomitable* and *Formidable* never located the Japanese carriers.

While Nagumo's five carriers were maneuvering around Ceylon, Admiral Ozawa's Malaya Force with the carrier *Ryūjō*, conducted commerce raids along the east Indian coast. The planes of the *Ryūjō* bombed Vizagapatam and Cocanada on 6 April, causing panic among the civilians. According to British records, Ozawa's force sank 23 freighters totaling 32,404 tons in five days of raiding.<sup>232</sup>

#### Conclusion of the First Phase

During the first few months of the war the Japanese Army and Navy enjoyed many spectacular successes. Throughout the period the Japanese relied heavily on their carrier air forces. Although Operation Z might have been made more effective than it was, it did successfully neutralize the Pacific Fleet. Afterward the Japanese carrier divisions sailed across the Pacific, supporting the myriad land operations throughout Southeast Asia. The

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<sup>231</sup> Ibid. p.109.

<sup>232</sup> Ibid. p.111.

Indian Ocean raids effectively neutralized British sea power in that area and secured for a time the western flank of the new Japanese perimeter.

There was a significant side effect of the Pearl Harbor strike that American and Japanese naval planners could not have foreseen. The destruction of the American battle line forced the United States Navy to abandon the traditional battleship doctrines and rely entirely on carrier air power to thwart Japanese advances. Yamamoto believed it was necessary to neutralize the Pacific Fleet in order to protect the southern advance. It was expected that the American fleet would immediately sortie from Pearl Harbor once the Philippines had been attacked. It is ironic that before Pearl Harbor was attacked, the American war plan had called for the abandonment of the Philippines. Only after six to nine months would the American fleet have sailed to seek a decisive battle somewhere in the Marshall Islands. This plan, called "Rainbow 1," meshed remarkably well with the traditional Japanese war plans calling for a decisive engagement between the battle lines in the vicinity of the Marshalls.<sup>233</sup> According to the American plan, there would have been little or no immediate threat to the southward advance once the Philippines had been captured.

### The Japanese Conquest of the Dutch East Indies

The Japanese enjoyed very good fortune in their capture of the Dutch East Indies. Although oil workers there had attempted to destroy their facilities before escaping, the

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<sup>233</sup> Masanori Ito, *The End of the Imperial Japanese Navy* (New York: Jove Books, 1962) p.36-37.

damage was generally less than was expected.<sup>234</sup> In short order some 4,000 Japanese workers, about 75 percent of the oil workers in Japan, were sent to the Indies. One very fortunate instance was the discovery of an oil rig left behind on Sumatra by the Caltex group; Caltex had just discovered a new site and was preparing to drill when the Japanese invaded. The Japanese continued the work and struck Japan's only wildcat well during the war. The Midas Structure, as Caltex had dubbed it, gave the largest yield to date between California and the Middle East.<sup>235</sup> The Dutch East Indies had proved to be every bit as rich in fuel as the Japanese had hoped. Throughout the occupied areas the Japanese were able to gather about 4,000,000 barrels of oil that had been abandoned by the Allies.<sup>236</sup>

As far as the Imperial Navy was concerned, the Dutch East Indies represented the crown jewel of the Japanese grand war plans. The Japanese armed forces had executed the operations with a very high degree of coordination, the like of which would not be seen again in the Pacific War. The relative ease with which the Japanese neutralized the American fleet and pushed the British and Dutch out of the South Pacific gave the Japanese planners a genuine sense of superiority. The Japanese carrier force had traveled thousands of miles across the vastness of the Pacific and Indian Oceans, managing to be everywhere it was needed. The Japanese carrier air groups suffered lightly, while dealing crippling blows to the Allied fleets and installations. Not one of the Japanese carriers

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<sup>234</sup> Daniel Yergin, *The Prize* (New York: Simon and Schuster, 1991) p.356.

<sup>235</sup> Ibid. p.356-57.

<sup>236</sup> Freeburg and Goralski, *Oil and War*, p.190.

suffered a hit during the opening phase of the war, and Allied carriers failed to engage the Japanese carriers.

The Japanese war plan was very ambitious, and it was successful for several reasons. Japanese planners had been exhaustive in their efforts to synchronize all of the various operations. The raid on Pearl Harbor is one example of the high degree of detail and thought that went into the plans. Although the general plan was audacious in its scope, it served to surprise the Allied commands significantly and made a coordinated resistance quite impossible. The Japanese left very little time for the Allies to react, so reinforcements were all but impossible. The capture of so many British troops in Hong Kong and Singapore, as well as American soldiers in the Philippines, is testimonial to the lightning swiftness of Japanese campaigns. Another related factor was the relatively low regard the Anglo-American forces had for the Japanese military. Although the Americans and British had come to see the Japanese as aggressive and warlike, their disdain for the abilities of the Japanese fighting man prevented them from imagining that such an offensive was possible. Japanese naval aircraft were at that time generally superior to Allied counterparts, and a large part of the Japanese military forces were experienced fighters. In particular, Japanese carrier pilots were exceptional and struck with effectiveness.

Although many in Japan felt they had the cause to celebrate, certain people knew to expect a change in fortune. Admiral Yamamoto was perhaps one such person. He had once remarked that in a war with Britain and the United States he would win victory after

victory in the six to twelve months, but afterward he had no expectation of victory.<sup>237</sup> He would not live to see how true those words would be. There were a number of factors that contributed to Japanese defeat, and these were not present during the opening months of the war.

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<sup>237</sup> Hoyt, *Yamamoto: The Man Who Planned Pearl Harbor*, p.1.

## CHAPTER 6

### THE END OF THE JAPANESE CARRIER FORCE

As the Pacific War progressed the Japanese naval construction programs became increasingly difficult to complete. During the first few months of the war the Japanese Navy enjoyed superiority in carrier strength. A number of new carriers were expected to be completed throughout the year, and during those months it seemed that the British and American navies had been dealt decisive blows. The British carrier *Hermes* had been sunk and there were no other British carriers in the Pacific. The United States Navy had the carriers *Enterprise*, *Yorktown* and *Lexington* with which to match the Japanese onslaught. The spectacular successes of the Japanese offensives during 1941 and the first part of 1942 inspired a high degree of overconfidence among the Japanese planners. Even Admiral Yamamoto was taken in to some degree, as he planned to use the momentum of the first offensives to extend the operations beyond the original plan. His purpose in doing so was to add depth to the defensive perimeter that was to be established around the newly acquired southern resources area.

Unfortunately, adding depth to the defensive perimeter meant adding a broader area that would have to be guarded. Admiral Yamamoto was particularly concerned about an American attack against the Japanese home islands, and as if to oblige him, the United States Navy made an audacious strike using the new carrier *Hornet*. The *Hornet* had departed Norfolk and passed through the Panama Canal, arriving at the Alameda Naval Air Station by 1 April 1942. The *Hornet* was loaded with B-25 bombers and together



with two cruisers, four destroyers and an oiler, set out westward across the Pacific. The *Hornet* group, under Captain Marc Mitscher, made a rendezvous in mid-Pacific with Admiral William Halsey's *Enterprise* group. The bombers were to have been carried to a take-off point 400 miles east of Tokyo, but the force was spotted by a Japanese patrol boat. The cruiser *Nashville* was ordered to sink the Japanese craft, but in the rough seas it took 925 shells and twenty-nine minutes to finish the job, by which time the position and composition of the force had been radioed to Tokyo several times.<sup>238</sup> Consequently, the Army bombers under Colonel James Doolittle were forced to take off at a distance of about 650 miles from Tokyo. The 16 B-25s each managed to drop fire bombs on and around Tokyo before turning for the coast of China. All aircraft were lost, and some of the crews were killed or captured. The *Hornet* and *Enterprise* turned for home as soon as the planes were off, and after sinking two more Japanese patrol boats, made it back to Pearl Harbor without difficulty. Admiral Nagumo's carrier force had returned to the South Pacific after the Indian Ocean raids and was unable to intercept the fleeing American force. One result of the raid was that the new light carrier *Ryūhō* was hit and damaged while being converted at Yokosuka, further delaying her completion.<sup>239</sup>

Although the damage to Tokyo was minor, the positive effect on American morale was significant. Admiral Yamamoto was quite shaken as well, until he learned that the raid was essentially a stunt. Even so, the Doolittle Raid prompted Yamamoto to push

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<sup>238</sup> Hoyt, *The Carrier War*, p.30.

<sup>239</sup> Gerald Wheeler, "Japan's Wartime Carrier Construction." *U.S. Naval Institute Proceedings* (September 1955) p.1033.

harder for the extension of the defensive perimeter and the destruction of the remaining American carriers.

### Operation MO

After four months of war, the American fleet had not been engaged in the decisive battle that Admiral Yamamoto had hoped for. Preparations were started for a major thrust at Midway Island in the central Pacific. As Yamamoto began coordinating the Midway operation, the Navy General Staff and the Japanese Army pressed for an operation in the New Guinea area. The Navy General Staff and the Army could not agree on an invasion of Australia, but both agreed that New Guinea and the Solomon Islands had to be secured. The key to winning New Guinea was the seizure of Port Moresby, on the southeastern shore of that island. Although Operation "MO" would be a diversion of forces from Yamamoto's Midway plans, the scheme seemed simple enough considering the relative ease with which previous war plans had been realized. Yamamoto agreed, and it was decided that Tulagi Island, Ocean Island and Nauru Island would be secured along with Port Moresby. Accordingly, the *Zuikaku* and the *Shōkaku* and two heavy cruisers were detached from Nagumo's carrier force as it returned home from the Indian Ocean raids. Also, the light carrier *Shōhō*, which had joined the fleet on 26 January, was assigned to support the transport force for the operation. The Japanese assembled a sizable force to secure the southeastern portion of their defensive perimeter. In addition to the two fleet carriers and single light carrier, there were six heavy cruisers, three light

cruisers, 14 destroyers, a seaplane tender, and numerous transports and smaller craft. The operation was under the direct command of Vice Admiral Inoue Shigeyoshi at Rabaul. Japanese war plans tended to be complex, and the organization for Operation “MO” was no exception. The force was divided into several groups under the direct supervision of six admirals.<sup>240</sup>

The Americans had learned of Operation “MO” through decoded radio traffic. It was known that the *Zuikaku* and the *Shōkaku* were being sent south to participate in the operation and that the new light carrier *Shōhō* was being used for it as well. The *Enterprise* and the *Hornet* were returning to Pearl Harbor following the Doolittle raid, and the *Saratoga* was laid up in Puget Sound undergoing a refit. Rear Admiral Frank Jack Fletcher and the *Yorktown* group had been operating from Noumea in New Caledonia, and it was decided that he would lead a thrust into the Coral Sea area to thwart the Japanese plan. Rear Admiral Aubrey Fitch who had recently assumed command of the *Lexington* group at Pearl Harbor, was ordered to rendezvous with Fletcher in the Coral Sea.

Beginning with the first Japanese landings at Tulagi on 4 May 1942, and ending with the final carrier strikes four days later, the Battle of the Coral Sea marked the first carrier duel in history, a battle in which the two opposing surface forces never made visual contact. Out of the carriers involved, the *Shōhō* was the first hit on 7 May. Over 90 American planes pounced on the *Shōhō* on 7 May. Planes from the *Lexington* located the

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<sup>240</sup> Griess, ed, *The Second World War: Asia and the Pacific*, p.270-71.

force at 0950 hours and planes from the *Yorktown* arrived at 1025. The first wave scored a near miss on the *Shōhō* which blew five planes over the side, but wild evasive maneuvering prevented further damage.<sup>241</sup> After the *Yorktown* planes arrived, a bomb smashed aft and broke the rudder of the *Shōhō* so she could not steer or evade. In a few moments the small carrier was hit with thirteen bombs and seven torpedoes. The order to abandon ship was given at 1031 hours, and the *Shōhō* sank only four minutes afterward. Only 255 men out of a crew of 800 could be saved.<sup>242</sup>

On 8 May, after days of tense maneuvering and searching, the two forces finally located one another. Both sides launched strikes in the early morning, and the resulting attacks happened almost concurrently. The American planes found the *Shōkaku* and the *Zuikaku* just as the latter was moving into the cover of a rain squall, eight miles from her sister ship. Thirty-nine planes from the *Yorktown* attacked the *Shōkaku*, scoring two bomb hits that started gasoline fires and damaged the flight deck. These hits prevented the *Shōkaku* from launching aircraft for an hour, although she was still able to land planes.<sup>243</sup> Less than half of the *Lexington* planes found the Japanese carriers, and they only scored a single bomb hit on the *Shōkaku*. The *Shōkaku* was in no danger of sinking from these three hits, but 109 men were killed and another 114 wounded.<sup>244</sup> After the fires were extinguished, the *Shōkaku* sent 46 planes to the *Zuikaku*, which had lost almost

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<sup>241</sup> Hoyt, *The Carrier War*, p.38.

<sup>242</sup> Dull, *Battle History of the Imperial Japanese Navy*, p.125.

<sup>243</sup> Ibid. p.126.

<sup>244</sup> Ibid.

that number. Admiral Takagi Takeo ordered the *Shōkaku* to retire to Japan. She made it under her own power, but at one point she nearly capsized from the damage.<sup>245</sup>

While the *Shōkaku* was being attacked, the Japanese flights located the *Lexington* and the *Yorktown*. The Japanese pilots were more experienced and more effective in their attacks. The *Lexington* took two torpedo hits, one on the forward port quarter, and the other on the port side opposite the island. As the *Lexington* was under attack by the torpedo planes, the dive bombers made their runs. One placed a bomb in a forward ammunition box and another bomb hit the stack.<sup>246</sup> By the end of the air battle the *Lexington* had water in three of her boiler room and numerous small fires. The *Lexington* was still able to launch and recover aircraft, however, and the damage control officer was confident that everything was under control. It probably would have been, but somewhere down below a motor generator had been left running and gas fumes from a ruptured tank began to collect in the same area, causing a tremendous explosion at 1247 hours. It is a testimony to the sturdy nature of the *Lexington* that with fires below and communications knocked out the ship was still conducting flight operations at 1445 hours, when another round of explosions below prompted Captain F.C. Sherman to shut them down. The order was given to abandon ship at 1630, and Admiral Fitch departed at 1707 hours. After a last inspection to see that all hands were safely off, Captain Sherman departed. Another explosion rocked the ship as bombs and torpedoes began to go off

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<sup>245</sup> Hoyt, *The Carrier War*, p.41.

<sup>246</sup> Ibid.

below decks. The destroyer *Phelps* was ordered to torpedo the *Lexington*, scuttling the carrier at 2156 hours.<sup>247</sup>

While the *Lexington* was absorbing hits during the air attack, the *Yorktown* was also under fire. Torpedo planes made runs against the *Yorktown*, but the attack was only on the port side and the carrier was able to evade the threat. One dive bomber, however, hit the *Yorktown* with an 800-pound bomb which penetrated four decks before exploding. The explosion killed 66 men in the confined spaces.<sup>248</sup> Fortunately for the *Yorktown*, the missile passed through both the flight and hangar decks before exploding, and the engine compartments were not affected. Flight operations were not impaired by the Japanese attacks.

The losses for the Americans and the Japanese were nearly even in the Coral Sea engagement. The United States Navy lost the carrier *Lexington*, the destroyer *Sims* and the fleet oiler *Neosho*. In addition, 66 planes were lost and 543 men were killed or wounded. The Japanese Navy lost the light carrier *Shōhō* and the destroyer *Kikuzuki*. The Japanese Navy also lost 77 planes and 1,074 men were killed or wounded.

A variety of problems plagued the carrier commanders of both sides during the Battle of the Coral Sea. Pilots of both sides misidentified vessels that were attacked and tended to exaggerate reports of damage inflicted. The Japanese pilots that returned to the *Zuikaku* after bombing the *Lexington* and *Yorktown* reported both ships as sunk. The destroyer *Sims* and the oiler *Neosho* had been reported by Japanese scout planes as a

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<sup>247</sup> Griess, ed, *The Second World War: Asia and the Pacific*, p.107.

<sup>248</sup> Hoyt, *The Carrier War*, p.41.

carrier and a cruiser. The American pilots were guilty of the same mistakes, notably when the *Yorktown* pilots made reports of their attack on the small Japanese landing force at Tulagi. To complicate matters, Admirals Fletcher and Takagi relied heavily on land-based reconnaissance during the battle.

Both the Japanese and the Americans considered the Battle of the Coral Sea to be a victory for their side. The Japanese viewed the postponement of the Port Moresby invasion as a minor setback, and the loss of the *Shōhō* was more than made up for by the destruction of one or two American fleet carriers. The Americans, on the other hand, had achieved their objective of preventing the Japanese capture of Port Moresby.

### Operation MI

At the close of May 1942 the Japanese Navy still enjoyed superiority in aircraft carrier strength. The Japanese Navy also still had the initiative. At a time when Admiral Yamamoto was most concerned with cornering the remnants of the American carrier forces and defeating them in a final, decisive battle, Operation "MI" would scatter the Japanese fleet across thousands of miles of ocean. Operation "MI" was typical of Japanese war plans in that it was overly complicated. The force assigned to the main thrust was invariably weakened to provide for diversionary campaigns.

Essentially, Operation "MI" provided for the capture of Midway Island in the central Pacific as well as the capture of certain islands in the Aleutian chain and an attack on

Dutch Harbor. The main purpose of the operation was to draw out the remaining carrier strength of the United States Navy and force a final engagement that would compel the Americans to accept a negotiated peace settlement. Yamamoto understood that it was only a matter of time before the production capacity of the United States began to overwhelm the forces of Japan. Yet given this knowledge that time was on the side of the Americans, Yamamoto still believed that there could be a decisive Japanese victory that would compel the Americans to accept a negotiated peace.

Operation "MI" was one of the grandest schemes yet devised by the Japanese. The plans for the Midway operation and the diversionary Aleutians campaign called for the deployment of the preponderance of the Imperial Navy. All together the Japanese force consisted of four fleet carriers, four light carriers, five seaplane tenders, seven battleships, 13 heavy cruisers, six light cruisers, 55 destroyers and 13 submarines. The force was supported by 13 fleet oilers, and 24 transports carrying 6,550 troops.<sup>249</sup> The four primary carriers, *Akagi*, *Kaga*, *Hiryū* and *Sōryū* composed the Carrier Strike Force under Vice Admiral Nagumo. The Carrier Strike Force brought 72 fighters, 72 dive bombers and 90 torpedo planes to Midway. The light carrier *Hōshō* with her 19 fighters was assigned to provide air cover for the Main Body of the First Fleet under Admiral Yamamoto. The light carrier *Zuihō* and her 24 planes was ordered to provide air cover for the Main Body of the Second Fleet under Vice Admiral Kondō Nobutake. The carriers *Ryūjō* (37 planes)

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<sup>249</sup> Dull, *Battle History of the Imperial Japanese Navy*, p.139-41.



and a new carrier. the *Junyō* (53 planes) were assigned to the Carrier Force of the Second Strike Force under Rear Admiral Kakuta Kakuji.

The carrier *Junyō* was a new addition to the Japanese Navy, having been commissioned on 3 May 1942. Part of the “shadow fleet”, the *Junyō* was laid down in 1939 as the 24,140 gross ton liner *Kashiwara Maru*. One of two such ships built by the NYK Line, the *Kashiwara Maru* was specifically designed for conversion to an aircraft carrier, possessing such military characteristics as a double hull, extra height between decks, provision for elevators, extra tank capacity, and provisions for extra longitudinal and transverse bulkheads.<sup>250</sup> The Japanese Navy subsidized the construction of such vessels and thus retained rights to the ships in the event of war. The unfinished *Kashiwara Maru* and her sister ship *Izumo Maru* were taken over by the Navy in August 1940 and completed as aircraft carriers.<sup>251</sup> The *Junyō* was launched on 26 June 1941 and completed nearly one year later by the Mitsubishi Shipbuilding Company at Nagasaki. When completed, the displacement of the ship was practically the same as it would have been as a liner. The fitting of new-pattern boilers was intended to raise the maximum speed of these ships by 1.5 knots, but in service they seldom achieved more than 22-23 knots.<sup>252</sup> *Junyō* was given a starboard island, and it was the first Japanese carrier to

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<sup>250</sup> Wheeler. “Japan’s Wartime Carrier Construction.” *U.S. Naval Institute Proceedings*, p.1036.

<sup>251</sup> Jentschura, Jung and Mickel, *Warships of the Imperial Japanese Navy*, p.52.

<sup>252</sup> *Ibid.*

incorporate the smoke stack into the island structure.<sup>253</sup> *Junyō* was armed with twelve 5-inch dual purpose guns and twenty-four 25mm anti-aircraft guns.<sup>254</sup>

Once again, the United States was forewarned about the pending Japanese operation. The primary Japanese naval code, known as JN-25, had been breached by the Americans and had been providing them critical information about the disposition and intentions of the Japanese fleet. It had helped at the Battle of the Coral Sea, and it helped the Americans thwart the Midway operation as well. The Americans would not have gained quite so much information from JN-25 if the Japanese had changed the code frequently. Due to the rapid expansion of the Japanese Empire and the great distances involved, it proved difficult for the Japanese Navy to disseminate new code books on a regular basis, though. Another problem was Japanese over-confidence; they did not seriously consider the possibility that the Americans would be able to crack the JN-25 code. The code was changed on 1 June 1942, throwing the American code breakers in Hawaii into a panic, since it was clear that the Japanese move was imminent. They had learned enough about the composition and disposition of the Japanese forces, however, to plan a trap for the Japanese fleet. The United States Navy was able to commit three carriers, ten heavy cruisers, four light cruisers, 33 destroyers, two seaplane tenders and 22 submarines. The carriers were able to bring to Midway 79 fighters, 112 dive bombers and 42 torpedo planes.<sup>255</sup>

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<sup>253</sup> Ibid. p.53.

<sup>254</sup> Ibid. p.52. These were the standard Type 89 40-caliber dual purpose guns and standard anti-aircraft guns (Campbell, *Naval Weapons of World War II*, p.192).

<sup>255</sup> Dull, *Battle History of the Imperial Japanese Navy*, p.141-43.

What followed between the forces at Midway is well documented. It was a tremendous victory for the United States Navy, and especially for the intelligence analysts at Hawaii. With the aid of the intelligence team, Admiral Chester Nimitz was able to put the only three serviceable carriers in the Pacific in the right place at the right time. The *Enterprise* and the *Hornet* had rushed back from the southwest Pacific, and at Pearl Harbor Rear Admiral Raymond Spruance took over for the ill Vice Admiral William Halsey. When the battered *Yorktown* had arrived at Pearl Harbor on 27 May it was estimated that it would take three months to repair the damage. With 1,400 men working day and night, however, the *Yorktown* was ready to sail from Pearl Harbor on the morning of 30 May.<sup>256</sup>

The Japanese lacked any hard information about the American carriers. They had believed the *Yorktown* to be sunk, or at least knocked out of action for a while. They had been making regular reconnaissance flights over Pearl Harbor, using a Kawanishi seaplane that was fueled by a submarine off French Frigate Shoals. This reconnaissance flight would have spotted the *Yorktown* under repair, but the Americans had learned of the Japanese activities and stationed a pair of destroyers at the shoals, thus preventing the Japanese reconnaissance flights during that time.<sup>257</sup> It was not believed that any of the American carriers would be in the vicinity of Midway, however, and Admiral Nagumo was confident that his four large carriers could deal with any eventuality.

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<sup>256</sup> Ibid. p.134.

<sup>257</sup> Ibid. p.136.

The Battle of Midway raged for two days, and resulted in the loss of all four of Nagumo's carriers. On 4 June 1942 the carriers *Akagi*, *Kaga* and *Soryū* were destroyed. The *Enterprise*'s dive bombers had located the Japanese carriers around 1000 hours, just after American torpedo planes had been wiped out making attack runs. The *Akagi* was hit with a bomb that struck the edge of the midship elevator, penetrated the shaft and detonated improperly stowed bombs and torpedoes. A second bomb hit the port quarter, exploding among the 40 planes that were in the process of shifting their armaments from bombs to torpedoes.<sup>258</sup> Flames from exploding bombs and gasoline swept across the flight deck. Fire parties were driven back by the searing heat. Bursting fireballs turned the great hangar into a roaring furnace that the carbonic acid gas fire extinguisher systems were powerless to control.<sup>259</sup> By 1300 hours Captain Aoki Tajirō had run out of ways to save his ship. The *Akagi* burned through the night, dead in the water, until 0450 hours on 5 June, when Admiral Yamamoto ordered four destroyers to sink the *Akagi* with Mark 93 torpedoes. The death toll was 221 men. Survivors had been transferred to the battleship *Mutsu*.<sup>260</sup>

The *Kaga* had experienced similar devastation after being hit by four bombs. The *Kaga* had fighters on deck that had been rearmed, but were not yet launched. Fires and explosions erupted as the frantic crew attempted to clear the deck of the fuel lines lying about. The first bomb had struck the starboard quarter, and the second bomb hit in the vicinity of the forward elevator, the force of the explosion blowing out the windows on

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<sup>258</sup> Hoyt, *The Carrier War*, p.56.

<sup>259</sup> Costello, *The Pacific War, 1941-1945*, p.296.

<sup>260</sup> Dull, *Battle History of the Imperial Japanese Navy*, p.153-55.

the bridge. The third bomb hit directly in front of the island bridge, shattering the planes on the flight deck, destroying the flight deck itself, and killing most of those on the bridge, including the captain.<sup>261</sup> The last bomb penetrated the hangar deck and exploded in a fiery blast. All efforts were made to fight the fires, but they were too intense for the carbonic acid gas to extinguish and the fire-fighting water pumps had been destroyed. Flight officer Amagai Takahisa, the ranking survivor on the bridge of the *Kaga*, gave the order to transfer the Emperor's portrait to the destroyer *Hagikaze* at 1325 hours.<sup>262</sup> Amagai also decided to evacuate the ship, and since all phone contact had been lost, he dispatched an orderly to inform crew members in the engine room. The fires were so intense that the message could not be delivered. To add to the confusion, the U.S. submarine *Nautilus*, which had been lurking amongst the ships of the Carrier Strike Force all day, fired a spread of torpedoes at the *Kaga* around 1400 hours. Two of the torpedoes missed: the third struck amidships but failed to explode.<sup>263</sup> The ship was finally abandoned at about 1700 hours, and, at 1925 hours when the *Kaga* sank, the forward gasoline storage tank exploded. About 800 men were killed, many of them trapped alive in the machinery spaces.<sup>264</sup>

The *Soryū*, like the other Japanese carriers, had armed dive bombers on deck waiting to launch and a hangar full of other aircraft being hastily refueled and armed. Dive

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<sup>261</sup> Ibid. p.155.

<sup>262</sup> Ibid. p.156.

<sup>263</sup> The skipper of the *Nautilus*, William Brockman, had identified the carrier as the *Sōryū*, but postwar records and accounts from Japanese survivors show that it was in fact the *Kaga* that Brockman fired upon. Clay Blair Jr., *Silent Victory: The U.S. Submarine War Against Japan* (New York: Bantam Books, 1985) p.244-45.

<sup>264</sup> Costello, *The Pacific War, 1941-1945*, p.297.

bombers from the *Yorktown* attacked the *Soryū* and scored three hits with 1,000-pound bombs. Bombs and torpedoes had not been properly stowed and gas lines were left open. One bomb exploded just in front of the forward elevator and penetrated the hangar deck. The resulting explosion flung the forward elevator back against the starboard island bridge.<sup>265</sup> A second bomb struck near the port side, hitting the planes on deck and exploding the bombs, torpedoes and gasoline that were scattered about. The third bomb penetrated the flight deck and did similar damage aft, engulfing the flight deck in sheets of flame.<sup>266</sup> Within fifteen minutes of the attack, the *Sōryū* had lost rudder control and was dead in the water. Captain Yanagimoto Ryūsaku had suffered severe burns in the attack, and before passing command to a subordinate, ordered all hands to abandon ship. Refusing the pleas of his staff to move to another ship, Yanagimoto plunged back into the flames at 1045, seeking death in battle (*senshi*).<sup>267</sup> At 1900 hours, on the light cruiser *Nagara*, Admiral Nagumo was preparing another fire-fighting unit to go aboard the *Sōryū*. The ship began to sink at 1912, however, and slipped under the waves three minutes later. At 1920 a huge underwater explosion occurred. It is impossible to know exactly how many were lost with the *Sōryū*, for there were many civilian newsmen on

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<sup>265</sup> Dull; *Battle History of the Imperial Japanese Navy*, p.152.

<sup>266</sup> Ibid.

<sup>267</sup> Ibid. p.153.

board. The unofficial figure of 718 killed was calculated from those missing from the ship's roster.<sup>268</sup>

The carrier *Hiryū* had gone unnoticed during the attacks due to a slight detachment from the other carriers and the added concealment of a squall. Taking aboard the stray aircraft from the other three carriers, Rear Admiral Yamaguchi launched his own attack and caught the *Yorktown* separated from the other American carriers. The *Yorktown*'s radar picked up the *Hiryū*'s dive bombers while they were still 50 miles distant, and the Americans were able to get steam up to 30 knots, launch fighters and take precautionary measures such as flooding the fuel lines with carbon dioxide gas and flooding the magazines. Passing through dense fire, the Japanese dive bombers made three hits on the *Yorktown*. One plane failed to pull out of its dive in time and disintegrated, its bomb rolling along the flight deck before exploding.<sup>269</sup> Another bomb went through the smoke stack, and the explosion temporarily snuffed out five of the six boilers. A third bomb penetrated the flight deck, passed through the hangar deck and exploded on the armored fourth deck. Due to the precautionary measures, the damage control teams had the fires in hand in under an hour and the gaping hole in the flight deck was covered with wooden planks in time to recover the returning bombers.<sup>270</sup> *Yorktown* was able to make 20 knots, but the destruction of the radar and the communications center forced Fletcher to move to the heavy cruiser *Astoria*, passing tactical command to Admiral Spruance.

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<sup>268</sup> Ibid.

<sup>269</sup> Costello, *The Pacific War, 1941-1945*, p.299.

<sup>270</sup> Ibid.

A second attack from the *Hiryū* consisted of ten torpedo planes and six fighters, and this attack scored two torpedo hits on the port side. Thousands of tons of water poured into the ship and the list became pronounced. Fearing the ship would capsize, Captain Elliot Buckmeister gave the order to abandon ship at around 1500 hours. The next morning the *Yorktown* was found drifting by the destroyer *Hughes*. Two wounded crewmen who had been left for dead in the sick bay had crawled up and discharged shots which attracted the attention of the *Hughes*.<sup>271</sup> The fires had all gone out, and work crews were brought over to save the ship. The work continued throughout the night and it seemed that the carrier might be brought into Pearl Harbor with the aid of tugs. The Japanese had ordered a nearby submarine to sink the *Yorktown*, however, and on 6 June the *I-168* did just that. The *I-168* torpedoed the destroyer *Hammann*, breaking her in two with heavy loss of life, and finished off the *Yorktown*.

The *Hiryū* was to launch a third attack on 5 June, immediately after the crew finished their evening meal. Thirteen dive bombers from the *Yorktown* and *Enterprise* caught the *Hiryū* by surprise, however, and succeeded in placing four bombs on the ship in rapid succession. The first blew the forward elevator up against the island bridge. All four bombs were closely spaced, completely ripping apart the flight deck.<sup>272</sup> The engineers remained below and kept the ship running at 28 knots, but eventually the fires spread to the lower decks. The engines went dead and the engineers made attempts to escape, but

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<sup>271</sup> Ibid. p.307.

<sup>272</sup> Dull; *Battle History of the Imperial Japanese Navy*, p.158.



by that time the deck plates had become red-hot and few made it out.<sup>273</sup> It was after 0100 hours the next morning when the Emperor's portrait was ceremonially removed to a destroyer. As the crewmen were being removed by destroyers, Admiral Yamaguchi Tamon and Captain Kaku Tadao exchanged ceremonial cups of water before retiring to their rooms to commit ritual suicide (*seppuku*).<sup>274</sup>

The main battle forces of the Japanese fleet were unable to catch the American carriers before they retired eastward. The *Ryūjō* and the *Junyō* hurried back from the Aleutians area, but were too late to be of any assistance. The Battle of Midway had been the first undeniable defeat experienced by the Imperial Navy. Four of the largest carriers and many of the most experienced pilots in the Japanese Navy were lost in two days. It was a blow from which the Japanese carrier air force would not recover.

#### Operation "KA" and the Solomons Campaign

With the defeat at Midway the initiative in the Pacific passed to the Americans. Operation Watchtower reflected the American determination to switch over to the offensive. The Japanese had been building an airstrip on the island of Guadalcanal in the Solomon Islands chain in order to create a strong outpost for the base at Rabaul. The United States First Marine Division was landed on Guadalcanal and Tulagi and secured the partially completed airstrip on Guadalcanal. In the months that followed, the airstrip became the object of extremely bitter fighting on the land and in the sea and air.

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<sup>273</sup> Ibid.

<sup>274</sup> Costello, *The Pacific War, 1941-1945*, p.302.

Admiral Yamamoto dispatched a large force consisting of the *Zuikaku*, the *Shōkaku*, the *Ryūjō* and 49 other warships to reclaim the Solomons area. The United States Navy had sent the carriers *Enterprise*, *Saratoga* and *Wasp* to cover the landings in the Solomons. On 24 August, the *Ryūjō* was located and bombed by planes from the *Enterprise* and the *Saratoga*. Inexplicably, Captain Katō Tadao of the *Ryūjō* had not launched any fighters for combat air patrol, leaving the carrier without fighter cover.<sup>275</sup> At 1557 hours planes from the *Saratoga* attacked, landing four to ten bombs along the flight deck. At least one torpedo hit aft on her port side. The *Ryūjō's* rudder became jammed and she could do nothing but move in circles. With flames running along her length, the *Ryūjō* began to list heavily. The destroyer *Amatsukaze* was ordered alongside to help the survivors abandon ship. The *Ryūjō* finally sank at 2000 hours. It is estimated that 624 men were lost on the *Ryūjō*.<sup>276</sup>

The *Shōkaku* and the *Zuikaku* launched their own attack that eventually found the carrier *Enterprise*. One bomb hit the aft elevator and tore through to the third deck before exploding. A second bomb hit aft of the carrier's island, but did little damage. The *Enterprise* was burning furiously and lost 74 men with another 95 wounded, but still worked up speed to land aircraft. A second attack wave might have caught the *Enterprise*, as her rudder jammed, but due to a plotting error the Japanese planes missed

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<sup>275</sup> Dull; *Battle History of the Imperial Japanese Navy*, p.201

<sup>276</sup> Ibid.

their target and the *Enterprise* escaped southward.<sup>277</sup> So ended the Battle of the Eastern Solomons.

Although the American position on Guadalcanal had been growing stronger, the aircraft carrier strength of the United States Navy was being sorely tested. On 31 August 1942, the *Saratoga* was patrolling northwest of Espiritu Santo when it was torpedoed and damaged by the submarine *I-26*. The United States suffered another loss on 15 September 1942 when the carrier *Wasp* was torpedoed in the Solomons by the submarine *I-19*. Three of the four torpedoes fired struck the carrier – two on the starboard side forward and one amidships. Fires swept across her deck and she erupted in a huge explosion at 1500 hours. The order to abandon ship was given at 1520 and she was later scuttled by the destroyer *Lansdowne* at 2100.

Between August and October of 1942 all Japanese efforts to regain the Solomons had ended in failure. Admiral Yamamoto determined to make a concerted effort in the area and settle the issue once and for all. The largest Japanese naval force since Midway sortied from Truk on 11 October. This force included the carriers *Shōkaku*, *Zuikaku*, *Zuihō*, *Junyō* and the new carrier *Hiyō*, a sister ship of the *Junyō*. The *Hiyō* developed engine trouble, however, and was forced to return to Truk. The United States Navy had been deprived of the *Saratoga*, but was able to use the *Hornet* and the repaired *Enterprise* to meet the Japanese offensive.

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<sup>277</sup> Ibid. p.202.

In the Battle of Santa Cruz, the forces made contact on 26 October 1942 when American search planes located and bombed the light carrier *Zuihō*. Two 500-pound bombs tore a 50-foot opening in the after end of *Zuihō*'s flight deck. Unable to land aircraft, the captain launched his remaining planes and turned his burning ship northward toward Truk.<sup>278</sup> The bombs did not hit any planes and the fires were minimal.

After the encounter with the *Zuihō*, both sides launched strikes that passed each other along the way. When the American planes located the Carrier Strike Force at 1040 they managed to drop four 1,000-pound bombs along the port side of the flight deck of the *Zuihō*, forcing her to retire from the battle. She could still make over 20 knots, however, and had no difficulty returning to port.<sup>279</sup>

The Japanese attacks proved to be more effective. The *Enterprise* had been hit with two bombs, one of which hit well forward and exploded deep in the ship. The second bomb landed aft of the forward elevator shaft, exploding in the hangar deck and the deck below. A near miss loosened plates in the starboard quarter.<sup>280</sup> The *Enterprise* remained seaworthy, although she could not land her aircraft and had to send them to Espiritu Santo before retiring southward.

The *Hornet* fared much worse, having taken the brunt of the attack while the *Enterprise* was obscured by a rainstorm. At 0910 the *Hornet* suffered a bomb hit on the flight deck. Then a Japanese pilot rode his plane into the carrier, hitting the funnel and

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<sup>278</sup> Hoyt, *The Carrier War*, p.72.

<sup>279</sup> United States Strategic Bombing Survey, Naval Analysis Division, *The Campaigns of the Pacific War*, p.123.

<sup>280</sup> Dull, *Battle History of the Imperial Japanese Navy*, p.230.

going through the flight deck where his two bombs exploded. Two torpedo hits in her engine room left the *Hornet* dead in the water. Three more bombs hit, one on the flight deck and two others penetrated four decks before exploding. Another Japanese plane hit the *Hornet*'s bow, ruining the forward elevator shaft.<sup>281</sup>

The first attacks on the *Hornet* were over by 1000 hours, and attempts were made to take her under tow. When it became apparent that the ship could not be towed, the order was given at 1440 to remove most of the crew. At 1520 planes from the *Junyō* and the *Zuikaku* arrived and subjected the carrier to further abuse. The *Hornet* was torpedoed again in her engine room, and at 1550 took another bomb hit on the flight deck. At 1720 the *Junyō* bombers scored a last hit on the empty hangar deck. All hands were off by dark and the destroyers *Mustin* and *Anderson* each fired four torpedoes into the *Hornet*. The ship remained afloat, though, until it was torpedoed by the Japanese destroyers *Makigumo* and *Akigumo* the following day.<sup>282</sup>

The Battle of Santa Cruz marked the end of carrier duels for many months. The surface battles in and around the Solomons raged on, however, and the losses in the Solomons weakened all subsequent Japanese defensive efforts. The Japanese Navy had lost a total of 50 combat vessels as well as having many ships damaged and inoperative for periods of several months. The air battles had cost the Japanese over 2,900 aircraft

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<sup>281</sup> Ibid.

<sup>282</sup> Ibid.

and many of the aircrews. The air losses in the Solomons had reduced the Japanese naval air strength to a point from which it was never able to recover.<sup>283</sup>

### Losses and Gains

As the war progressed, new carriers were added to the Japanese fleet, but all the ships that were ready to join the fleet in 1942 and 1943 were carrier conversions. The few fleet carriers that the Japanese were trying to build were suffering delays from dockyard and material shortages. If it were not for the “shadow fleet,” the Japanese Navy would not have been able to replace its losses during 1942. The converted carriers were no replacement for the fleet carriers lost at the Battle of Midway, however. Most of the converted carriers were only suitable for escort work or ferrying aircraft between the island bases.

The ex-liners *Junyō* and *Hiyō* joined the fleet in May and July 1942. These ships had been large enough and just fast enough to be considered suitable for fleet operations. The other carriers completed during 1942 and 1943 were all light. The sister ships of the ex-liner *Taiyō*, the *Unyō* and *Chuyō*, were commissioned in May and November 1942. The ex-submarine tender *Ryūhō* also joined the fleet in November 1942. Thus, at the end of 1942 the Japanese Navy had the fleet carriers *Zuikaku*, *Shōkaku*, *Junyō* and *Hiyō*, as well as the light carriers *Zuihō*, *Ryūhō*, *Taiyō*, *Chuyō*, and *Unyō*.

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<sup>283</sup> United States Strategic Bombing Survey, Naval Analysis Division, *The Campaigns of the Pacific War*, p.160.

The losses at Midway had prompted the Japanese Navy to find more ships to convert into aircraft carriers. In 1943 the two seaplane tenders, *Chiyoda* and *Chitose* were brought in for such a purpose. Both of these ships were given a flush deck and could carry about thirty planes apiece. They were armed with eight 5-inch dual purpose guns and thirty 25mm anti-aircraft guns. The two ships had both diesel machinery as well as two sets of geared turbines and could make speeds of up to 29 knots.<sup>284</sup> *Chiyoda* was the first completed, and rejoined the fleet on 31 October 1943. The *Chitose* was finished on 1 January 1944.

In December 1942 the Japanese Navy brought in the troop transport *Argentina Maru* for conversion. The *Argentina Maru* had been a passenger liner, and was originally built in 1938 for the OSK Lines. After the conversion process was completed in November 1943, the ship displaced 16,748 tons. The ship was renamed *Kaiyō* and was quite similar in appearance to the *Taiyō*. The diesel engines of the *Kaiyō* were replaced with destroyer turbines, giving the carrier a speed of 24 knots.<sup>285</sup> The *Argentina Maru*'s sister ship, the *Brazil Maru* had also been earmarked for conversion, but the ship was sunk by a submarine in August 1942.

Although from the Battle of Santa Cruz through the end of 1943 the five new carriers put into service were all conversions, the Japanese did have plans to build two classes of carriers by 1944. The *Taiyō*-class was intended to be an improved *Shōkaku*-class. The *Taiyō* was actually proposed under the Fourth Naval Armament Replenishment Program

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<sup>284</sup> Jentschura, Jung and Mickel, *Warships of the Imperial Japanese Navy*, p.57.

<sup>285</sup> *Ibid.* p.59.

of 1939 as the Japanese answer to the planned American *Essex*-class and the British *Illustrious*-class. Despite the timeliness of the idea, the *Taihō* would not be launched until 7 April 1943 and she would not be ready to enter service until a year after that. Since the *Taihō* was so long in the making, the Japanese had time to apply some of the lessons learned through combat. *Taihō*'s elevators, flight deck and machinery spaces were all heavily armored. The *Taihō* was also outfitted with radar equipment, something Japanese ships had lacked until 1944.<sup>286</sup>

Another promising new class was the *Unryū*, a modified *Hiryū* design. The class was proposed under the 1941-1942 War Construction Program as a new medium carrier. Only three of the six proposed ships were ever fully completed. The other three were each 60 to 85 percent complete by the end of the war.<sup>287</sup> After mid-1943, the increase in repair work from the various battles of the previous year, coupled with the paucity of material, greatly hindered shipbuilding. The first two *Unryū*-type carriers, the *Unryū* and the *Amagi*, were completed in August 1944, just five days apart. A third ship, the *Katsuragi* entered service on 15 October 1944. As completed, these ships weighed in at just over 20,000 tons each. All ships of this class were 745-feet long, had island structures and twin funnels coming out the starboard side of the hull. The *Unryū* and *Amagi* had cruiser turbines installed, which gave them both a shaft horsepower of 150,000 units and a speed of 34 knots. The *Unryū* was equipped with twelve standard 5-inch dual purpose guns and fifty-one 25mm anti-aircraft guns. The *Amagi* and the

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<sup>286</sup> Polmar, *Aircraft Carriers*, p.343.

<sup>287</sup> Jentschura, Jung and Mickel, *Warships of the Imperial Japanese Navy*, p.56.



*Katsuragi* were both given thirty-eight more 25mm anti-aircraft guns for a bristling total of 89 guns apiece.<sup>288</sup>

As a final confirmation of the new predominance of carriers over battleships in the Japanese Navy, the hull of the third *Yamato*-class super battleship was marked for completion as an aircraft carrier to make up for the shortage of fleet carriers after Midway. Work had stopped on the battleship hull just prior to the war in order to release work crews for other ships. After the Midway debacle, it was decided that the hull of the *Shinano*, already completed up to the deck, should be made into a giant aircraft support ship. Instead of functioning as a regular carrier, the *Shinano* would contain all the supplies and shops necessary to repair and service planes and return them to the parent carriers.<sup>289</sup> This became an appealing idea with carriers ranging far and wide across the Pacific. When completed the *Shinano* was to be the world's largest aircraft carrier, displacing 71,890 tons. *Shinano* was armed with sixteen 5-inch guns, twelve sets of twenty-eight 120mm rocket launchers and 145 anti-aircraft guns. To speed the conversion, as many original battleship features as possible were adopted. The barbettes originally designed to hold the main gun turrets were kept and fitted with high-speed lifts to carry bombs and torpedoes from the magazines below. In true battleship fashion, the flight deck on the *Shinano* was armored.<sup>290</sup> The *Shinano* was lost to a submarine on the very day she was completed in November 1944, having the shortest career of any Japanese warship.

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<sup>288</sup> Ibid.

<sup>289</sup> Preston, *Aircraft Carriers*, p.131.

<sup>290</sup> Jentschura, Jung and Mickel, *Warships of the Imperial Japanese Navy*, p.55.

Another telling symptom of Japanese carrier depletion was the conversion of the two *Ise*-class battleships to partial carriers. This was one of the most unusual and least useful attempts of the war, though it foreshadowed the future Soviet *Kiev*-class battleship-carriers of the 1970s. The *Ise* and her sister ship *Hyuga* were both built at the end of World War I. They had served as battleships until late in 1943, when to make up for losses in 1942 they were chosen for conversion. The conversion involved removing the after turrets and installing a flight deck. The forward section of the ship, including the battleship superstructure, remained intact. The ships were intended to operate bomber seaplanes.<sup>291</sup> By the spring of 1944 the *Ise* and the *Hyuga* were completed. The armament included eight of the 14-inch battleship guns, sixteen 5-inch guns, and fifty-seven 25mm guns. In June 1944 both ships were given a total of 104 anti-aircraft guns, and by September 1944 they both had six sets of thirty 5-inch rocket launchers. As battleships they had heavy armor protection along the sides and displaced 38,676 tons. The *Ise* and the *Hyuga* could only make 25 knots, which would have limited their usefulness as carriers had there been any planes to embark on them. By the time that these two ships were completed, the Japanese Naval Air Arm could spare no planes.

Many existing carriers were brought in for refits during the lull in carrier actions in 1943. While the *Zuihō* underwent repairs for damage sustained in the Battle of Santa Cruz, her armament was increased from eight 25mm guns to forty-eight such guns. Also,

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<sup>291</sup> Humble, *United States Fleet Carriers*, p.99.

the flight deck was extended, improving the deck area by 14 percent.<sup>292</sup> *Ryūhō*'s armament was increased from thirty-eight 25mm guns to forty-two guns, and she was given six 13.2mm machine guns.<sup>293</sup> While the *Shōkaku* was in for repairs after Santa Cruz, she was joined by the *Zuikaku* and they both had their anti-aircraft defenses increased from forty-two 25mm guns to seventy guns.<sup>294</sup> The *Hiyō* and the *Junyō* were increased from twenty-four 25mm guns to forty guns.<sup>295</sup> These rearmament efforts are an indication of the increasing threat that was posed by Allied aircraft. Many other types of Japanese warships were given increased anti-aircraft protection around this time.

Another contributor to the worries of Japanese naval leadership was the ever increasing pressure from submarine attacks. American submarines, aided by decoded Japanese communications, were taking a serious toll on Japanese shipping. By 1944 the American submarine effort was finally becoming formidable. One improvement was the fact that American submarines had adopted the wolf-pack tactics used by German subs in the Atlantic. It is notable that two of Japan's largest, best-armed carriers were sunk not by aircraft, but by submarines.

One Japanese carrier was lost in December 1943, the only major Japanese warship sunk by U.S. submarines in that year.<sup>296</sup> The *Chuyō* was caught off Japan by the American submarine *Sailfish*. When the submariners later learned that the American survivors of the submarine *Sculpin* were aboard the Japanese carrier, they would remark on the irony.

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<sup>292</sup> Jentschura, Jung and Mickel, *Warships of the Imperial Japanese Navy*, p.49.

<sup>293</sup> Ibid. p.50.

<sup>294</sup> Ibid. p.51.

<sup>295</sup> Ibid. p.52.

<sup>296</sup> Blair, *Silent Victory*, p.553.

In 1939 the *Sculpin* had found and stood by the submarine *Squalus* when she sank, and now *Squalus*, since renamed *Sailfish*, had killed half the survivors of the *Sculpin*.<sup>297</sup>

For the Japanese Navy there was another great loss in 1943. American code breakers had intercepted the itinerary of Admiral Yamamoto's planned inspection tour of the forward bases. The trip was intended to boost morale, and the American code breakers knew the precise schedule that would be kept. The decision of how to handle such information ultimately fell on President Franklin D. Roosevelt, for it was not only a question of assassinating an enemy admiral but also a question of keeping secret the fact that the Americans could read the Japanese code. Roosevelt approved a plan to send long-range P-38 fighters deep behind the Japanese perimeter to intercept Yamamoto's plane. On 18 April 1943 the two medium bombers that carried Yamamoto and his staff were shot down over Bougainville. The shock to the Japanese was great.

#### Losing the Production War

As 1943 opened, American industry was beginning to turn out new ships in incredible numbers. New designs were being made that incorporated the lessons learned in the battles of 1942. In 1943 steel production in Japan was at 7.8 million tons, while during the same year in the United States steel production was at 90 million tons. By the anniversary of Midway the United States had completed four *Essex*-class carriers, and five *Independence*-class carriers to replace the four that were lost. In addition, by that

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<sup>297</sup> Ibid. p.529.

time seven converted escort carriers were serving in the Pacific and were due to be joined by the four *Sangamon*-class escort carriers from the Mediterranean. The first *Casablanca*-class ship had been launched and would be followed by twenty more by the end of 1943.<sup>298</sup>

The disparity in production became very apparent when the Americans assembled carriers to become the core of the new Fifth Fleet. The mobile striking group of the Fifth Fleet included the large carriers, *Enterprise*, *Saratoga*, *Essex*, and the new *Essex*-class ships *Yorktown*, *Lexington* and *Bunker Hill*. In addition the force included the first five *Independence*-class carriers, *Independence*, *Princeton*, *Belleau Wood*, *Cowpens* and *Monterey*. These carriers, through a series of raids, denied the Japanese Navy the use of Rabaul and Truk as major naval bases. The carriers of the Fifth Fleet provided valuable support for the series of amphibious invasions carried out by the Americans in the central Pacific.

#### Operation A-Go

By the end of April 1944 both Japanese and American commanders knew that a final battle could not be far away. The Americans were approaching the Marianas and the Japanese Navy would be compelled to prevent the capture of those islands at all costs. Admiral Toyoda Soemu, the new commander-in-chief of the Combined Fleet devised Operation "A-Go" in order to protect the Marianas and to destroy the American fleet.

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<sup>298</sup> Humble, *United States Fleet Carriers*, p.96.

Operation "A-Go" depended a great deal on land-based air power. The Japanese fleet would operate within range of land-based planes and rely on them to even the odds. By the spring of 1944 the Japanese fleet had been reorganized as the First Mobile Fleet. This new fleet consisted of three carrier groups deploying a total of 430 carrier aircraft.<sup>299</sup> The Van Force consisted of the light carriers *Chitose*, *Chiyoda* and *Zuihō*, escorted by four battleships, five cruisers and nine destroyers. Force A included fleet carriers *Zuikaku*, *Shōkaku*, *Taihō* as well as three cruisers and nine destroyers. Force B included the light carriers *Ryūhō*, *Junyō*, *Hiyō*, one battleship, one cruiser and ten destroyers. Against the Japanese forces, the Americans had the Fifth Fleet, which consisted of seven fleet carriers, eight light carriers, seven battleships, fourteen cruisers, six anti-aircraft cruisers and sixty-six destroyers.

Admiral Ozawa Jinzaburō, commander of the carrier forces, planned on attacking the American ships after the land-based planes had damaged the American fleet. The Japanese carrier planes would then attack and make their way to land bases. Once landed, they would refuel and rearm and make a second attack on the return to the Japanese carriers. Unfortunately for Ozawa, Vice Admiral Kakuta Kakuji, commander of the Base Air Force of the Marianas, failed to damage any of the American ships, so in the end, it came down to carrier planes versus carrier planes.

At the time of the Battle of the Philippine Sea, the major difference between the American and Japanese carrier fleets was in the degree of experience and training. The

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<sup>299</sup> Ibid. p.119.

American force had been operating together for a time, whereas the newly assembled First Mobile Fleet had not had the opportunity to practice together, much less fight together. The carrier pilots of the Japanese fleet were no longer the able veterans who had flown in the first six months of the war; most were largely inexperienced.

Ozawa's biggest problem during the "A-Go" operation was the total lack of cooperation from Kakuta. Ozawa had expected Kakuta to collect 500 planes from nearby bases and concentrate them at Guam. Instead, there were only 50 planes at Guam because Kakuta did not want to leave other bases unprotected. He lied to Ozawa, however, leading him to believe that his planes were inflicting significant damage to the American fleet.<sup>300</sup>

On 19 June 1944, Admiral Ozawa launched the first strike of the Battle of the Philippine Sea. The ensuing air battle clearly showed the improvement of American carrier aircraft, tactical formations, plane directors and pilots. It also demonstrated the ineptitude of the new, poorly trained Japanese pilots.<sup>301</sup> The first wave of Japanese planes was devastated and did little damage. At 0910, ten minutes after Ozawa had launched a second attack, the submarine *Albacore* torpedoed the carrier *Taihō* on her starboard side, near the gasoline tanks. Although the forward elevator was made inoperable by the hit, there were no flames. The ship maintained a speed of 26 knots and all shafts were kept open to ventilate the ship. At other times this practice might have been a good idea, but the *Taihō* was running on unrefined crude oil from Borneo, and this gave off dangerous

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<sup>300</sup> Dull; *Battle History of the Imperial Japanese Navy*, p.305.

<sup>301</sup> Ibid. p.307.

and volatile fumes. Six hours later a spark somewhere in the ship ignited the fumes and the *Taihō* erupted with fires so hot rescue ships could not approach. In less than two hours the ship went down and 1,650 men were lost.<sup>302</sup>

Ozawa launched successive strikes, but the Japanese planes could not inflict any significant damage to the American forces. Worse, the Japanese planes were taking heavy losses each time they assaulted the American battle line. In the first day of the battle the Japanese lost 200 planes. Shortly after midday, disaster again struck the First Mobile Fleet. The submarine *Cavella* sent four torpedoes into the *Shōkaku*, which lost power and became engulfed in flame. After three hours the magazines exploded and she sank.<sup>303</sup> On first day of the engagement the American fleet had been out of range and thus could launch no attacks against the Japanese force. The second day, however, Spruance launched a heavy attack late in the afternoon. The carrier *Hiyō* was hit by two torpedoes and sank. The carriers *Zuikaku*, *Chiyoda* and *Junyō* suffered extensive damage.

The Japanese Navy never recovered from the losses suffered by the Japanese carrier air forces during the Battle of the Philippine Sea. The Japanese, still seeking the decisive battle, determined to send the remaining heavy units to the Philippines to thwart the Allied landings there. Ozawa's two carrier divisions had only 108 planes left, however, and his force was reduced to serving as a decoy. It was sacrificed to draw the American carrier force away from the battle force that was attempting to get at the American transport ships. The destruction of Ozawa's force during the Battle of Cape Engano was

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<sup>302</sup> Ibid. p.308.

<sup>303</sup> Ibid.



complete. After that battle the Japanese carrier force no longer existed as a fighting force.<sup>304</sup>

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<sup>304</sup> Ibid. p.330.

## CHAPTER 7

### CONCLUSION

From the time of its formation in 1869, the Imperial Japanese Navy had been a miracle of modernization. A positive early relationship with Great Britain and a subsequent alliance with that country enabled Japan to have the Royal Navy as a tutor of the highest caliber. When the airplane had evolved enough to be considered by the principal navies of the world as a possible reconnaissance tool, the Imperial Navy was in a position to explore naval aviation along with the other powers. The Japanese had been a relative late-comer to the circle of imperialist powers in Asia, but in terms of naval aviation the Japanese had the opportunity to compete on more or less equal footing.

World War I eliminated the Germans as a player in the Far East, and left the British, American and Japanese as the primary naval powers there. The positive Japanese relationship with Great Britain continued through the war years and the Royal Navy continued to be a major role model for the Japanese Navy. The Royal Navy was by far the largest and strongest navy in the world, and in terms of naval aviation, the British had become the paramount power as well. The war gave the British an opportunity to experiment with different applications of naval aviation and much was learned through trial and error. By and large, the Japanese Navy was spared trial and error, and the modest additions that were made to the fledgling Japanese Naval Air Service were sound. In contrast, the United States Navy did very little to develop naval aviation during the war years, preferring conventional warfare instead.

By the end of World War I both the Japanese and the American navies were prepared to build their first aircraft carriers. During the war, Anglo-American relations had become quite cordial and the Americans were offered technical advice on their project. Despite some suspicion engendered by Japanese conduct in Asia and Siberia, the Japanese Navy continued to benefit from its relations with the Royal Navy.

Determination on the part of the Wilson Administration to enlarge the American fleet at the end of the war alarmed the British and Japanese, and made the major powers receptive the idea of an international accord on naval arms limitation. When the ratio of proposed naval reduction became known, a serious split occurred among the officers of the Japanese Navy. This split was not a major factor during the 1920s, but it would become a serious problem during the following decade.

The first carriers built by the United States and Japan were similar in size and background. Both ships had been converted from auxiliaries, and both were relatively small vessels. The Japanese Navy enjoyed parity in aircraft carriers with the United States Navy at this time, but even at that early date a significant difference in aircraft stowage capacity was evident. From that time forward, American carriers would always be able to carry more planes than their Japanese counterparts.

The Washington Treaty compelled the Japanese and Americans to continue building aircraft carriers that were similar in size and background. Both navies were allowed to convert two capital ship hulls into large aircraft carriers. Again, in size and background the American and Japanese carriers were very similar. At this point, however, the

Americans were relatively independent of British design influences, whereas the Japanese Navy carriers clearly had been inspired by the ships of the Royal Navy. In the years after World War I the British Naval Air Service had suffered under financial retrenchment and domination by the Royal Air Force. The British edge was lost during the 1920s and there was a failure on the part of the Royal Navy to maintain pace with the rapid development of naval aircraft. Thus, many of the ideas and methods that were adopted by the Japanese were patently outdated by the time the *Kaga* and *Akagi* were completed in 1926 and 1927. The multiple flight deck configuration, for example, meant smaller hangar space and an inferior aircraft complement as compared to the American carriers *Lexington* and *Saratoga*. It is significant to note that while the *Kaga* and *Akagi* underwent lengthy reconstruction during the 1930s, the American ships underwent no major modifications by the time of the Pacific War. While parity in the number of aircraft carriers was being maintained, the Japanese reliance on the British model had become a liability by the late 1920s.

The treaty system continued until the end of 1936, and the navies of the United States and Japan continued at a similar pace in aircraft carrier development. By this period, however, the rift between members of the "Fleet Faction" and the "Treaty Faction" had become serious. Allying with the radical elements of the Japanese Army, the officers of the "Fleet Faction" plotted the demise of the treaty system and the end of international cooperation. In view of the magnitude of the First Vinson Program of 1934, even the officers of the Japanese Navy who had no personal experience with the United States

should have realized that a naval arms race between the two countries would ruin Japan. By that time, however, the Navy General Staff was dominated by Admiral Katō Kanji and the "Fleet Faction", and they were determined that Japan should maintain its national integrity through the strength of its navy.

The unrealistic demands placed on naval architects and planners by the Navy General Staff seriously hampered the efforts to keep pace with American naval expansion. The Japanese Navy was able to keep up in terms of aircraft carrier construction, and during the remainder of the treaty period carrier development was still very similar to that of the United States. Both countries experimented with a small carrier design to test the economic and practical feasibility of dispersing air assets, and in both cases the result was less than satisfactory. Again, the specifications put forth by the Navy General Staff resulted in a ship that was dangerously top-heavy and required a great deal of reconstruction.

After building a small carrier, the Japanese Navy and the United States Navy independently concluded that a new type of fleet carrier would be the best design. In this case both navies produced a solid model which became the basis for latter carrier designs. Although the number and type of carriers built by both navies up to the mid-1930s had been identical, the Japanese carriers could carry fewer aircraft than their American counterparts. At this time it was recognized in Japanese naval circles that it would be impossible for Japan to maintain parity with the United States in terms of quantity. The *Yamato*-class battleships were the ultimate embodiment of the effort to build warships

that were far superior in effectiveness. They are also indicative of the effort and resources that the Japanese dedicated to this goal. Unfortunately, carriers proved to be the more valuable asset during the Pacific War and the Japanese aircraft carriers were not superior to those of her enemies.

During the latter half of the 1930s Japanese carrier design reached a peak. The fleet carrier designs were steadily evolving and the ships of the *Shōkaku* class are generally considered Japan's best aircraft carrier design. British influences were no longer predominant as relations with the Anglo-American powers had deteriorated to such a point that the Anglo-Japanese Alliance was allowed to expire. Further evolution of Japanese carrier designs was greatly impaired, however, by the urgent preparations that were being made for war at the end of the 1930s. Realizing the limitations of the national production capabilities during the mid-1930s, the Japanese naval planners arranged secret programs to subsidize merchant ship construction and produce the "shadow" fleet. This group of auxiliary and merchant vessels was the source of the Japanese edge in the quantity of carriers the Imperial Navy had at the beginning of the Pacific War. There was no qualitative edge enjoyed by the Japanese aircraft carrier fleet, at least not in terms of the vessels themselves.

The true edge of the Japanese carrier force at the start of the Pacific War lay not with the carriers themselves, but in the quality of the aircraft and pilots. The Japanese pilots were well trained, highly motivated and in good physical condition. The Japanese pilots who operated with the *Kido Butai* were experienced combat veterans who were

considered the elite of the Imperial Navy. The aircraft that were used at that time were generally excellent. The Mitsubishi A6M fighter was superlative and could out-maneuver and out-range any other fighters then in service. The Aichi D3A dive bomber was a sturdy craft inspired by the famed German Stuka, and was at least as good as that plane. The Nakajima B5N attack plane was just as effective at its own task, and Japanese torpedoes were far superior to American models.

It is unlikely that the excellent cadre of Japanese carrier pilots would have been so successful had the Japanese war plans been less audacious and thorough. The British, Dutch and Americans were taken utterly by surprise. Although an attack was expected, the scale of the Japanese offensive could not have been imagined by the Allied nations. As far as the opening offensives of the Pacific War are concerned, the Japanese plans were impeccably detailed. Admiral Yamamoto discarded traditional battle line tactics and made excellent use of the only warship, the carrier, that could carry out a plan of such magnitude.

The Japanese plans for the opening strikes of the Pacific War were highly detailed and thoroughly coordinated. The Japanese achieved surprise largely due to the fact that their initial assault was so broad in its scope as to defy anticipation. Another reason for the Japanese surprise is that the American handling and interpretation of decoded Japanese messages was not as competent as it should have been. As a result of poor communication on the part of the Americans, the Japanese enjoyed thorough surprise at Pearl Harbor.

The Japanese Imperial Navy did succeed in assembling the most powerful naval striking force in the world at that time. The aircraft carriers themselves were not qualitatively superior, and the quantitative advantage was nominal, for most of the “shadow fleet” that provided the numerical edge were not suitable for fleet work. It is not an accident that the Japanese sent the ships they did on the Pearl Harbor strike. The edge the Japanese enjoyed during the first six months of war came from training, experience, superior aircraft, preparation and surprise. These factors made the *Kido Butai* the most powerful force in the world.

Japan lost the carrier edge in the Pacific War because most of these factors were not renewable. The quantitative superiority was barely made by virtue of geographic concentration of ships and through the rapid construction of marginal carrier-conversions. It was expected that United States naval construction would eventually overwhelm the Japanese fleet. The quantitative edge in the number of aircraft carriers was certainly temporary. The Battle of Midway resulted in the loss of many of Japan’s best and most experienced carrier pilots. Due to rigorous and demanding standards, the Japanese pilot training program turned out very few pilots each year and there was no way to replace the loss of so many experienced pilots after June 1942. Thus, the high degree of training and experience of Japanese naval pilots declined sharply after that defeat. The losses were increased by the attrition battles around the Solomons in 1942 and 1943. Due to an increasingly severe fuel shortage, new pilots and carrier crews had fewer opportunities to conduct training operations. In the end, pilots were only quickly shown the rudiments of



flight before being sent to the front lines. Ozawa's carrier force in the Battle of Cape Engano did not have any chance to practice or conduct operations as a group before they joined for that engagement. Not even the initial superiority of Japanese naval aircraft lasted, for improved American models began to appear that incorporated all of the lessons the learned in fighting. The Japanese were too slow in introducing improved designs, and when they did appear they were too few too late.

The same thoroughness and complexity characterized Japanese operations throughout the Pacific War, although they were considerably less successful than the opening moves. Japanese plans tended to divide forces into several segments and each phase of the operation depended on the successful completion of the preceding phase. One difficulty that manifested itself was poor communication between commanders. In the case of Ozawa and Kakuta during the Battle of Cape Engano, the misinformation fed to Ozawa was inexplicable and disastrous. While Japanese communication and cooperation tended to worsen with time, the size and cooperation among the American task groups tended to be quite good. The Americans had the benefit of good information, through tactical means such as radar as well as code breaking and other forms of intelligence. In fact, the intelligence efforts by the United States and the Japanese failure to change codes with sufficient frequency greatly impaired the Japanese war effort. American submarines were constantly vectored to targets using knowledge provided by the intelligence teams.

The destruction of the powerful Japanese carrier force that roamed the Pacific during the first months of the Pacific War was a matter of course. It was expected that the

United States would out-produce the Japanese Navy and within four years the American fast carrier groups projected their unprecedented striking power across the Pacific at will. The Japanese Navy was crippled by a lack of fuel that forced its ships to burn unrefined Borneo crude oil. The lack of strategic flexibility caused by the fuel shortage was so bad by the end of the war that the great *Yamato*-class battleships and their attendant warships were ultimately sent on one-way suicide missions.

The Japanese aircraft carrier force shared the same fate as the rest of the Imperial Navy. Admiral Yamamoto had been remarkably prophetic when he stated that he would run wild and win victory after victory for the first six to twelve months of the war. Indeed, the *Kido Butai* did just that. But time was on the side of the Americans and Japanese dominance, built on the power of the Japanese aircraft carrier force was short-lived.

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