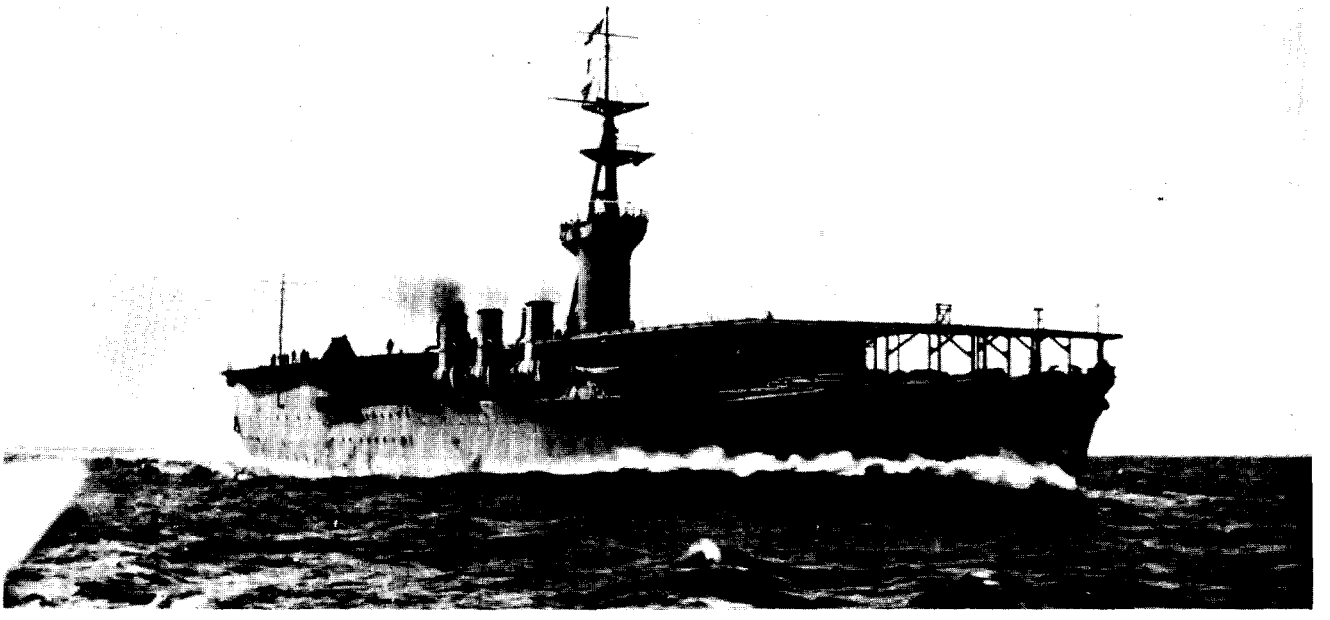


IMPERIAL JAPANESE *Navy's first aircraft carrier, the Hosho, was built as such from the keel. She appears here in her original rig in 1922. Later on, the starboard island was removed and the three hinged funnels were placed in a fixed position, bending aft.*

Evolution of Aircraft Carriers

THE JAPANESE DEVELOPMENTS

'In the last analysis, the success or failure of our entire strategy in the Pacific will be determined by whether or not we succeed in destroying the U.S. Fleet, more particularly, its carrier task forces.'—Adm. Isoroku Yamamoto, IJN, 1942. 'I think our principal teacher in respect to the necessity of emphasizing aircraft carriers was the American Navy. We had no teachers to speak of besides the United States in respect to the aircraft themselves and to the method of their employment. . . . We were doing our utmost all the time to catch up with the United States.'—FAdm. Osami Nagano, IJN, 1945.

By Scot MacDonald

BY CHRISTMAS EVE 1921, the Washington Disarmament Conference had already been going on for a month and a half. Participating were Great Britain, Japan, France, Italy, and the United States. It was on this day that Great Britain refused any limitation on auxiliary vessels, in view of France's demand for 90,000 tons in submarines. The delegates then began to consider confining the treaty to capital ships and aircraft carriers.

The Washington Naval Treaty, signed February 6, 1922, established a tonnage ratio of 5-5-3 for the capital ships of Great Britain, the United States, and Japan, respectively, assigning a smaller tonnage to France and Italy. The same ratio for aircraft carriers was set, with an overall limitstion of 135,000 tons each for Great Britain and the U. S., and 81,000 tons for Japan. It also limited any new carrier to 27,000 tons, with a provision that, if total carrier tonnage were not thereby exceeded, nations could build two carriers of not more than 33,000 tons each, or obtain them by converting existing or partially constructed ships which would otherwise be scrapped by the treaty.

December 27 that year, Japan commissioned its first aircraft carrier, the *Hosho* ("Flying Phoenix"). This was a remarkable *hoku bokan* (literally, mother ship for aircraft). Though the British were the first to operate aircraft onto and off a ship especially designed for that use, their first aircraft carriers were conversions. *Hosho* was a carrier from the keel, the first of its kind completed in any navy of the world.

Laid down in 1919 at the Asano Shipbuilding Co. of Tsurumi, the ship was fitted out at Yokosuka Navy Yard at a standard displacement of 7470 tons, a speed of 25 knots, with the capability of handling six bombers (plus four reserve), five fighters (in addition to two in reserve), and four reconnaissance planes, a total of 21 aircraft.

Hosho was indeed a strange looking craft. She was all flying deck. Originally, she had an island structure and a tripod mast, but either because of the small width of her flying deck (and its attending hazards) or because some turbulence might have been caused by it, the island was taken off.

The carrier sported three funnels on the starboard side. These were of the hinged type, held upright when not in use, and swung outboard to provide additional safety from stack gas. Later, they were placed in a fixed position, bending aft and slightly downward.

UNDER THE WASHINGTON *Naval Treaty, Japan converted a battle cruiser to aircraft carrier characteristics. In 1928, that country's 2nd carrier was completed and named Akagi, after a mountain.*

Hosho's original armament consisted of from 14cm single mount guns and two 8cm single mount high angle guns. At the outbreak of WW II, her high angle guns were replaced by four 25mm twin mount machine guns. Later, the 14cm guns were removed and 25mm double or single mount machine guns were added.

Before continuing with Japanese development, an explanation of the naming of their aircraft carriers is in order.

"Transliteration of the names of Japanese aircraft carriers into American equivalents is a pretty risky business," said Mr. Roger Pineau, a frequently published writer on the Japanese Navy after World War II. "It becomes misleading. The names should be treated as such and should not be taken too literally. For instance, when we speak of astronaut Carpenter, we don't visualize a man walking around with hammer and saw in hand."

Mr. Chris Beilstein, another expert on Japanese aircraft carriers, concurs. "The *Shokaku* becomes 'Flying Crane,' for that is the closest we can translate the original Japanese. The first Japanese CV's carried names of mountains and provinces. These, in turn, were frequently named after mythological characters. *Shokaku*, for example, could have been a flying crane in an age-old story, a crane that was named Shokaku. This is very much like our real life Misty, the wild horse. Certainly, to translate 'Misty' to literal Japanese would be meaningless to them, or at best, misleading. It would be more accurate to translate it 'Wild Horse.' Thus, 'Misty,' to the Japanese, would mean 'Wild Horse,' just as we would erroneously translate Shokaku as 'Flying Crane.'

"Think of the problem in transliterating *Shangri La* into Japanese," said Mr. Pineau. "To paint the picture accurately, it would be necessary to describe Hilton's book and then go into President Roosevelt's fascination with it. That would be rather difficult to do in one or two words. Perhaps the closest would be 'Paradise of the Ageless'—and this would, in the Japanese mind, seem a pretty silly thing to name an aircraft carrier.

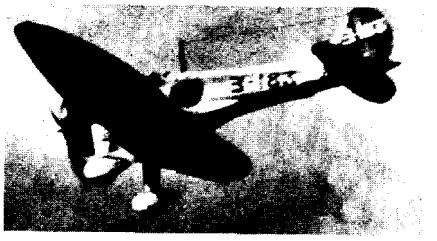
"But transliteration has a very real value—especially to those who have difficulty in pronouncing Japanese words. Many competent researchers don't even speak the language. The transliteration is a handy reference point, but should not be taken seriously, at face value."

Japanese Naval Aviation dates back to 1912 when the Navy sent officer trainees to the U.S., Great Britain, and France. They returned from France with two Farman seaplanes, and from the U.S. with two Curtiss seaplanes. A beach on the west side of Tokyo Bay, Oppama, was selected as a site for a seadrome in the fall of that year and placed into commission. The first class at Oppama consisted of four officers and 100 men.

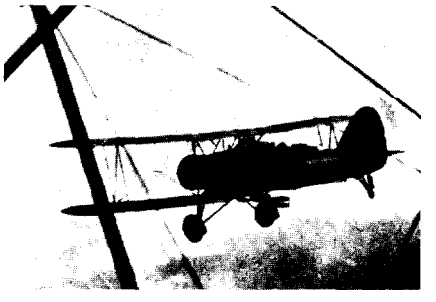
From 1912 to 1917, ¥3-400,000 (about $150-200,000) was allotted to the fledgling air arm. In 1918, this sum was increased to ¥1 million (about $500,000), and the next year to ¥2 million.

The first landing on the *Hosho* was made by a British civilian, a Mr. Jourdan, on February 22, 1923. States the Japanese Year Book of 1924-25: "... our Naval flight officers are making similar experiments with good results."

(In chronological comparison, Eugene Ely landed on a platform on the armored cruiser USS *Pennsylvania* January 18, 1911; USS *Langley*, the U.S. Navy's first aircraft carrier, a converted collier, was commissioned March 20, 1922; the first U.S. aircraft carrier built as such, from the keel, USS *Ranger*, was not commissioned until June 4, 1934.)



LATER CODE-NAMED *Claude, Mitsubishi Type 96 fighters replaced Japanese Navy's 90's.*



ALSO OPERATING *from carriers in the Sino-Japanese War were Type 96 attack aircraft.*

NAKAJIMA TYPE *90 fighter biplanes operated from Japanese carriers in the mid-Thirties.*

A naval expansion program, decided upon in 1920, was completed by March 1923. Under the limitations set by the Washington Naval Treaty, Japan turned her attention to the conversion of the battle cruiser (then eight months under construction at the Kure Naval Arsenal). This, in 1928, became Japan's second aircraft carrier, the *Akagi* ("Red Castle," actually the name of a Japanese mountain).

MODERNIZATION *in the mid-Thirties saw Akagi undergo extensive changes. Flight deck area was extended forward. Other changes forced a reduction in carrier's speed from 31 knots to 28 knots.*

Akagi displaced over 30,000 tons standard when completed, had a speed of 31 knots, and carried 60 aircraft. She was armed with ten eight-inch and 12 4.7-inch guns.

A sister ship, the *Amagi* ("Heavenly Castle"), was also scheduled for conversion at that time, but sustained severe damage in the earthquake of September 1, 1923. She was scrapped in July 1924 at Yokosuka. In her place, Japan converted the *Kaga* (the name of an old Japanese province) to an aircraft carrier. Originally, she was laid down as a 39,000-ton battleship, but was scheduled for the scrap pile as a result of agreed disarmament limitations. Conversion was completed in 1928 and she was commissioned the following year. The 1929 Japanese Year Book states of *Akagi* and *Kaga:*

"They are the pride of the Japanese Navy, and though slightly inferior to the *Saratoga* of the U.S. Navy in respect of speed, the *Akagi* surpasses the other in point of the range of her high angle guns, of which she carries 12 4.7-inchers. The *Hosho* . . . [is] by far smaller than the *Akagi*, but in the mode of construction [it possesses] special features of [its] own. The completion of the *Kaga*, only second to the *Akagi*, is a powerful addition to the Japanese Navy."

Kaga was reported as displacing 26,900 tons standard, but actually displaced over 30,000 tons, had a speed of 27 knots and carried 60 aircraft.

As the signatories of the Washington Naval Treaty reconvened in London in 1930, Japanese naval officers began to chafe under the ship construction restrictions imposed upon their nation. At that time, the armed forces were unpopular with the liberal government in power. Final decision on the size of the Navy lay in the competence of the civilian government. Most career officers were hostile to the treaty; those officers, who supported the civilian government in the bitter fight that ensued concerning ratification of the 1930 London Treaty, were either forced to resign within the next few years or were placed in unimportant posts. Militarists, ascending in power, referred contemptuously to the ratification as "the May 15th Affair."

The London Treaty carried forward the general limitations of the earlier Washington agreement and provided for further reductions of naval armament. Under terms applicable to Naval Aviation, the definition of an aircraft carrier was broadened to include ships of any tonnage designed primarily for aircraft operations. It was agreed that installation of a landing-on or flying-off platform on a warship designed and used primarily for other purposes would not make that ship an aircraft carrier. It also stipulated that no capital ship in existence on April 1, 1930 would be fitted with such a platform or deck.

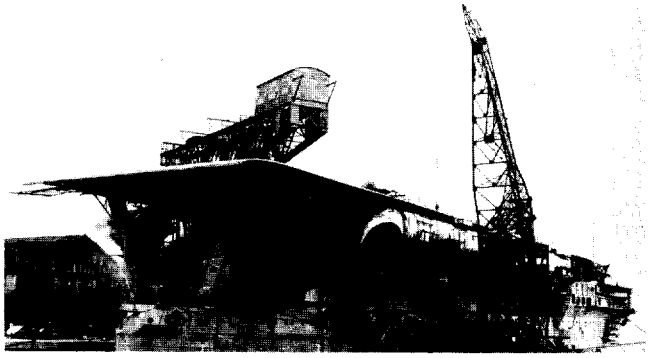
The Japanese Navy expanded rapidly after 1930, at such a rate that it became necessary to conscript men. In 1931, a replenishment plan was authorized the Navy, permitting it to complete construction of the *Ryujo* ("Galloping Dragon"), a small aircraft carrier of about 10,000 tons laid down in 1929. It was completed in 1933, its limited deck free of an obstructive island. *Ryujo* had a speed of 29 knots, carried 36 aircraft, and was armed with 12 five-inch guns. She was Japan's fourth aircraft carrier. In June 1934, USS *Ranger* became the United States Navy's fourth carrier.

In 1932, naval authorities referred a second naval replenishment plan to the Ministry of Finance for study. The plan called for a total expenditure of ¥460,000,000 (about $230 million), covering the construction of one aircraft carrier of 8000 tons, other capital and auxiliary ships, and the establishment of eight flying corps on land: all this to be completed by the end of 1936. This aircraft carrier was never built.

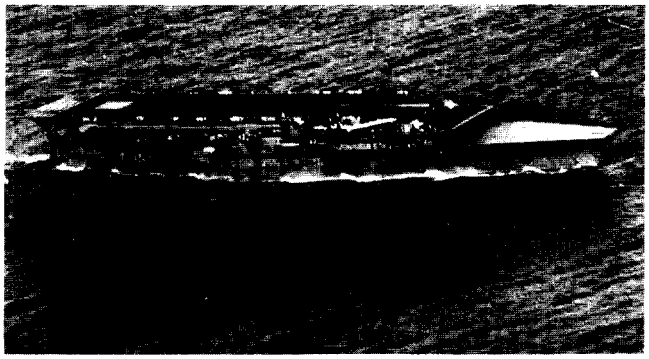
In 1934, preliminary disarmament conferences were held in London. Congress had already passed and President Roosevelt authorized an act that popularly became known as the Vinson-Trammell Act. This permitted the U.S. to construct naval ships to the tonnage limitations prescribed by the previous Washington and London Naval Treaties. Under this authorization, USS *Wasp* (CV-7) was laid down in 1936.

Japanese militarists were not eager to continue in the disarmament pacts. Wrote U.S. Ambassador to Japan, Joseph C. Grew, "Japanese attitude toward the coming Naval Conference in 1935 London Treaty is intensely unpopular among the Japanese Naval officers high and low;" and in separate correspondence, "The situation is entirely different from that in 1930. . . . Under present conditions the Navy alone will have the final say [as to the size of the Imperial Japanese Navy]."

It boiled down to this: Japan wanted quantitative as well as qualitative parity in ship power, equal to the United States and Great Britain. The 5-5-3 ratio was no longer acceptable. Neither the U.S. nor Britain favored such an increase in Japanese strength, for,



SISTER SHIP *to Akagi, the Kaga, is shown here shortly after her commissioning in December 1928. Note the unusual stack arrangement.*



AN AERIAL VIEW *oj Kaga shows the chopped-ofl bow configuration and the starboard stack. Kaga, even after refitting, bad no island.*

THE SHOKAKU CLASS *consisted of two carriers, Shokaku (shown here) and Zuikaku. They were authorized under the Fleet Replenishment Program of 1937, displacing 25,675 tons standard. Zuikaku was first to have a bulbous bow configuration. Both were completed in 1941.*

granted equality in armored ships, Japan would be the major power in the Pacific, greater than the U.S. and Great Britain combined; their Fleets were divided geographically.

Japan persisted. The Japanese Year Book of 1935 enumerated that country's "official" reasoning:

"(1) The progress and development made recently in battleships, aeroplanes, etc., have made it extremely difficult to effectuate defence operations.

"(2) The remarkable increases in the air forces of the U.S.S.R. and China, and the revival of the Far Eastern naval forces of the former.

"(3) The establishment of the naval port of Singapore by Great Britain, and the extension and strengthening of the naval port of Hawaii by the U.S.A. have had a great effect on the naval plan of operations in Far Eastern waters.

"(4) The birth of Manchoukuo [independence of Manchuria, February 18, 1932] has brought forth vast changes in Far Eastern policies. It has increased the responsibility of the Japanese Empire as the stabilizing power in the Far East."

These were political arguments the world's two top naval powers could not buy. But Japan was adamant, refused compromise and, on December 29, 1934, gave the required two years' formal notice that after December 31, 1936, she would no longer be bound by the terms of the Washington and London Naval Treaties. Her act of abrogation unleashed the restraints on international shipbuilding.

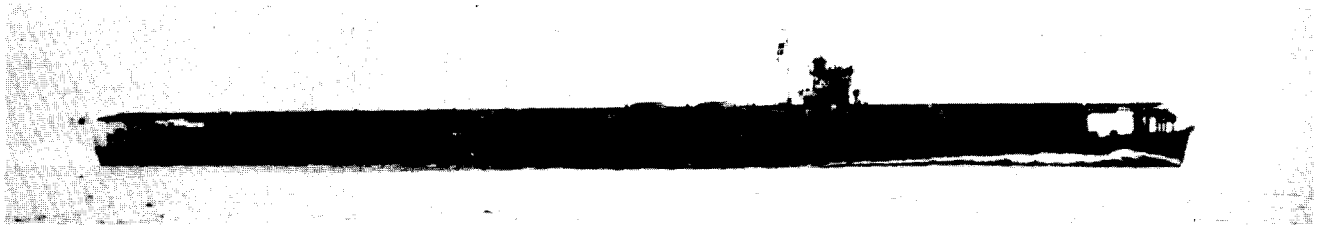
Two more aircraft carriers were laid down in Japanese ways in 1934 and 1936, the *Soryu* ("Blue Dragon") and *Hiryu* ("Flying Dragon"). *Soryu* displaced about 18,000 tons standard, had a speed of 34.5 knots, and handled 63 aircraft. *Hiryu* was heavier, 18,500 tons standard, and had a speed of 34.3 knots. Officially, both ships were carried on the books as of 10,050 tons standard; the true tonnage was not revealed until after WW II. Both ships carried the same number of planes and had the same armament, 12 five-inch guns.

It was sometime between 1935 and 1937 that naval ship designers configured carriers to provide a surprising technical innovation. *Akagi* and *Kaga* underwent major modernization at this time. The lower flight decks were suppressed, the upper flight decks were extended forward, and the eight-inch gun turrets and mountings were reduced in *Akagi* from ten to six, while *Kaga* replaced her 12 4.7-inch guns with 16 five-inchers. *Kaga's* unwieldly funnels were also reduced. The modernization of *Kaga,* which included new machinery, added about 1½ knots to her speed, giving her 28.3, but *Akagi's* modernization cost her several knots, bringing her down to 28.

But the startling innovation was the introduction of small islands on the port side of the carriers *Akagi* and *Hiryu*. The remaining carriers had islands on the starboard (standard) side—of those that had them at all. Strategists planned to use these carriers in a formation that was unique. The lead carriers in the basic formation were to be the port-islanded *Hiryu* and *Akagi,* followed by the *Soryu* and *Kaga.* This would supposedly allow for a more compact formation with nonconflicting aircraft traffic patterns. This formation was used in the Battle of Midway.

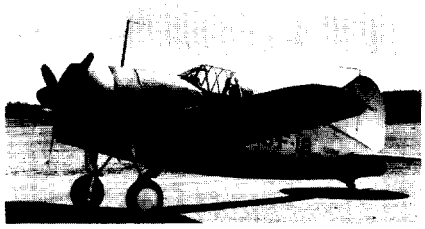
Japan's next venture into aircraft carrier construction was the *Shokuku* ("Flying Crane") and *Zuikaku* ("Lucky Crane"). These carriers were kept fairly well under wraps, insofar as specifications are concerned. They were authorized under the very ambitious Fleet Replenishment Program of 1937, the same program under which the famed super battleships *Yamato* and *Musashi* were built.

Shokaku was laid down December 12, 1937 at the Yokosuka Navy Yard, while *Zuikaku* was started at Kawasaki Dockyard May 25, 1938. Basically, the ships had similar specifications. They displaced 25,675 tons standard, had a designed speed of 34.2 knots, carried 16 five-inch guns in twin mounts, and could carry up to 84 aircraft, although a normal complement

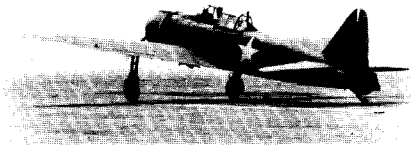


THE SORYU CLASS *was first laid down in 1934 and 1936, displacing about 18,000 tons standard, at a speed of 34 knots. The Soryu had her island on the starboard (conventional) side. She, with other IJN aircraft carriers, participated in the Dec. 7, 1941 Pearl Harbor raid.*

was 73. There were no major differences between the ships. *Zuikaku,* however, was fitted with a bulbous bow, the first Japanese warship so designed. *Shokuku* was launched June 1, 1939, and completed August 8, 1941; *Zuikuku* was launched November 27, 1939, and completed September 25, 1941.



FIRST USN *monoplanee fighters, Brewster F2A-1's, did badly against Japanese Zeroes.*



CAPTURED ZERO, *Mitsubishi Type O, has U.S. markings here, for U.S. tests early in war.*

Completion of both carriers was delayed when the original funnel arrangement was changed in mid-construction by the Aeronautical Headquarters. As designed, the funnels were to appear one on each side of the island bridge, fore and aft on the starboard side. This was changed by placing the two funnels immediately aft of the island.

The Japanese did not give either ship much publicity. Both ships, *Zuikaku* and *Shokaku,* were to figure prominently in most sea battles of WW II involving naval air. Their design was based on the best material gathered from experiences in *Akagi, Kaga,* and the *Soryu* types. Later Japanese carriers (i.e., multiple ship design classes) were constructed in two groups: the large to be like *Taiho* (with armored flight deck) , and the medium to be repeats of the *Soryu* class. *Zuikaku* and *Shokaku* comprised an entire class.

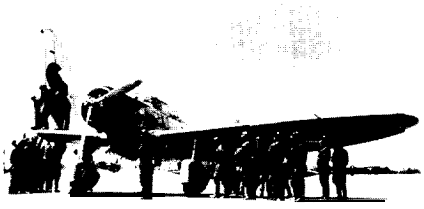
Japan's next aircraft carrier was a conversion. In 1936 the submarine depot ship *Takasaki* was under construction. While she was still in the ways, the decision was made to complete the ship as a carrier. Work on this project was not started until January 1940, but was completed in December that year. The carrier was renamed *Zuiho* ("Happy Phoenix"). She displaced 11,200 tons standard, sailed at 28 knots, and carried 30 aircraft. She was armed with eight five-inch guns.

A sister ship, *Shoho* ("Lucky Phoenix"), converted between January 1941 and January 1942, was originally named *Tsurugisaki,* launched as a submarine depot ship in 1934. *Zuiho* and *Shoho* particulars were similar.

Other aircraft carriers were under construction or conversion. At least 15 more would be commissioned during the war years, produced in growing restrictions of limited materials, and, after the Battle of Midway in 1942, in desperation.

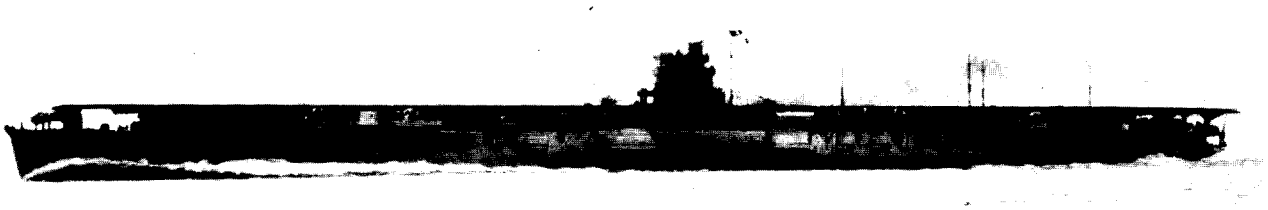
IN THE FIVE-YEAR period preceding December 7, 1941, the military of Japan grew stronger in power. March 1936 the cabinet was dominated by men in uniform and the development of heavy industry was pushed. An extraordinarily ambitious and successful expansion of the Navy was launched in 1937, the same year hostilities broke between Japan and China. That same year, the *Panay* was sunk. In 1938, the National Mobilization Bill was passed. In September 1940, Germany, Italy and Japan concluded a three-power pact. November 1941, Japanese Prime minister, Gen. Hideki Tojo, stated that British and American influence must be eliminated from the Orient.

The Japanese Navy had been conducting intensive training of its officers and men during this period. Most of the training, including war games, was conducted in out-of-the-way gulfs and in the stormy northern reaches of the Pacific. The men were hardened by the elements and drilled continuously. To avoid antagonizing the Japanese, the U.S. Navy at the same time was instructed to hold all of its fleet problems in the less satisfactory areas west of the International Date Line.



MITSUBISHI TYPE 97 *carrier attack aircraft is typical of early Japanese monoplanes.*

By 1941, Japan was determined to wage war. On November 10, VAdm. Chuichi Naguma, placed in charge of the initial attack, issued his first operation order on the mission. The Striking Force of *Akagi, Kaga, Soryu, Hiryu, Shokaku* and *Zuikaku,* as well as other capital ships, sortied from Kure navy base between November 10 and 18, rendezvousing on the 22nd in Tankan Bay in the Kuriles. Adm. Yamamoto ordered the force to sortie on November 26. On December 2, he broadcast a prearranged signal that would launch the attack on Pearl Harbor: *Niitaka Yama Nobore* ("Climb Mount Niitaka"). Five days later, December 7, the Japanese Navy launched its surprise attack by aircraft, launched from carriers, at Pearl Harbor and the Philippines. The next day, the United States and Japan were officially at war.



HIRYU, SISTER *to the Soryu, had her island on the port side, as did Akagi, the only two IJN aircraft carriers so configured. Hiryu was heavier by some 500 tons. Exact displacements of IJN carriers is in doubt, owing to the burning of official records at the end of WW II.*