

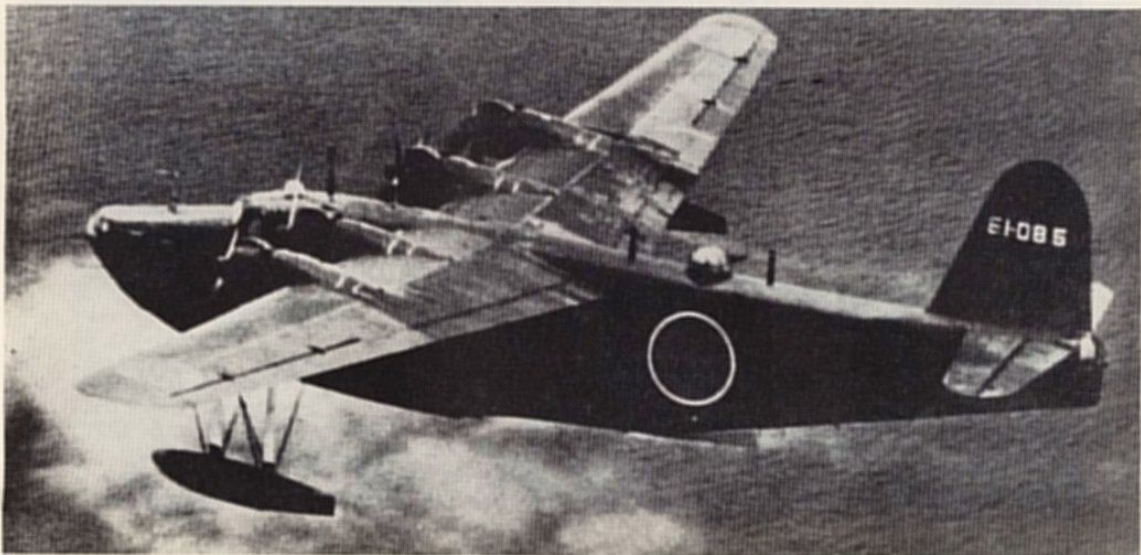
AIRCRAFT PROFILE

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Kawanishi 4-Motor Flying-Boats (H6K 'Mavis' and H8K 'Emily')

by M. C. Richards

35p





Two H6Ks, moored in a lagoon, with canvas covers over the cockpits.

(Photo: Koku Fan, Tokyo, Japan)

Kawanishi 4-Motor Flying-Boats (H6K 'Mavis' and H8K 'Emily')

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BY late 1942, the tide of war had begun to turn against Imperial Japan. One important factor contributing to this reversal was the increasing scale of losses suffered by the Imperial Japanese Navy and Army Air Forces. To achieve superior performance, the aircraft for the Navy and Army were designed and constructed as lightly as strength would permit. The price paid for ignoring (or applying too sparingly) such items as crew protection armour plate and self-sealing fuel tanks was heavy indeed.

The two Kawanishi flying-boats recorded in this *Profile* bear witness to what has already been observed. By comparison with Western patrol boats, the earlier H6K (Allied code name: 'Mavis') had an excellent range, good speed and load-carrying capability. This was achieved by complete lack of armour or fuel tank protection. In consequence, 'Mavis' was a relatively easy "kill" for most Allied aircraft. Not so the later H8K ('Emily'). It was extremely well armoured and equipped with adequate self-sealing tanks and a fuel system incorporating fire extinguishers. Yet the H8K had a fine turn of speed coupled with long endurance—and it was seldom an easy 'kill'.

KAWANISHI DEVELOPMENT: H6K AND H8K

By the beginning of the 1930s, quite a few of the aircraft in front-line service with the Imperial Japanese Navy Air Force (IJNAF) were licence-built or were designs which owed a great deal to foreign influence. For example, at this time the IJNAF was taking delivery of the Kawanishi Navy Type 90-1 (and 90-2), the tri-motor biplane flying-boat which also bore the IJNAF short designation, H3K1 (and H3K2). The H3K was in fact a British design from Short Brothers of Rochester, Kent. The prototype had been reassembled in Japan in late 1930 and thereafter built under

licence by *Kawanishi Kokuki Kabushiki Kaisha* (Kawanishi Aircraft Co. Ltd.) at the new plant of Naruo, on Honshu Island between Kobe and Osaka.

Because of changes in the administration of the Imperial Japanese Navy in early 1932, a Naval Aircraft Establishment was created. Speedily this agency began to assert influence; not least, by urging the Navy not only to raise the standard of its aircraft but also to order new aircraft of purely Japanese design and manufacture.

One of the first fruits of this change of policy occurred in the first half of 1933 when Kawanishi was awarded an 8-*Shi* (8th year of *Showa*; corresponding to the Western year of 1932) Specification for a Navy Experimental Large Flying Boat. In common with other specifications issued by the Navy at this time, the conditions were stringent. To the 8-*Shi* Specification, Kawanishi evolved two monoplane flying-boat designs; the four-motor Type Q and the tri-motor Type R. From March to September 1933, both designs were subjected to critical study and testing. Models under-

The Kawanishi H3K1, Type 90-1 Flying-Boat of the Imperial Japanese Navy Air Force was a British Short Bros. of Rochester (Kent) design. Kawanishi produced five examples under licence in 1931.

(Photo: via Heinz Nowarra)



went full examination for aerodynamic and hydrodynamic qualities in wind tunnel and seaplane testing tank respectively. In the event, the Navy could not be convinced that either design would match its full-size requirements. Accordingly, the 8-*Shi* Specification was withdrawn.

Despite disappointment at Kawanishi, their past 8-*Shi* efforts were soon to be rewarded by the Navy in the form of an exclusive 9-*Shi* Specification for a four-motor monoplane flying-boat.

The 9-*Shi* Specification demanded a comparatively big flying-boat—with a performance superior to that of the long-range Sikorsky S-42 commercial boat ordered by Pan American Airways for its Pacific pioneer routes of the mid-1930s. The design team under Yoshio Hashiguchi and Shizuo Kikuhara had to build into this Types Q and R successor a cruising speed of better than 120 knots and a 2,500-nautical miles operating range. At Kawanishi, the new 9-*Shi* flying-boat was designated Type S.

As the Type S evolved, so a graceful shape emerged of a high wing, strut-braced, parasol monoplane powered by four 840 h.p. Nakajima Hikari 2 air-cooled, 9-cylinder radials. With twin tails, the resemblance to the S-42 was marginally there but the Type S had a longer and slimmer hull as well as a bigger wing span.

With Kawanishi's chief test pilot, Katsuji Kondo, at the controls, the prototype took to the air for the first time on July 14, 1936. Only one modification was required; that of boat handling, which was effected by shifting the forward step of the hull rearwards by some 500 mm. (1 ft. 7 in.).

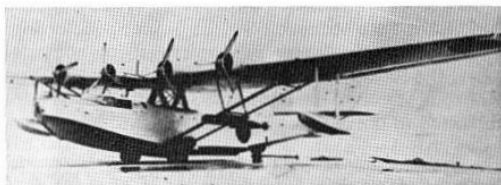
Further testing by the Kawanishi test pilots was then conducted and the flying-boat was considered more than satisfactory. On July 25, the prototype was handed over to the IJNAF. In turn, the Navy found the flying-boat adequate in most respects. But the performance was found to be a little disappointing, due to lack of power. The war load, carried on the parallel wing struts, could consist of up to 1,000 kg. (2,205 lb.) bombs or two 800-kg. (1,764-lb.) torpedoes. Armament comprised three 7.7-mm. Type 92 machine-

guns—one hand-held in the open bow position, another hand-held in the tail and the third in a dorsal turret. Of French design, this was the first power-operated turret installation in service on any Japanese aircraft at that time.

During 1937, Kawanishi delivered two more prototypes to the IJNAF, and a further prototype was accepted early in 1938. Slight modifications were incorporated—such as fins of increased area, longer-span ailerons, a modified dorsal turret. Also, in the latter part of 1937, all the flying-boats were re-engined with motors of increased power. The motors fitted were Mitsubishi Kinsei 43 air-cooled 14-cylinder radials of 1,000 h.p. each. With this latest modification, the Type S four-motor flying-boat was finally accepted for service with the IJNAF, receiving the designation Kawanishi H6K1, Navy Type 97 Flying Boat, Model 1.

The H6K was then placed in full production by Kawanishi—with the fifth example becoming the first production model and allocated the Navy short designation of H6K2. During 1938-9, two of the first batch (numbers seven and eight) were modified on the production line as prototype transport flying-boats. This project was further developed when Nos. 15 and 16 of the production batch were built as transport flying-boats from the keel upwards. They were allocated the designation H6K3. Although a need for such ocean-going aircraft was envisaged both as personnel transports by the IJNAF, and for commercial airlines, the Navy insisted on priority in the production of the full military version for the time being.

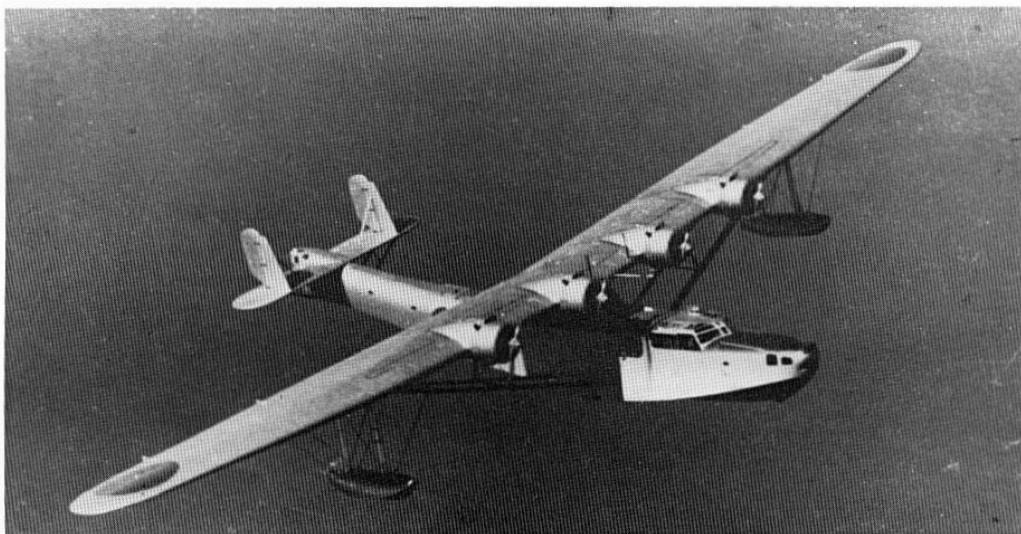
During the summer of 1938, Kawanishi received from the IJNAF an additional design specification for a Navy Experimental Large Flying Boat. Eventually, this newcomer, to a 13-*Shi* Specification, was to supplant the H6K-series then just coming into service with the IJNAF. The specification called for a flying-boat having a better performance than the British Royal Air Force's Short Sunderland (*Profile* No. 189) and the U.S. Navy's experimental Sikorsky XPBS-1. The IJNAF conditions laid down were that the 13-*Shi* flying-boat should have a range of over 4,500 nautical



The prototype Kawanishi H6K1 with torpedoes on the wing struts.
(Photo: via Heinz Nowarra)



A Kawanishi H6K4 in pre-Pacific War colour scheme.
(Photo: Shin Meiwa Industry Ltd.)

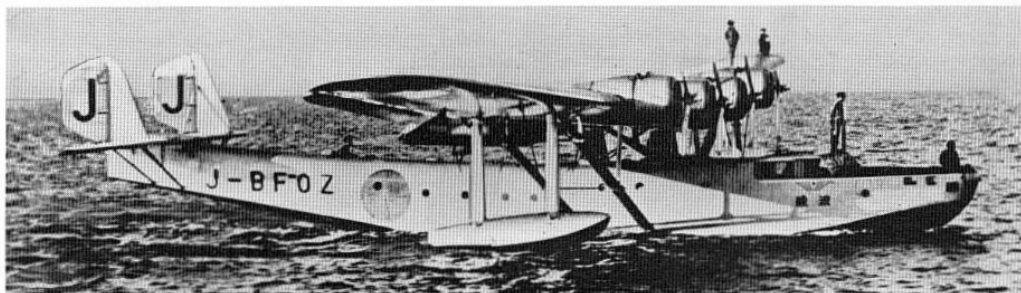


A Kawanishi H6K4 in flight.

(Photo: Aireview via René J. Francillon)

One of the sixteen H6K2-Ls operated by Dai Nippon Koku K.K. on trans-Pacific services. Civil-registered J-BFOZ, this H6K2-L was named Ayanami (Beautiful Wave).

(Photo: U.S. Navy via René J. Francillon)



miles at a cruising speed of 180 knots and a maximum speed of 240 knots. The initial design advanced during August 1938 with wind tunnel and water tank testing of models. The final result of these exhaustive tests was an aerodynamically 'clean', shoulder-wing flying-boat of advanced conception for its day. The design team was again led by Dr. Shizuo Kikuhara.

By early 1939, production of the H6K series was gaining momentum at the Naruo plant. By now, the design had been further modified to include an increased fuel capacity. The tankage was advanced from 7,765 litres (1,708 Imperial gallons) to 13,409 l. (2,950 Imp. gal.). At the same time, the dorsal turret was deleted and replaced by two waist gun 'blisters', each housing a hand-held 7.7-mm. Type 92 machine-gun. The tail turret now housed a hand-held 20-mm. Type 99 Model 1 cannon, and the bow position one hand-held 7.7-mm. Type 92 machine-gun, while an open dorsal gun position also housed one hand-held 7.7-mm. Type 92 machine-gun. This model received the Navy short designation H6K4 and ultimately became the main production version.

Dai Nippon Koku K.K. (Greater Nippon Air Lines Ltd.) also, at this time, took delivery of several transport versions of the H6K4, and these were

designated H6K2-L. On April 1, 1939, one of these flying-boats made an inaugural flight from Yokohama to Saipan in the Marianas.

The transport version of the H6K4—the H6K2-L—was modified by the removal of all the armament, and the hull was also modified to include cargo holds in the bow and stern. Behind the crew cockpit was the galley. Amidships was a sleeping cabin for up to four passengers or eight seated passengers. Aft of this was a second cabin which could seat 10 passengers. Fuel tankage was also increased. Production of this version continued from 1940 until 1943; production being completed with the 36th flying-boat. The final 20 were redesignated as H6K4-Ls.

Early in 1940, the IJNAF amended their designation system. Thus, the H6K2 became the Navy Type 97 Flying Boat, Model 1-1. Similarly, the H6K4 then became the Navy Type 97 Flying Boat, Model 2-2. This version had been fitted with Kinsei 43 motors but, with the installation of Kinsei 46 motors, the H6K4 was designated the Navy Type 97 Flying Boat Model 2-3. These designations were effective from April 1940.

Throughout 1940, construction of the 13-Shi Experimental Flying Boat continued in the Kawanishi prototype shop. The prototype was rolled-out on



An H6K4 in flight with bombs attached to the wing support struts. The drab Pacific War colour scheme was introduced in mid-1942 for all combat aircraft of the IJNAF.

(Photo: via Heinz Nowarra)



Another view of J-BFOZ seen here being positioned—with the crew preparing for mooring.

(Photo: via Heinz Nowarra)

December 31, 1940. It was powered by four Mitsubishi MK4A Kasei 11 air-cooled 14-cylinder radials of 1,530 h.p. each. Flight trials beginning in January 1941 soon revealed some major faults. When the flying-boat was taxied at high speed or on take-off runs, spray flooded over the wings, spilled into the cockpit and swept through the propellers. Equally, when the bow was lifted, the pilots had great difficulty keeping control of the aircraft. In fact, on several occasions, the flying-boat was capsized. Inevitably, the aircraft was returned to the prototype shop for modification, by which it was hoped that the water handling of the aircraft could be improved.

The hull of the prototype was increased in depth by 500 mm. (1 ft. 7 in.), the planing bottom (the faired smooth surface on the bottom of the hull) was modified, and distinctive spray strips were fitted under the hull's bow to divert the spray away from the cockpit and propellers. At this point, the prototype was returned to the Kawanishi test pilots for further flight trials. Water-handling trials showed a marked im-

provement and, in consequence, the 13-Shi Experimental Flying Boat was handed over to the IJNAF for service trials.

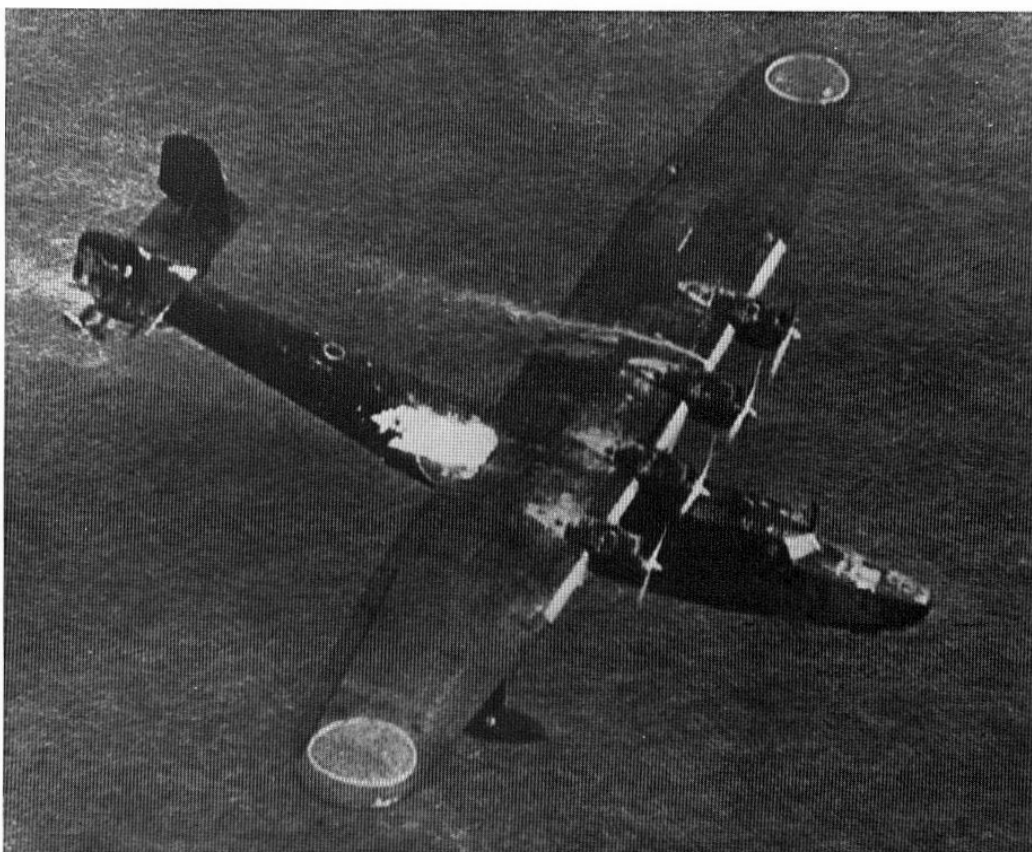
The prototype could carry eight 250-kg. (550-lb.) bombs or two 800-kg. (1,764-lb.) torpedoes. Defensive armament included five flexible 20-mm. Type 99 Model 1 cannon—one each in the bow, dorsal, two waist blisters and tail positions—plus three flexible 7·7-mm. Type 92 machine-guns firing through side hatches in the cockpit area. The Kasei motors each drove a four-blade propeller of 3·90 m. (13 ft. 1½ in.) diameter.

The flying-boat had a unique fuel system. In the wings were eight small tanks (which on the prototype had no protection), and in the hull were six large tanks. The hull tanks had CO₂ fire extinguisher bottles fitted, and thus had limited protection. However, the whole fuel system was so arranged that if any tank were punctured, the leaking fuel would drain into a bilge and the fuel would be transferred to a tank not damaged by means of a remotely-controlled pump.

H6K flying-boats in a lagoon in the south-west Pacific in late 1942. The aircraft nearest the camera is an H6K5 of the Yokohama Naval Air Corps and that on the immediate left is a H6K4 of the Toko Naval Air Corps.

(Photo: Koku Fan, Tokyo, Japan)





An H6K4-L going down under attack from an Allied aircraft.

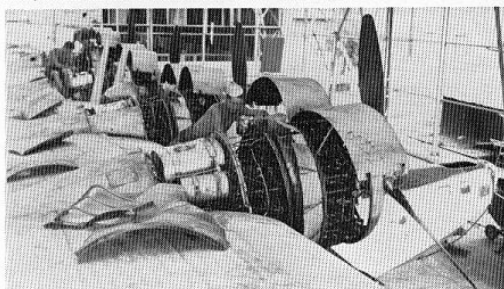
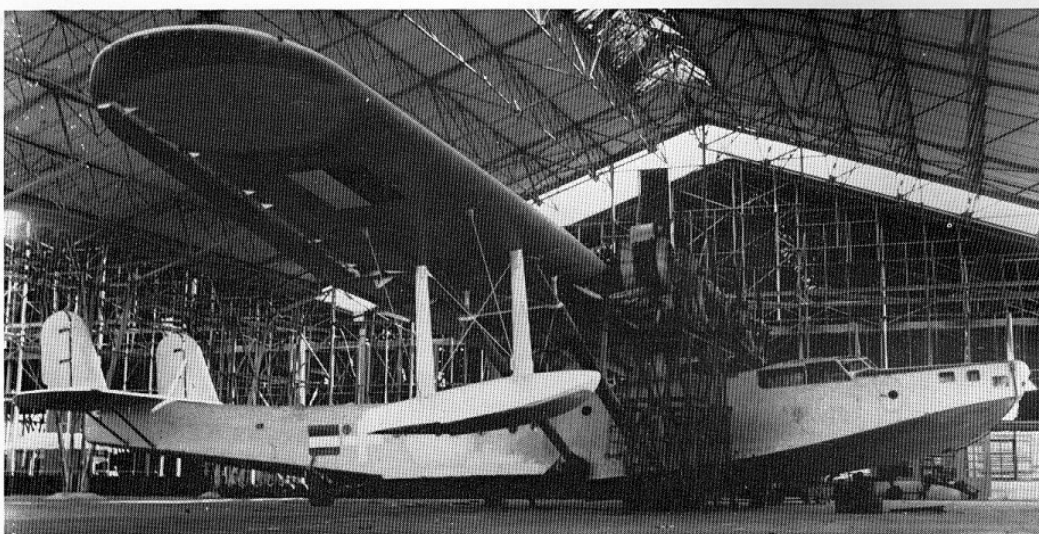
(Photo: via Major Robert C. Mikes)

While the testing of the 13-*Shi* prototype continued, Kawanishi could not be certain that the trials would be successful. So, as a safeguard, the H6K was still further modified. From the 119th flying-boat on the production line, the H6K was fitted with four 1,200 h.p. Mitsubishi Kinsei 53 air-cooled 14-cylinder radials. The top speed advanced to 208 knots. The open gun position in the bow was deleted (and faired over) and the 7.7-mm. machine-gun was rehoused in a turret behind the cockpit. This version was designated H6K5 and became the Navy Type 97 Flying Boat, Model 2-3. Thirty-six of these Model 2-3s were produced in late 1941 and 1942.

During 1941, the prototype 13-*Shi* experimental flying-boat was joined in the test programme by two pre-production aircraft. These incorporated all the modifications already noted together with an increase in fin area and a lengthened nose. They were accepted for service with the IJNAF as the H8K1, the Navy Type 2 Flying Boat, Model 1-1. The H8K1 differed from the prototype in having a reduced armament of two flexible 20-mm. cannon in the dorsal and tail turrets, plus four flexible 7.7-mm. machine-guns—two in the nose turret and one in each of the waist 'blister'. The propellers were reduced in diameter to 3.40 m. (12 ft. 9½ in.).

In the early months of 1942, the prototype H8K1 had been fitted with four Kasei 22 motors of 1,850 h.p. each. These motors had water injection and the nacelles were modified. This experiment improved the performance by nearly 15% and it was decided to incorporate the Kasei 22 motors on the succeeding H8K flying-boats being built by Kawanishi. After producing 16 H8K1 with Kasei 11 motors, Kawanishi started to manufacture the Kasei 22-powered model. This version received the designation H8K2 or Navy Type 2 Flying Boat, Model 1-2, and became the principal production 'Emily'. The H8K2, because of its increase in power loading over the H8K1, was extensively modified and included an increased armament and armour protection.

The H8K2 carried an armament of five flexible 20-mm. Type 99 Model 1 cannons (in the nose, dorsal, two waist 'blisters' and tail turret) and a flexible 7.7-mm. Type 92 machine-gun firing through hatches in the cockpit. On later production models of the H8K2, four flexible 7.7-mm. Type 92 machine-guns were carried—two in the nose and two in the cockpit. Armour plate 6-mm. in thickness was fitted behind each pilot's seat, and three similar plates aft of the top turret extended each side of the hull. Inside the dorsal turret there were two similar plates (250×400 mm.)



Multiplicity of markings. This H6K2-L was found in a hangar at Sourabaya in the Netherlands East Indies in late 1945 by British forces fighting the Indonesians. The markings include the Japanese Hinomaru and green surrender crosses only thinly painted out, and Dutch and Indonesian markings still in evidence.

(Photo: Imperial War Museum via Bruce Robertson)

Fitters of No. 3210 R.A.F. Servicing Commando at work on the engines of a H6K2-L at Sourabaya, Java, in 1945. Nearest the camera is Leading Aircraftsman Alfred Minster of Beckenham, Kent.

(Photo: Imperial War Museum ref. CF 1076)

beside the gun slot and curved to fit the turret. Equally important, the whole fuel system was given protection against enemy fire. Each fuel tank in the wings and hull was covered with a leak-proof material. This was composed of alternate layers of gum rubber and thin cured-rubber sheeting to a thickness of 40 mm. approximately, moulded around to fit the tanks and held in place by galvanized steel wire mesh. It was the thickest protection given to any fuel system in a Japanese aircraft in the Pacific War. The fuel system also had an excellent fire-fighting arrangement. Each tank had an individual pipe line connected to a battery of CO₂ bottles for purging in case of fire. The CO₂ gas was released by means of cables attached to a panel behind the pilot's seat, and was considered to be an effective method of fire control.

An advanced feature installed in the H8K2 was the provision of a water flushing toilet, a facility which did not become available on an aircraft until the introduction of the Boeing 707 many years later.

The boat-handling of the H8K2 in service, however, still left much to be desired. As an aid to the pilot on take-off, a mark was painted on the pole of the pitot head attached to the bow. This mark was aligned up on the horizon by the pilot and gave the correct angle of attack which was 5° with a tolerance of one degree, plus or minus. Alighting on a calm sea by an experienced H8K2 pilot produced only minute waves. Take-off with the H8K2 was very rapid, because of the good

power/weight ratio of the aircraft. This take-off was aided by a unique combination flap (of Fowler and split variety) which had been under development at Kawanishi since 1935. Flap setting for take-off was 17°.

The only external modification carried out on the H8K2 was a slight increase in fin area. The all-up weight of the flying-boat was increased from 31,000 kg. (68,343 lb.) to 32,500 kg. (71,650 lb.) at take-off, and the fuel capacity was increased from 17,040 l. (3,749 Imp. gal.) to 18,880 l. (4,154 Imp. gal.). Despite this increase in weight, the H8K2 had a top speed of 252 knots. Late production H8K2s had flush sliding hatches fitted instead of the waist 'blisters', and the flying-boat was fitted with ASV (air-to-surface-vessel) radar.

It was intended to fit the H8K prototype flying-boat with retractable wing-tip floats. In order to save development time and also weight, retractable wing-tip floats were not fitted. Nevertheless, in 1943, Kawanishi (in a further attempt to increase the performance of the H8K2) did fit retractable wing-tip floats on two H8K2s from the production line. These aircraft were designated H8K3, the Navy Type 2 Flying Boat, Model 2-2. They also incorporated sliding hatches in the place of the two waist 'blisters' and a fully retractable dorsal turret. Extensive flight testing was conducted during 1943-4 and, in early 1945, the two aircraft were remotored with Kasei 25b radials of 1,825 h.p. In this



A rather forlorn H6K2-L prior to being destroyed by the U.S. Army in November 1945—after being found at the Takuma Base by the occupying U.S. Forces.
(Photo: U.S. Army via Major Robert C. Mikes)

form the two aircraft were redesignated H8K4, the Navy Type 2 Flying Boat, Model 2-3, but no production was undertaken because of the Pacific War turning in disfavour of Japan.

Once the production of the H8K2 was established, the IJNAF requested Kawanishi to produce a transport version of the H8K2 to augment the service supplied by the H6K2 and H6K4-L flying-boat transports. The H8K1 prototype (after being used in the tests of the Kasei 22 motors installation) was modified once more as the prototype H8K series transport flying-boat. The project was given the company designation of K-30. The deep hull of the flying-boat made the modifications for the transport role relatively easy. Once the hull fuel tanks were removed a cabin was made from the lower deck from the nose to the rear step of the hull, and an upper cabin extended from behind the cockpit to the hull rear, taking in the gunner's compartment as well. Armament was still retained although reduced to one flexible 13-mm. machine-gun in the nose turret and one flexible 20-mm. cannon in the tail turret. The fuel capacity was reduced to 13,414 l. (2,951 Imp. gal.). Flight trials proved very successful and the aircraft was accepted by the IJNAF as the H8K2-L, the Navy Type 2 Transport Flying Boat, Model 2-3.

In the summer of 1943, the IJNAF had introduced a new designation system by which all new aircraft coming into service were given popular names for home propaganda purposes. Under this system, the

H8K2-L was named *Seiku* (Clear Sky). Between 1943 and 1945, Kawanishi produced 36 H8K2-Ls, and these could carry up to 29 passengers or up to 64 fully-armed troops. Kawanishi also intended to produce a transport version of the H8K4 designated the H8K4-L, Model 3-3 but this version was not proceeded with because of the adverse war situation in 1945.

During 1943-4, as the IJNAF flying-boat units became fully equipped with the H8K2, the H6K4 and H6K5s were withdrawn from front-line service. Some of these aircraft were then modified by Kawanishi to become transports, by the removal of the armament and installation of additional seats for service passengers.

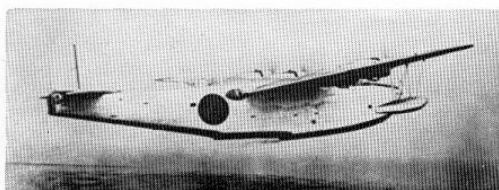
OPERATIONAL RECORD OF THE H6K AND H8K SERIES

The Kawanishi Type S was accepted for service with the IJNAF in January 1938, following completion of acceptance trials. The aircraft was designated the Navy Type 97 Flying Boat, Model 1, H6K1. Subsequent modifications resulted in the service use of models H6K2 and H6K4, the latter being the principal production version. Prior to the Pacific War, the H6K4 had seen little action in the Sino-Japanese conflict.

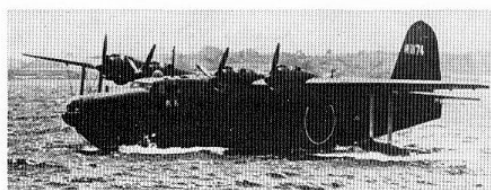
Throughout 1941, the IJNAF began to regroup and prepare for the coming war with the Western Allies. The outbreak of hostilities on December 8, 1941 (Japanese Time) found the IJNAF with 66 flying-boats in service, all of which were H6K4s. Twenty-four

A mixed group of H6K2-L and H8K2-L Transport Flying Boats found on the Dai Nippon Koku slipway at Yokohama in September 1945 by the U.S. Forces. The H8K2-L in the foreground is minus its inboard propeller and wingtip float. The two H6K2-Ls are painted with white surrender markings on the rear hull only, with green surrender crosses on the hull and superimposed on the upper wing Hinomarus.
(Photo: U.S. Air Force via Major Robert C. Mikes)



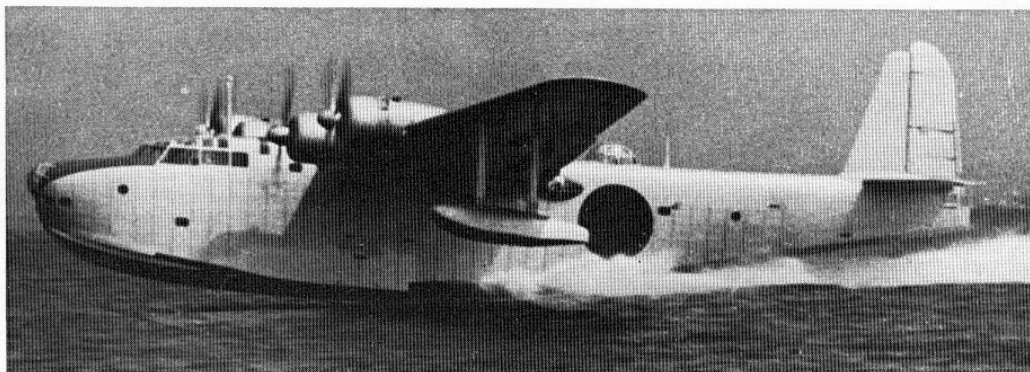


The prototype Kawanishi H8K1 prior to having the hull modified and deepened.
(Photo: via René J. Francillon)



The prototype H8K1 as subsequently modified to become the first H8K2-L Seiku (Clear Sky) Transport Flying-Boat. The aircraft was operated by the Yokosuka Chinjufu Naval Air Corps.
(Photo: via Heinz Nowarra)

The prototype H8K1 after hull modifications; note the spray strips fitted in the chine under the nose area.
(Photo: Shin Meiwa Industry Ltd., Japan)



each were with the Toko Naval Air Corps (based on Formosa) and the Yokohama Naval Air Corps, both units being in the First Line Striking Force. In the Second Line Striking Force, the Yokosuka Naval Air Corps had another three H6K4s and the Sasebo Naval Air Corps had the remaining 15 on strength.

In the weeks following the attack on Pearl Harbor, the Formosa-based Toko Naval Air Corps provided reconnaissance support for the Japanese invasion of the Philippines. The unit saw little action as the U.S. Air Forces in the area had been almost eliminated soon after the outbreak of the Pacific War. By the turn of the year 1942, however, the Royal Australian Air Force began to encounter H6K4s in the New Britain area. For example, on January 4 at 19:00, 11 H6K4s carried out an attack on the Vunakanau airfield, near Rabaul, which was an R.A.A.F. base. The bombing caused little damage. Two days later, nine H6K4s again attacked Vunakanau with better results. A Commonwealth Wirraway (*Profile* No. 154) fighter trainer was destroyed, a Lockheed Hudson bomber damaged, and the radar station put out-of-action. The H6K4s were intercepted by four Wirraways without sustaining any damage. This is credited with being the first air combat of the South West Pacific Area.

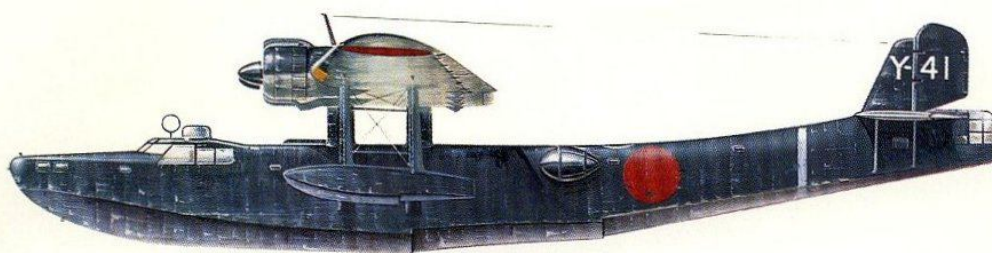
On January 9, 1942, a reconnaissance sortie from Rabaul by a R.A.A.F. Hudson over the Truk atoll, in the Caroline Islands, was carried out. The sortie revealed that the IJNAF had several floatplanes and eight H6K4s at anchor in the main lagoon, on the main island of Toll. On a nearby airfield were a number of Mitsubishi A6M2 Zero (*Profile* No. 129) fighters and 27 Mitsubishi G3M3 (Allied code name: 'Nell') bombers (*Profile* No. 160). As a result of this recon-

naissance sortie, the R.A.A.F. was convinced that the base at Rabaul would soon be under heavy pressure. The Japanese subsequently carried out a number of attacks on Rabaul with carrier and land-based aircraft and occupied the town on January 23. Also on the same day, a lone H6K4 carried out a bombing attack on the Australian base at Namlea on Buru Island in the Netherlands East Indies. The attack caused little damage but, as at Rabaul, the base was soon subjected to severe air attacks by land-based units prior to Japanese occupation.

The IJNAF at this time began to range farther afield in the S.W. Pacific Area. On February 5, nine H6K4s carried out a bombing raid on the town of Port Moresby in Papua. Only minor damage resulted. Later that month, and several thousand miles to the east, another raid by flying-boats was being prepared by the IJNAF.

The Japanese Naval High Command was, in the early weeks of the Pacific War, planning to carry out a reconnaissance sortie over the U.S. base at Pearl Harbor. It was considered that the H6K4 did not have sufficient range for this operation. At this time, the H8K1 pre-production flying-boats were being tested by the Yokohama Naval Air Corps. They proved to be a great improvement on the H6K4s then in the service. So the Yokohama Naval Air Corps was instructed to dispatch two H8K1s to the Wotje naval base in the Marshall Islands, Wotje being the nearest IJNAF base to Pearl Harbor. Even with the extensive range of the H8K1, the flight from Wotje to Pearl Harbor and return could not be achieved in a single flight without refuelling.

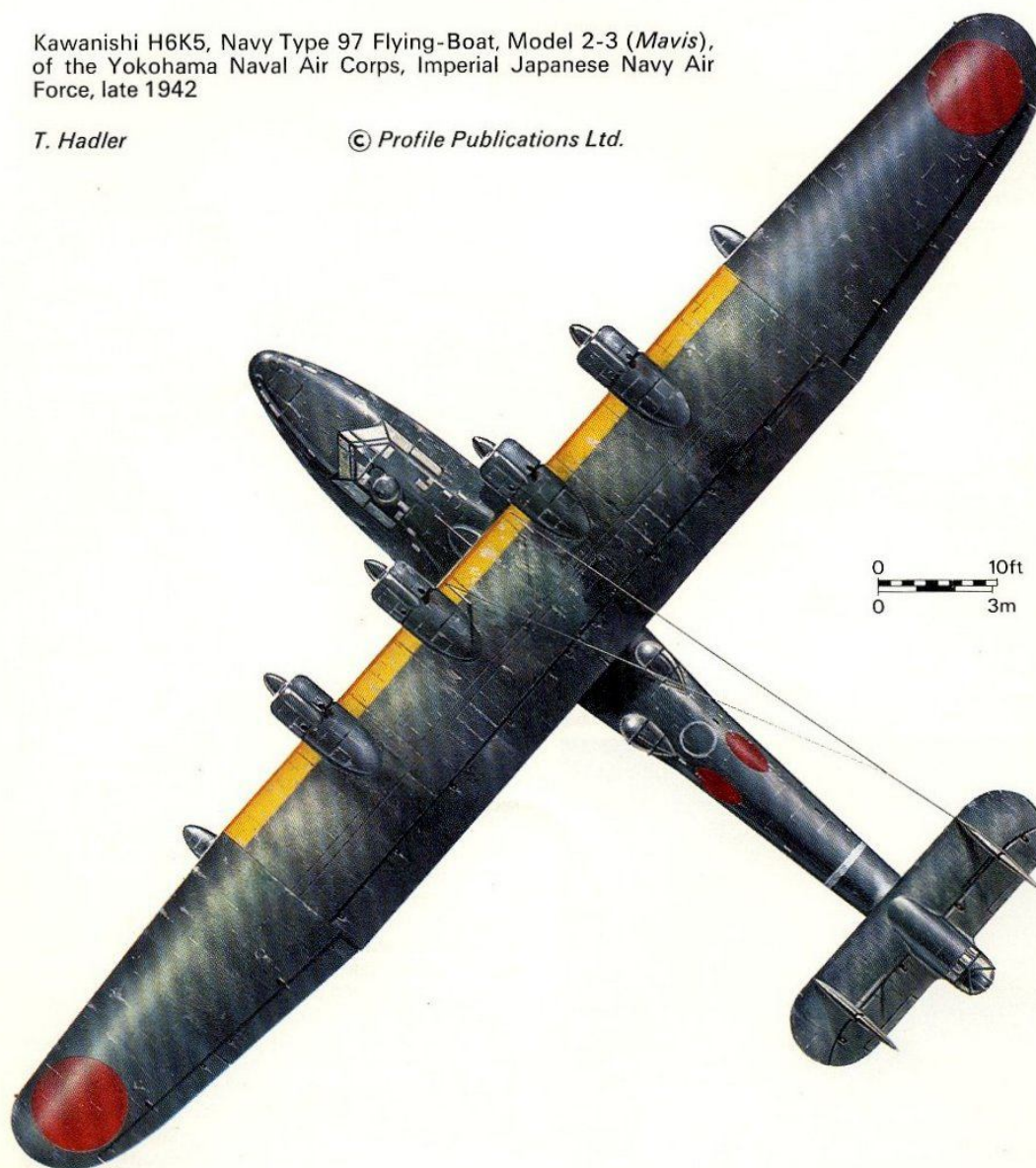
When undertaking the planning for this operation,

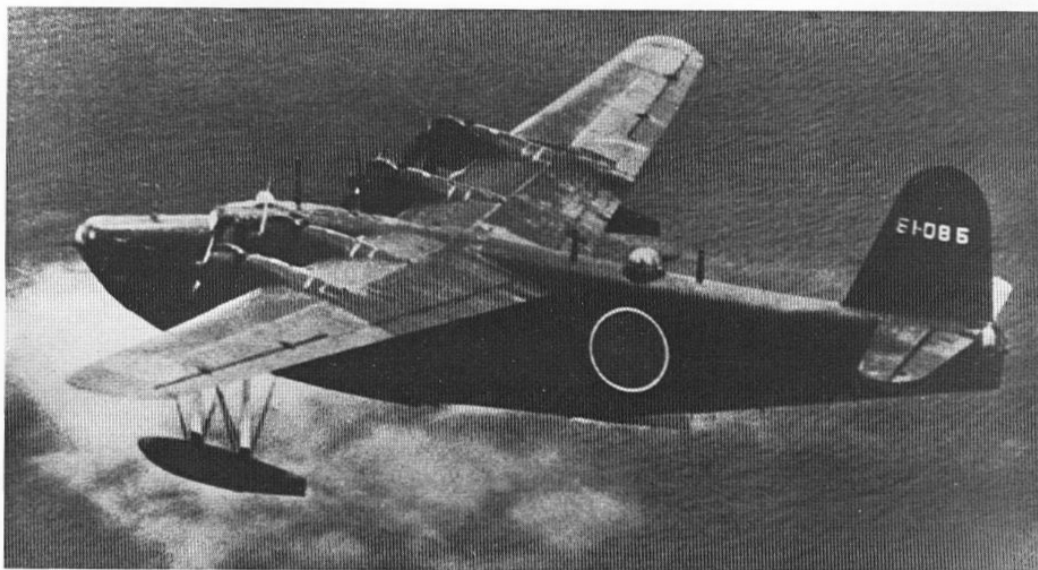


Kawanishi H6K5, Navy Type 97 Flying-Boat, Model 2-3 (*Mavis*),
of the Yokohama Naval Air Corps, Imperial Japanese Navy Air
Force, late 1942

T. Hadler

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An H8K2 of the 951st Naval Air Corps in flight over the Pacific.

(Photo: via Major Robert C. Mikes)

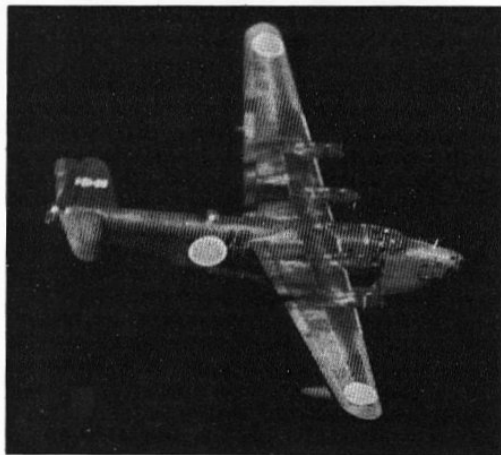
the High Command of the IJNAF considered refuelling the flying-boats from submarines. Since this could not be carried out on the open sea, it was agreed that a lagoon (of an atoll on route) would have to be selected. Early in February 1942, Submarine *I-22* was dispatched from Wotje to discover a suitable lagoon for refuelling the flying-boats. The most ideal place which the *I-22* found was the French Frigate Shoals atoll some 550 miles north west of Hawaii. So the IJNAF decided to go ahead with the sortie and designated this as *Operation K*.

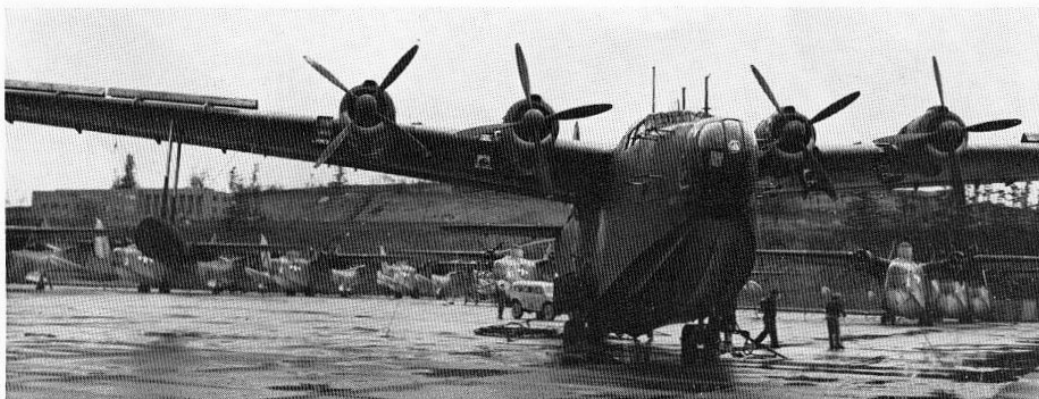
In the third week of February, Submarines *I-15*, *I-19* and *I-26* departed from Wotje for the French Frigate Shoals, each loaded with aviation fuel. Submarine *I-9* was positioned between Wotje and the Hawaiian Islands to assist in radio vectoring. The two H8K1s

had departed on February 15 from their home base at Yokohama to fly to Wotje for the operation. The two H8K1s were numbered Y-72 and Y-73. They were, in fact, the only two aircraft available following extensive testing by the Yokohama NAC. This was also about the time that the IJN had managed to break the code the U.S. Navy had been using for weather information. The Japanese hoped that by this means, the weather situation en route for the two flying-boats to Pearl Harbor could be obtained. To their dismay, the U.S. Navy changed the coding for weather broadcasts on March 1, so the start of *Operation K* had to be delayed until some more accurate weather information could be obtained from the Japanese base on Wake Island. The two flying-boat crews were personally briefed on the evening of March 2 by Vice-Admiral Shigeyoshi Inouye, the Commander-in-Chief of the Fourth Air Fleet. At dawn the following day *Operation K* was launched when the two flying-boats took off for the French Frigate Shoals. The Flight Commander was Lieutenant Toshio Hashizume who flew the lead aircraft, followed by Lieutenant Tomano flying the second aircraft.

Just before 18:30, and after a long flight, the two aircraft arrived at the French Frigate Shoals and found the submarines in the lagoon as planned. The two aircraft alighted and refuelling began. There was a moderate swell running, and on several occasions the tie-lines between the flying-boats and the submarines parted. By the time each aircraft had been loaded with some 13,620 l. (3,000 Imp. gal.) of fuel, it was well after nightfall. Lieutenant Hashizume, in the first H8K1, took-off from the lagoon shortly after midnight; there was a full moon which eased this problem. The H8K1 piloted by Lieutenant Tomano followed some 20 minutes later. Just after 02:10, Lieutenant Hashizume flying at 4,550 m. (15,000 ft.) made landfall over the northern coast of Oahu Island. Ironically, when he arrived over Pearl Harbor, he found the target area

A H8K2 under attack by Allied aircraft. Observe the ASV radar fitted on the nose. (Photo: U.S. Navy via René J. Francillon)





The H8K2 at Whidbey Island clearly illustrates the spray strips on the hull and the integrated engine servicing platforms which fold up into the wing leading-edges.
(Photo: U.S. Navy via Major Robert C. Mikes)

covered by dense cloud. Taking bearings from the Kaena lighthouse (which was just visible) he released his bombs, but his aim was poor, the bombs fell in a clump of trees on Mount Tantulus. Lieutenant Tomano fared no better with his bombing attack. His four bombs fell into the sea at the entrance to Pearl Harbor.

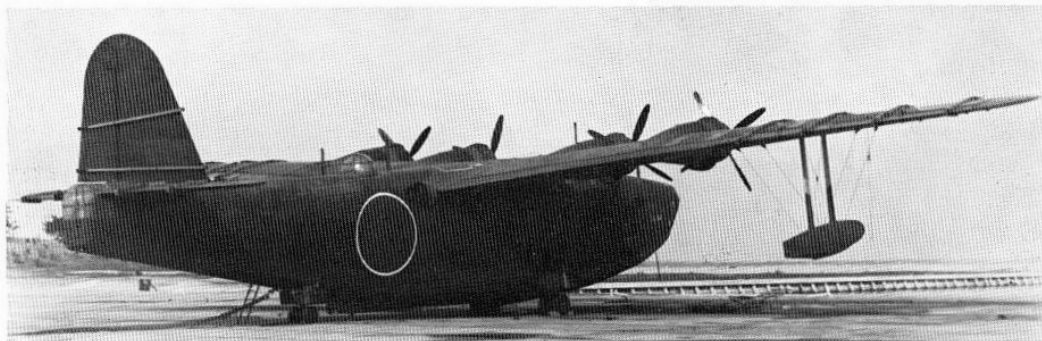
Both aircraft returned safely to Wotje after a long and uneventful flight; their objective, a reconnaissance of Pearl Harbor, had not been accomplished, because of unfavourable weather. They had proved, however, such a flight could be undertaken. On March 6, both flying-boats were dispatched on individual reconnaissance missions. Lieutenant Hashizume to Midway and Lieutenant Tomano to Johnstone Island. Both aircraft departed at dawn. On his approach to Midway, Lieutenant Hashizume was picked up by radar and was intercepted by Brewster F2A-3s (R.A.F.: Buffalo) fighters (Profile No. 150) of VMF-222, U.S. Marine Corps and shot down. Lieutenant Hashizume had ranked as leading flying-boat pilot of the IJNAF. Over Johnstone Island, Lieutenant Tomano was not intercepted and returned with some excellent photographs.

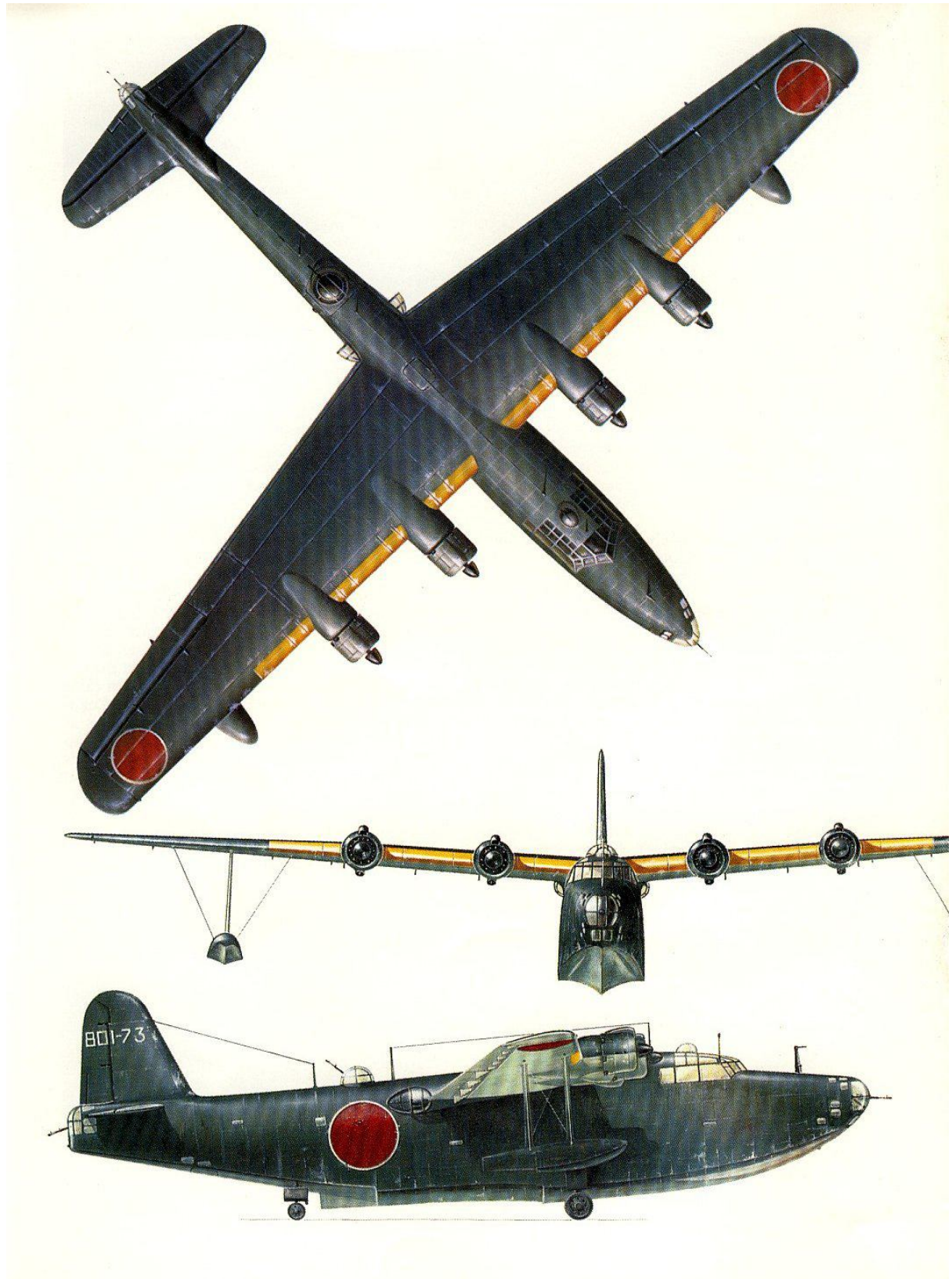
Following the successful operation in the Indian Ocean, the High Command of the IJN planned a further campaign designed to capture both the base at Tulagi in the lower Solomons Group, and Port Moresby on New Guinea. Japanese intelligence reports

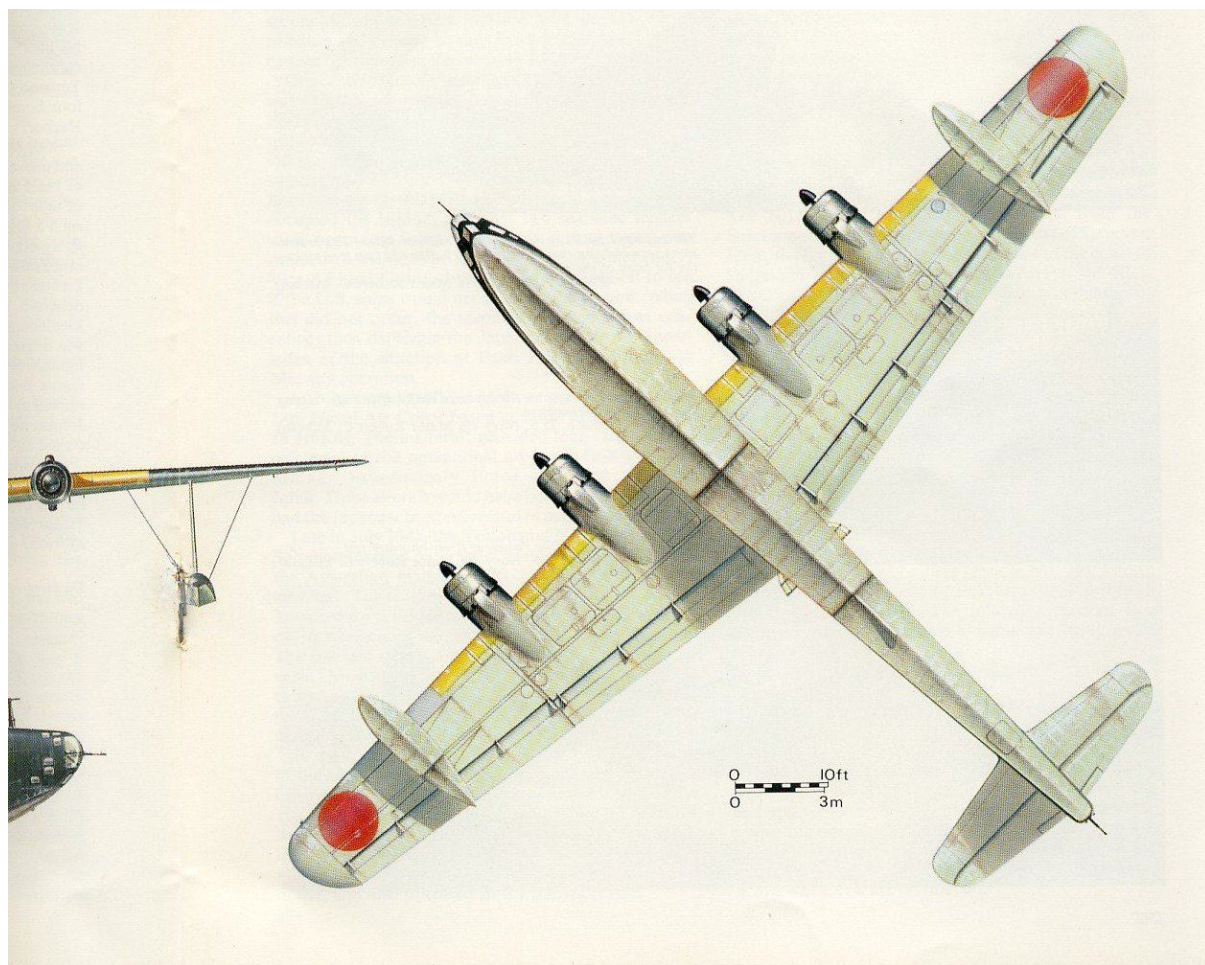
indicated that the U.S. Navy would most likely oppose these moves. The planned moves by the IJN received the code name of *MO Operation*, and also included the 5th Carrier Division under Rear-Admiral Chuichi Hara commanding the aircraft carriers *Shokaku* and *Zuikaku*. The Yokohama NAC with 16 H6K4s, attached to the 25th Air Flotilla, provided support for the *MO Operation*. The Yokohama NAC was based at Rabaul, Shortland and, following its recent capture on May 3, at Tulagi. On May 5, a H6K4 from Rabaul was attacked and brought down by Grumman F4F Wildcat fighters (Profile No. 53) from a U.S. Navy carrier. On the previous day, a strong force of U.S. carrier aircraft had attacked the Tulagi base, causing considerable damage. Further confirmation of the fact that U.S. aircraft carriers were in the Coral Sea came the following morning when an H6K4 of the Yokohama NAC sighted a group of U.S. Navy ships at 08:10 some 600 miles south of Tulagi. The group included one aircraft carrier and nine other ships. This information was not destined to reach Rear-Admiral Hara until next day. The opposing fleets exchanged air strikes in the following days in the Battle of the Coral Sea. This caused the Japanese to postpone indefinitely their planned capture of Port Moresby.

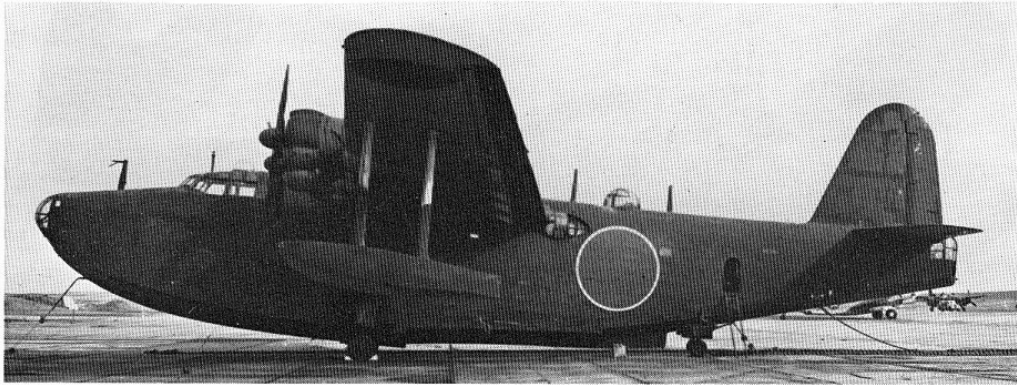
Late in May 1942, the Japanese carried out an operation to capture the atoll at Midway from the Americans. This was the largest assembly of warships,

The captured H8K2 now at the Patuxent River Naval Air Station, Maryland, and repainted with Japanese Hinomarus.
(Photo: U.S. Navy via Major Robert C. Mikes)

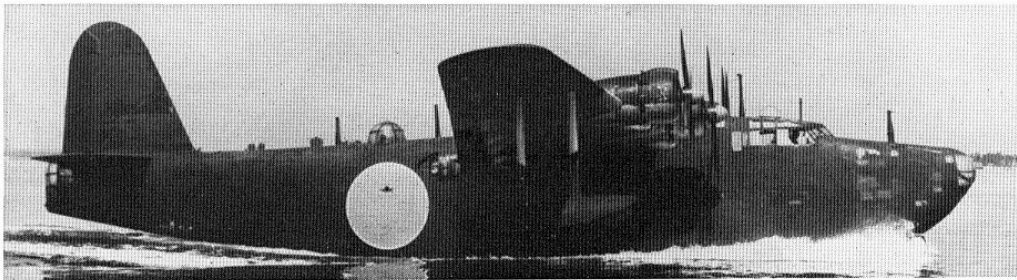








The captured H8K2 now at the Patuxent River Naval Air Station, Maryland, and repainted with Japanese Hinomarus.
(Photo: U.S. Navy via Major Robert C. Mikesch)



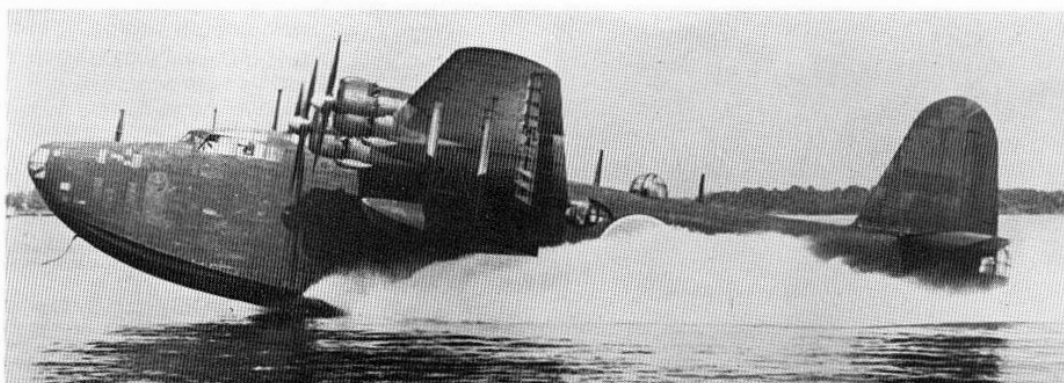
The captured H8K2 taxiing on the Patuxent River. The protrusions seemingly on the top of the rear hull are in fact tree tops on the far bank of the river.
(Photo: U.S. Navy via Major Robert C. Mikesch)



The beaching crew securing the captured H8K2 after water testing at the Patuxent River base.
(Photo: U.S. Navy via Major Robert C. Mikesch)

The H8K2 taxiing on the Patuxent River on water tests.
(Photo: U.S. Navy via Major Robert C. Mikesch)





The captured H8K2 undergoing water trials on the Patuxent River.

(Photo: U.S. Navy via René J. Francillon)

troop transports and aircraft that had been operated in the Pacific up to that time. The Japanese hoped to secure Midway as a base, and also bring the U.S. Fleet to battle and destroy it; thus leaving the way clear for further operations in the central Pacific.

One of the parts of the overall plan to secure Midway was a further *Operation K*, a reconnaissance flight over Pearl Harbor. The two H8K1s allocated for the sortie were standing by at Wotje on May 30. Take-off was scheduled for midnight. However, one of the refuelling submarines, *I-123*, had arrived at the French Frigate Shoals early on May 30 to find the U.S. Navy had occupied the lagoon, and that two seaplane tenders were operating flying-boats. This serious news was radioed to Wotje. The 24th Air Flotilla commander, Vice-Admiral Goto, advised a 24-hour hold-off to see if the U.S. ships would depart from the lagoon. When this did not occur, the second *Operation K* was cancelled; thus depriving the Japanese of any pre-knowledge of the situation at Pearl Harbor prior to the Midway operation.

Also in support of the Midway operation was the 14th Naval Air Corps based at Jaluit and Wotje with 18 H6K4s. These aircraft provided long-range reconnaissance of the operational area. Six H6K4s of the Midway Expeditionary Force were also based at Jaluit. These aircraft would have been based at Midway had the Japanese been successful in occupying the atoll.

Late in July 1942, the Yokohama NAC based in the Solomons carried out a series of nuisance raids against the Australian mainland. On July 26, three H6K4s attacked Townsville on the Queensland coastline. Townsville was raided again on July 28 and 29, without causing casualties and inflicting only minor damage. The last raid in this area was on the night of July 31, when Mossman, near Cairns, was bombed. This caused some damage and a small child was injured; the first Australian mainland civilian to be injured in the Pacific War.

In the autumn of 1942, most of the flying-boat units of the IJNAF, in common with other units, were re-organized into new echelons. It was at this time that the H8K1 began to enter service with the IJNAF. The H6K4 had been lacking in armour and self-sealing tanks and, in consequence, had proved vulnerable to Allied fighter attacks. Thus, the H6K4 was relegated to second-line duties, and also operated in the transport role.

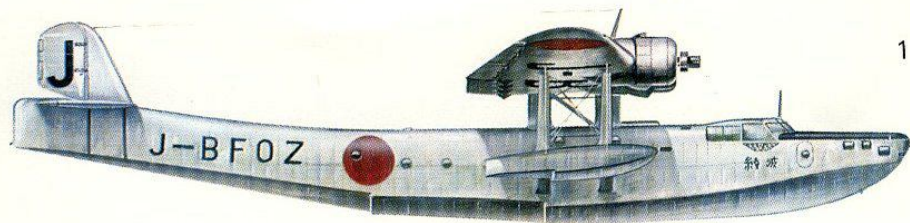
Late in 1942, the Allies introduced the code name system of aircraft identification in the Pacific area for Japanese aircraft. Under this system the H6K series received the code name '*Mavis*' and the H8K series the code name '*Emily*'. The H8K was shown in Allied aircraft recognition books of late 1942 to have a slight gull wing, but this was soon rectified when the Allies were able to examine crashed H8K1s as the war progressed.

During 1943, the flying-boat units of the IJNAF operated in the South West Pacific Area and at other strategic points in the Japanese defensive perimeter. The 801st Naval Air Corps had moved from the Solomons area to Sibolga on the west coast of Sumatra. Here, the unit engaged in reconnaissance of the coast of India and over the Bay of Bengal. Part of the 801st NAC was based on the Andaman Islands in the Bay of Bengal. From the Andamans, the flying-boats carried out night-bombing attacks against Trincomalee, Colombo and Calcutta. Such flights often lasted up to 17 hours duration and were a considerable challenge to the crews and aircraft alike. During December 1943, the 801st was re-assigned to Japan and based at Takuma on Shikoku Island.

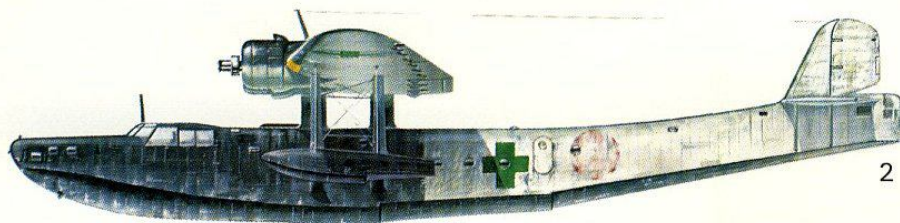
During late 1943 and early 1944, the Japanese began to feel the effects of mounting Allied pressure on their forces in the Pacific. One measure mounted by the U.S. Navy was to send heavily-armed, long-range patrol bombers into the areas normally used by Japanese transport aircraft. These aircraft were modified Consolidated Liberator bombers (*Profile* No. 19), known to the U.S. Navy as PB4Ys and were developed from the U.S.A.A.C.'s B-24. The following account is a combat report of an encounter between a PB4Y and a H6K (*Mavis*).

Combat Report A:

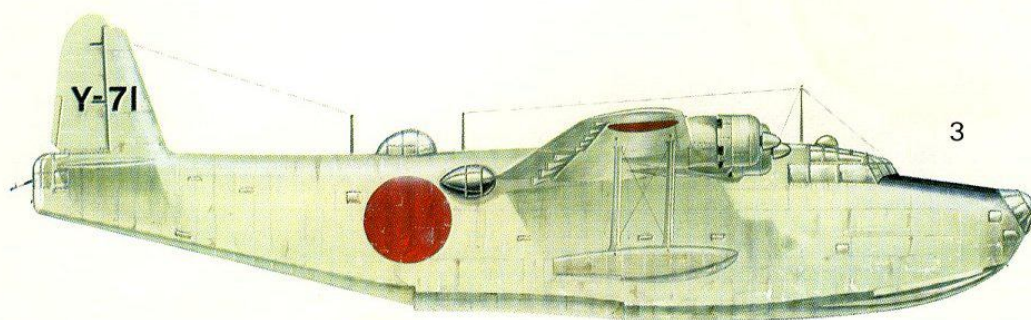
The PB4Y was at 8,000 ft. when the *Mavis* was sighted some five miles ahead at 6,000 ft. The *Mavis* evidently sighted the PB4Y and dived towards the sea, and later opened fire with the tail cannon and a waist gun. Full power was applied by the PB4Y pilot and upon reaching a position at nine o'clock and 500 ft. above the *Mavis*, the first attack was made. Fire was opened at 900 ft. above, closing to 200 ft. above and maintained until out of range. The No. 3 engine on the *Mavis* was set on fire on this run.



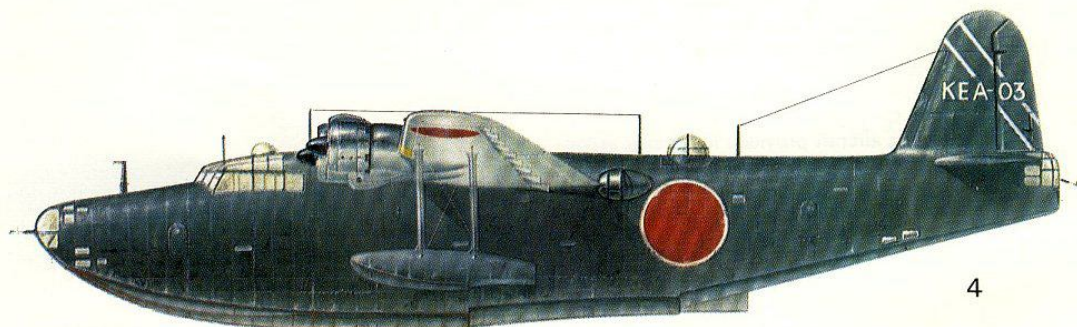
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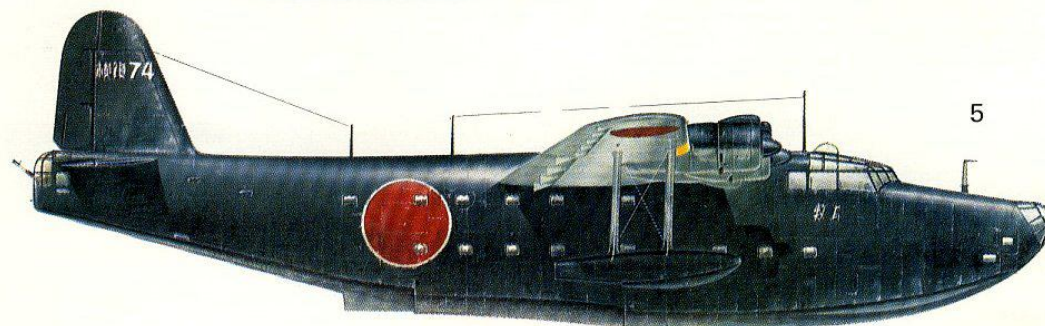
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Key to colour illustrations

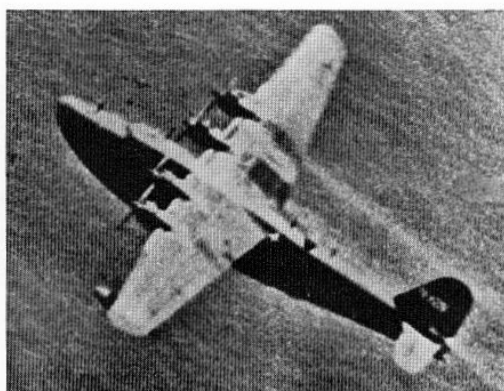
- 1 **J-BFOZ**—Kawanishi H6K2-L Transport Flying-Boat, operated by Dai Nippon Koku K. K. (Greater Nippon Air Lines Co. Ltd.) on western Pacific routes, 1940–41
- 2 Kawanishi H6K4-L Transport Flying-Boat (*Mavis*) wearing 'surrender' identification marks. This H6K4-L was on the Yokohama slipway of Dai Nippon Koku K. K., September 1945.
- 3 **Y-71**—An H8K1, Navy Type 2 Flying-Boat, Model 1-1 (by the second half of 1942 retrospectively code-named *Emily* by the Allies). Attached to the Yokohama Naval Air Corps, this H8K1 was one of two which carried out a long-range bombing attack on Hawaii, March 1942.
- 4 **KEA-03**—An H8K2, Navy Type 2 Flying-Boat, Model 2-2 (*Emily*), of the 901st Naval Air Corps. This unit was also known as the Combined Maritime Escort Force and was equipped with a variety of aircraft, 1944–45.
- 5 **74**—*Seiku (Clear Sky)*, an H8K2-L Transport Flying-Boat, Model 3-2 (*Emily*), of the Yokosuka Chinjufu Naval Air Corps. This particular example is the prototype H8K1 after transport modification. The same unit (a transport flying-boat unit) also operated H6K2-Ls and H6K4-Ls during 1944–45.

On the second run although fire was maintained no apparent damage resulted. On the third run, at nine o'clock high, the belly turret gunner shot off the tail of the *Mavis*. This was followed by an immediate explosion in the wing centre section. The wing tips seemed to fall off as the *Mavis* fell flaming into the sea. The *Mavis* appeared helpless in the face of the superior fire of the PB4Y, and at no time offered any effective resistance. The PB4Y attained 270 m.p.h. I.A.S. (Indicated Air Speed) to overtake the *Mavis* from about three miles in three minutes.

Combat Report B:

In late 1944, a PB4Y sighted an *Emily* near Formosa while both aircraft were flying just below a 10/10th layer of cloud at 6,000 ft. The *Emily* dived for a lower cloud layer and continued right through. Maintaining radar contact the PB4Y pilot followed. When the PB4Y broke from the cloud, the *Emily* was seen only three miles away and still going down.

The Japanese aircraft levelled-off at 150 ft. above the sea and started shooting with the 20-mm. dorsal and tail cannon before the PB4Y was in 0.50-in. calibre range but registered no hits. The PB4Y closed from four o'clock slightly above, securing hits as it came in. When almost above the *Emily* the PB4Y pilot reduced power to avoid over-shooting. The pilot of the PB4Y reported that after shooting out the dorsal turret on the *Emily* he maintained a course at about four o'clock to the *Emily* and approximately 250 ft. higher and about 50 ft. distant. From this point, the tail gun of the *Emily* could not bear on him while the two aircraft were in



A H8K2 (*Emily*) going down under attack by an Allied aircraft in the South Pacific. (Photo: I.J.N.)

this relationship. Although the tail gunner of the *Emily* fired repeatedly at the PB4Y, all his shots were low and short. Sensing doom the *Emily* pilot pulled up steeply in an effort to ram the PB4Y. The PB4Y successfully evaded the *Emily* but with only 25 feet to spare. The *Emily* then fell to destruction in the ocean below.

AUTHOR'S NOTE: The combat accounts related above were both fairly easy kills for the two attacking Allied aircraft, the following account of an H8K *Emily* shows how difficult this aircraft could be to destroy, as compared with contemporary Japanese aircraft of that time.

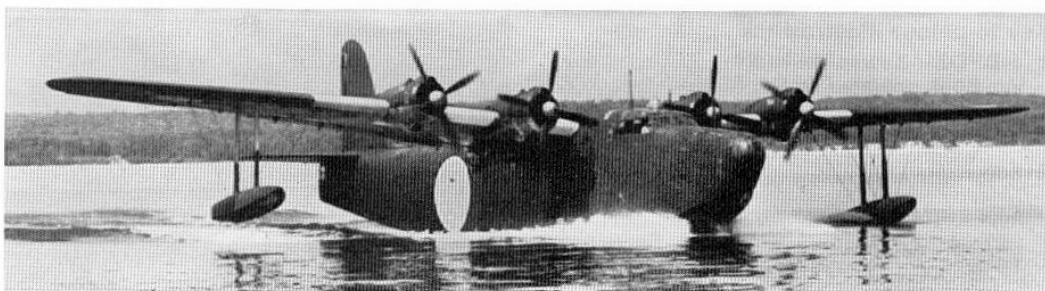
Combat Report C:

The *Emily* was sighted near the Bonin Islands by a patrol of one fighter and a torpedo-bomber, in the late summer of 1944. The flying-boat changed course immediately and dived for the water at about 240 knots. The fighter made passes from four o'clock and from about eight o'clock, firing from 600 ft. down to 150 ft. The fighter pilot reported seeing his bullets striking the flying-boat, and fuel spilling out of the port wing tanks. He also noticed that the inboard port engine lost power, and the crew jettisoning equipment.

The torpedo-bomber took up a position about 1,500 ft. on the flying-boat's starboard side at 1,500 ft. above. The torpedo-bomber made an interception run. The port gun did not fire and after one long burst the starboard gun jammed. The torpedo-bomber pilot pulled back while the fighter made two more runs, and came down for another attack which was also spoilt by gun jamming.

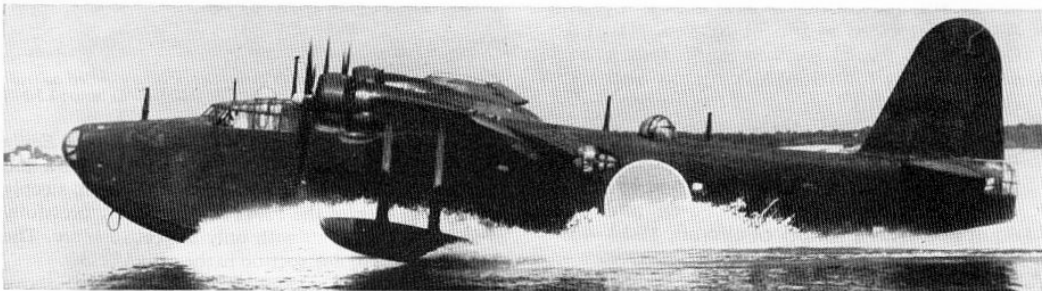
The two aircraft then assumed flanking positions above the flying-boat, one with three-quarters of his ammunition spent, and the other with his guns jammed. A fresh two-aircraft section of fighters from the same base then arrived and assumed a bracket position. From above they made four runs alternatively from three to nine o'clock above, pulling up to six o'clock and recovering from 11 o'clock. The only damage reported at this stage was the outboard engine being knocked out with the propeller 'windmilling.' The flying-boat was now flying at 165 knots.

The newly-arrived fighters continued their runs, scoring numerous hits on the wing roots and forward part of the hull. On the seventh run, hits were scored around the cockpit and port wing roots. The bow



The captured H8K2 undergoing water trials on the Patuxent River.

(Photos: U.S. Navy via René J. Francillon)



gunner was seen to fall across his gun, presumably killed. After this run, flames burst out in the port wing.

The *Emily* seemed to be under control until the seventh run, and, although it had absorbed a great deal of punishment was still making headway. As soon as the flames came from the port wing, the big flying-boat settled towards the water, bounced once and flew a short distance and then fell over its starboard wing, crashing into the sea on its nose at the same time exploding and burning.

The only evasive tactics employed by the *Emily* pilot was to turn slightly towards the attacking aircraft, to use all possible speed, and to be positioned low on the water, down to 20 feet at times. One fighter pilot noted that on each of his runs the flying-boat opened fire long before the fighter fired, but fired very little on his recovery runs. The turns employed by the *Emily* pilot were not sharp enough to upset the attacking runs. The three fighters expended 5,500 rounds of ammunition, and the torpedo-bomber 450 rounds, a total of 5,950. Even allowing for inevitable wastage, the flying-boat absorbed a terrific amount of punishment before crashing and burning.

KAMIKAZES AND THE H8Ks

By early 1945, the war situation had become desperate for the Japanese, and already the IJNAF were using *Kamikaze* suicide attacks against Allied shipping. In February 1945, the U.S. forces had captured the island of Iwo Jima after a savage struggle. The fleet supporting this invasion had withdrawn to the Ulithi Atoll in the Carolines to regroup. The presence of the U.S. Fleet was confirmed by a Nakajima C6N1 *Saiun* (Allied code name: *Myrt*) reconnaissance aircraft operating from Truk on March 9. To attack this fleet, the IJNAF had formed a special *Kamikaze* unit stationed at the Kanoya Air Base on

Kyushu and called the 'Asusa Special Attack Unit'. The aircraft used by the unit were Yokosuka PIY1 (Allied code name: *Frances*) bombers making their operational debut in the service of the IJNAF. The 801st NAC was selected to provide navigational assistance to the PIY1 *Ginga* (Milky Way) bombers on their long flight to Ulithi. The attack was known to the IJNAF as the *Tan Operation* and by its success the Japanese hoped to gain time to build up defensive forces to combat the next Allied assault wherever it may occur; no sacrifice was too great to achieve this objective.

The 'Asusa Special Attack Unit' comprising 24 *Ginga* bombers left the Kanoya Base on Kyushu on March 11 on their 1,500-mile flight to Ulithi. Each *Ginga* bomber was loaded with bombs, and fuel enough for a one way flight. The bombers were guided initially by a single H8K2 flown by Lieutenant Commander Hitsuji, a senior pilot of the 801st. The H8K2 was lightly loaded so as to keep pace with the bombers. At the halfway point of the flight, guidance was assumed by two more H8K2s of the 801st, having been sent on ahead (and having now burnt-off fuel) they were able to keep pace with the bombers. These H8K2s were to witness the strike on Ulithi and report on the damage sustained by the U.S. Fleet. Near the island of Okinotori Shima, the formation ran into rain squalls and had to climb above the clouds. When the formation came down below cloud level to locate the target, they found that the island of Yap was near at hand, some 20 miles to the east. From this bearing, the run-in to Ulithi could be ascertained, and the bombers parted from the two H8K2s at 18:30 and set course for their target.

The atoll at Ulithi was in darkness at this time, the sun having set at 18:52 as the bombers approached their target. On the flight to Ulithi, the formation had

encountered head winds which reduced the speed of the formation. In addition, navigational errors also caused delays. Thirteen of the *Gingas* had developed engine trouble since take-off and had to leave the formation. Most of them managed to land on Japanese-held islands on the flight route. Two *Gingas* did have to 'ditch' in the sea. The 11 survivors now made their run in on the target, the first bomber diving on its target at 19:05. The last *Ginga* attacked at 19:30. The two escorting H8K2s saw little evidence of the attack in the gloom. Only two small fires were observed, and later the Japanese considered the attack as unsuccessful. Post-war records revealed that only the U.S.S. *Randolph*, an aircraft carrier, had sustained any damage on that date, while anchored in the Ulithi atoll.

In the remaining months of the Pacific War, the flying-boat units of the IJNAF found their movements severely restricted. This was because of the constant Allied air attacks, coupled with fuel and spares shortages. Only a handful of the flying-boats of the once proud and powerful IJNAF remained to be surrendered to the victorious Allies.

OPERATIONAL RECORD: TRANSPORT VERSIONS OF THE H6K AND H8K SERIES

In 1940, as related in the Development section of this *Profile*, Kawanishi began to produce a small number of transport versions of the H6K4 designated H6K2-L. The *Dai Nippon Koku K.K.* (Greater Nippon Air Lines Co. Ltd.) began to receive H6K2-Ls for their Pacific routes. These aircraft operated on services between Japan and the mandated islands, Indo-China and Siam. The *Dai Nippon Koku K.K.* flying-boats received names such as *Ayanami* (Beautiful Wave), *Sazanami* (Rippling Wave) and *Kenun* (Cirrus Cloud).

With the outbreak of the Pacific War, the IJNAF also started to employ the H6K2-L and subsequent H6K4-L Transport Flying Boats for the movement of

personnel and freight. *Dai Nippon Koku K.K.* also carried on with its services. However, as the tide of war began to turn against Japan, so the losses amongst the transport flying-boats mounted. The principal transport flying-boat unit of the IJNAF was the Yokosuka Chinufu Naval Air Corps, which operated H6K2-L, H6K4-L and H8K2-L Seiku types until the end of the Pacific War.

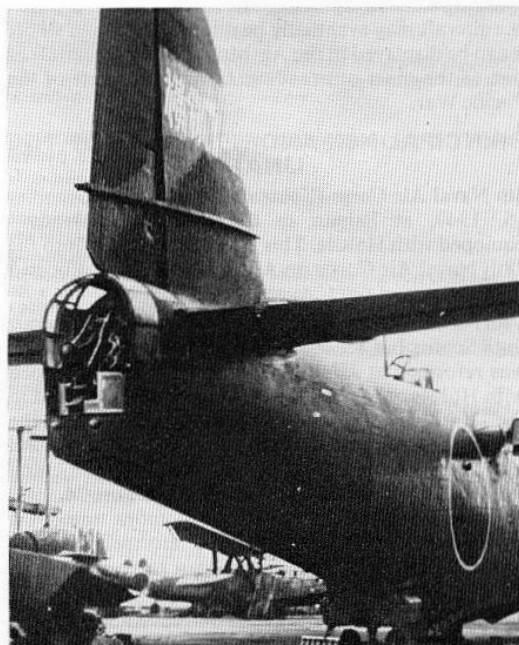
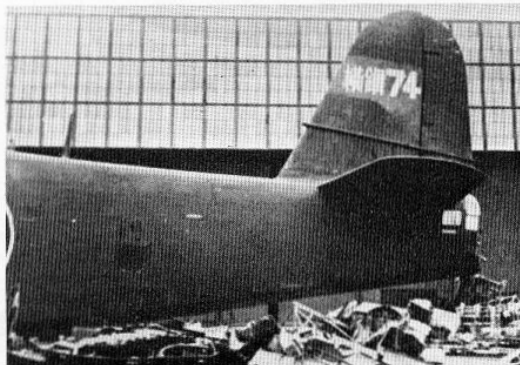
By the end of 1944, flights by the transport flying-boats of the IJNAF were extremely hazardous because of Allied air patrols. The following is an account of an attack on a H6K2 loaded with passengers in which the H6K2 escaped without damage, unlike the previous combat reports related above.

Late in May 1945, a H6K2 piloted by Ensign Daita Kitaide was approaching Hong Kong around dawn. The flying-boat was on route to Japan from Java. When the H6K2 had descended to 1,500 feet, the crew spotted three Lockheed P-38 Lightning fighters (*Profile* No. 106) approaching from the rear. Kitaide took the flying-boat down to wave-top height, and successfully evaded two firing passes by the P-38s.

By this time, the H6K2 was fast approaching the rocky coastline of China. The next firing pass by a P-38 was again evaded, the bullets could be seen striking a small beach house as the two aircraft crossed the coastline. Ahead lay a mountain range partly shrouded in mist, Kitaide pulled the H6K2 up to climb over and, as he did so, a P-38 made another firing pass. However, the pilot misjudged his speed and crashed into the mountain side with a violent explosion. Kitaide continued to fly inland, descending into valleys and climbing over mountains until the H6K2 was creaking and straining at every rivet joint. He was relieved to find that he had shaken-off the remaining two P-38s, who had given up the chase by this time. After this, an uneventful flight from Hong Kong to his home base in Japan, Kitaide found on his arrival that the H8K2 he

The H8K1 prototype: shows the tail turret partially dismantled. In the background is a Yokosuka H5Y1 two-motor flying-boat, a type which saw limited service with the Navy. (Photo: I.J.N.)

The H8K1 prototype showing the tail of the aircraft. The tail inscription identifies the Yokosuka Chinufu Naval Air Corps to which the prototype H8K1 was attached. (Photo: I.J.N.)



was to fly back to Java had just been destroyed in an air raid.

In the Netherlands East Indies, at the end of the Pacific War, the nationalist elements in the islands formed an independent government and proclaimed the Republic of Indonesia. This government had created a makeshift air force, using captured Japanese aircraft, including several H6K2-Ls left behind by the IJNAF. Although the H6K2-Ls were painted with the Indonesian markings, there is no record of operational use or, indeed, of actually flying in Indonesian service.

POSTSCRIPT

At the end of the Pacific War, at the headquarters of the 801st Naval Air Corps, Takuma Base on Shikoku Island, the occupying American forces found three H8K2s in reasonable condition. The least damaged aircraft was repaired and, on November 13, 1945, it was flown to Yokohama. The pilot of the H8K2 was Lieutenant-Commander Hitsuji. A U.S. Navy Consolidated PBV Catalina (*Profile* No. 183) flew in escort. This flight marked the last by a World War Two Japanese military aircraft in home skies.

On arrival at Yokohama, the H8K2 was dismantled and shipped to Norfolk, Virginia. On May 23, 1946, the flying-boat made a short test flight which was hampered by engine trouble; the landing being made with only one engine on power. The engines were subsequently overhauled but, on inspection, they were cleared for water-handling trials only. The boat trials occupied the succeeding months and, when concluded, the U.S. Navy had a large flying-boat which it did not really want. Fortunately, the National Air Museum intervened in time and it was saved from destruction; subsequently being cocooned and stored at the Norfolk Seaplane Base, Virginia. In the summer of 1960, the H8K2 was dealt a severe blow when a hurricane overturned it. The flying-boat was repaired and righted, and, at the time of writing, it is still at the Norfolk Base awaiting some decision as to its future. It is hoped that the aircraft may eventually be returned to Japan where it can be displayed in the Air Museum as an example of one of the most outstanding Japanese aircraft of the Pacific War.

PRINCIPAL H6K AND H8K UNITS OF THE IJNAF

8th Naval Air Corps (Kokutai) Formed on November 15, 1940, at Saipan in the Mandated Islands—equipped with H6K4s. This unit was reformed into the 18th Naval Air Corps on April 10, 1941 and allocated floatplanes.

14th Naval Air Corps This unit flew land-based aircraft until September 15, 1941, when it disbanded. The unit was reformed at Jaluit as a flying-boat unit equipped with H6K4s on April 1, 1942. The unit was attached to the 11th Air Fleet, 24th Air Flotilla. At the time of the Midway operation (late May, early June 1942) the unit had 18 H6K4s on strength, part based at Wotje and Jaluit. The unit moved to Rabaul on August 24, 1942 and began operations in the Solomons area. On November 1, 1942 the unit was reformed into the 802nd Naval Air Corps, and began to re-equip with H8Ks.

801st Naval Air Corps Formed on November 1, 1942, from the Yokohama Naval Air Corps while based at

Rabaul and attached to the 11th Air Fleet, 25th Air Flotilla. The unit was re-equipping with H8Ks towards the end of 1942; this being completed by May 1943. During the latter part of May, the unit moved to Sibolga, Sumatra. In December 1943, the 801st was re-assigned to Japan and based at Takuma, on Shikoku Island. On July 10, 1944, the unit was attached to the 3rd Air Flotilla. Then on February 11, 1945, the 801st was re-attached to the 5th Air Flotilla. The unit was still at the Takuma Base at the end of the Pacific War.

802nd Naval Air Corps Formed on November 1, 1942, from the 14th Naval Air Corps while still based at Rabaul. On December 1, the unit was assigned to the 22nd Air Flotilla, and remained with this flotilla until the unit disbanded on April 1, 1944. The 802nd re-equipped with H8Ks during the first half of 1943.

851st Naval Air Corps Formed on September 20, 1942, from the Toko Naval Air Corps while based at Rabaul. Flying H6Ks at this time, the unit operated from various bases in the South West Pacific Area. Re-equipped with H8Ks during 1943. On September 1, 1943 the 851st was attached to the 28th Air Flotilla. A year later it was absorbed into the 801st Naval Air Corps, on September 20, 1944.

901st Naval Air Corps Formed on December 15, 1943. Operated a wide selection of floatplanes and flying-boats including H6K4-5s and H8K2s. The unit operated from various bases as follows: Formosa, Iwojima, Saipan, China, the Philippines and the Netherlands East Indies. The unit was also known as the *Combined Maritime Escort Force*, and was still operational at the end of the Pacific War.

951st Naval Air Corps Formed on December 15, 1944, the 951st was a mixed aircraft unit operating floatplanes and flying-boats, including H8K2s. The unit operated mainly from bases in Japan, with a detachment at Shanghai, China. Still operational at the end of the Pacific War.

1021st Naval Air Corps Formed on January 1, 1944; partly land and water based. The water-based operated H8K2-Ls Flying Boat Transports. The unit also operated land based bombers. The 1021st saw service in Formosa as well as from Japan, and was attached to the 101st Air Flotilla in March 1945. On July 15, 1945, the unit was absorbed into the 1081st Naval Air Corps, and became land-based at this time.

Midway Expeditionary Force Had the Japanese been successful in occupying the atoll, this unit was to have been based on Midway in June 1942. The unit had six H6K4s on strength in late May 1942, and was based at Wotje in the Marshall Islands.

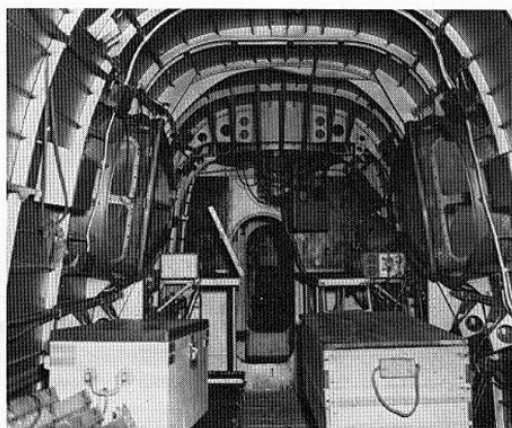
Sasebo Naval Air Corps Yet another mixed aircraft unit, this one had 15 H6K4s on strength at the start of the Pacific War.

Takuma Naval Air Corps Formed on June 1, 1943 at the Takuma Base, Japan, and was attached to the 12th Air Flotilla at this time. A mixed aircraft unit which operated H8K2s and Aichi E13A2 (Allied code name *Jake*) floatplanes. The unit saw service in the Okinawa campaign.

Toko Naval Air Corps Formed on November 15, 1940, at Toko, Formosa, it was attached to the 1st Air Flotilla, but on January 15, 1941 was re-attached to the 11th Air Fleet, 21st Air Flotilla. At the outbreak of the



A close-up of the right-hand pilot's seat on the H8K2.
(Photo: U.S. Navy via Major Robert C. Mikesh)



The beam blister positions on the H8K2, looking aft.
(Photo: U.S. Navy via Major Robert C. Mikesh)

Pacific War on December 8, 1941 the unit was still based on Formosa and provided support for the invasion of the Philippines. During the early weeks of 1942, the unit moved into the South West Pacific Area through Truk. On August 26, 1942, the unit was based at Rabaul and Shortland. On September 20, 1942, the unit was re-formed into the 851st Naval Air Corps.

Yokohama Naval Air Corps Formed on October 1, 1936, as a floatplane unit based at Yokohama. On December 8, 1941, the unit was attached to the 4th Air Fleet, 20th Air Flotilla and was based in Japan equipped with 24 H6K4-5s. On February 14, 1942, the unit was re-assigned to Rabaul via Truk. On March 1, 1942, supplied the first two H8K1s for *Operation K* against Hawaii. On April 1, the unit was re-attached to the 25th Air Flotilla. Early in May 1942, the unit participated in the Battle of the Coral Sea. At this time and into July the unit carried out bombing attacks against Australia. On August 7, 1942, the unit was based at Rabaul and Tulagi. The latter section was decimated in the U.S. landings on Guadalcanal later that month. On November 1, 1942, the unit was redesignated into the 801st Naval Air Corps.

Yokosuka Naval Air Corps Formed in 1930, this unit had at the outbreak of the Pacific War three H6K4s on strength.

Yokosuka Chinjufu Naval Air Corps This was a division of the Yokosuka Naval Air Corps and, in 1944, flew transport flying-boats H6K2 and H6K4-Ls and H8K2-Ls. The unit operated from Japan during 1944-5.

TECHNICAL SPECIFICATION: KAWANISHI H6K5 TYPE 97 FLYING-BOAT, MODEL 2-3

Description

Long-range maritime reconnaissance flying-boat.

Accommodation

Crew of nine.

Powerplant

Four Mitsubishi Kinsei 53, air-cooled, 14-cylinder, two-row radials each with a single-speed supercharger; take-off, 1,300 h.p.; at 3,000 m. (9,845 ft.) 1,200 h.p.; at 6,000 m. (20,340 ft.) 1,100 h.p.

Propellers

Three-blade Hamilton Sumitone constant-speed, metal type of 3-20 m. (10 ft. 9 in.) diameter.

Dimensions

Span, 40-00 m. (131 ft. 2½ in.); length, 25-63 m. (84 ft. 1 in.); height, 6-27 m. (20 ft. 6½ in.); wing area, 170 m² (1,829-86 ft.²).

Weights

Empty, 12,380 kg. (27,117 lb.); loaded, 17,500 kg. (38,581 lb.); maximum, 23,000 kg. (50,076 lb.); wing loading, 102-9 kg/m² (21-1 lb./ft.²); power loading, 3-4 kg./h.p. (7-4 lb./h.p.).

Performance

Maximum speed, 208 knots at 6,000 m. (239 m.p.h. at 19,685 ft.); cruising speed, 140 knots at 4,000 m. (161 m.p.h. at 13,125 ft.); landing speed 58 knots (67-3 m.p.h.); climb rate, 5,000 m. (16,405 ft.) in 13 min. 23 sec.; service ceiling, 9,600 m. (31,365 ft.); range, normal, 2,667 nautical miles (3,070 statute miles) and maximum, 3,656 n. miles (4,208 st. miles).

Fuel Capacity

Maximum, 13,414 litres (2,960 imp. gal.); lubricating oil, 500 l. (110 imp. gal.).

Armament

One flexible 7-7-mm. Type 92 machine-gun in turret at rear of cockpit; one flexible hand-held 7-7-mm. Type 92 machine-gun in each waist 'blister'; one flexible hand-held 7-7-mm. Type 92 machine-gun in open dorsal position; one flexible 20-mm. Type 99 Model 1 cannon in the tail turret.

Bomb Load, carried on the wing support struts: Torpedoes, 2 × 800-kg. (1,764-lb.). Bombs, 2 × 500-kg. (1,103-lb.); 4 × 250-kg. (551-lb.); 16 × 60-kg. (132-lb.).

Radio Equipment

Type 96 Aero Model 3 air-to-ground liaison; Type 96 Aero Model 4 air-to-ground liaison; Type 1 Aero Model 3 command liaison; Type 0 Aero Model 4 radio homing and direction finding; also ASV radar set Model 1 fitted on some H6K5s.

Construction

All-metal with fabric covered control surfaces. No armour protection fitted at any position on the aircraft. The fuel system not fitted with self-sealing protection or fire extinguishers.

TECHNICAL SPECIFICATION: KAWANISHI H8K2 TYPE 2 FLYING-BOAT, MODEL 1-2.

Description

Long-range maritime reconnaissance flying-boat.

Accommodation

Crew of ten.

Powerplant

Four Mitsubishi Kasei 22, air-cooled, 14-cylinder, two-row radials each with a two-speed supercharger; take-off, 1,850 h.p.; at 2,100 m. (6,900 ft.) 1,680 h.p.; at 5,500 m. (18,000 ft.) 1,540 h.p.

Propellers

Four-blade Hamilton Sumitone constant-speed, metal type of 3-90 m. (12 ft. 9 in.) diameter with a pitch range of 27-49°.

Dimensions

Span, 38-00 m. (124 ft. 8 in.); length, 28-12 m. (92 ft. 3 in.); height, 9-15 m. (30 ft. 0 in.); wing area, 160 m² (1,722-25 ft.²).

Weights

Empty, 18,380 kg. (40,520 lb.); loaded, 24,500 kg. (54,010 lb.); maximum, 32,500 kg. (71,650 lb.); wing-loading, 153-1 kg/m² (31-4 lb./ft.²); power loading, 3-3 kg./h.p. (7-3 lb./h.p.).

Performance

Maximum speed, 252 knots at 5,000 m. (290 m.p.h. at 16,400 ft.); 232 knots at 2,000 m. (268 m.p.h. at 7,050 ft.); cruising speed, 160 knots at 4,000 m. (184 m.p.h. at 13,125 ft.); landing speed 70 knots (81 m.p.h.); climb rate, 4,000 m. (13,125 ft.) in 7 min. 55 sec.; 5,000 m. (16,405 ft.) in 10 min. 26 sec.; 6,000 m. (19,700 ft.) in 13 min. 26 sec.; service ceiling 9,120 m. (29,950 ft.); range, normal, 3,468 n. miles (4,000 st. miles), and maximum, 3,862 n. miles (4,460 st. miles).

Fuel Capacity

Maximum, 18,880 l. (4,150 Imp. gal.); lubricating oil, 700 l. (154 Imp. gal.).

Armament

One flexible 20-mm. Type 99 Model 1 cannon in nose turret (5 × 45-round drums of ammunition); one flexible 20-mm. Type 99 Model 1 cannon in dorsal turret (10 × 45-round drums); one flexible, hand-held 20-mm. Type 99 Model 1 cannon in each waist 'blister' (8 × 45-round drums); one flexible 20-mm. Type 99 Model 1 cannon in the tail turret (5 × 45-round drums); four flexible, hand-held 7.7-mm. Type 92 machine-guns (12 × 97-round drums) firing through hatches in the cockpit area, waist and underbelly.

Bomb Load, carried externally under each wing: Torpedoes, 2 × 800-kg. (1,764-lb.); Bombs, 2 × 800-kg. (1,764-lb.); 8 × 250-kg. (551-lb.); 16 × 60-kg. (132-lb.).

Radio Equipment

Type 2 Aero Model 3 command liaison; Type 96 Aero Model 4 air-to-ground liaison; Type 1 Aero Model 3 command liaison; Type 0 Aero Model 4 radio homing and direction finding; also ASV radar set Model 1 fitted on some H8K2s.

Construction

All-metal throughout, with the fuel tanks situated near the motor nacelles. Six fuel tanks situated in the lower hull under the wing position. All fuel tanks protected by 40-mm. thickness of self-sealing rubber and fitted with CO₂ fire extinguishers. Oil tanks located in the motor nacelles. Armour-plating 6-mm. thickness throughout. Installed behind the two pilot's seats. Also fitted inside the dorsal turret beside the gun slot. 250 × 400-mm. in area curved to fit the turret. Each side of the hull extending from the dorsal turret towards the tail, similarly protected.

**PRODUCTION SCHEDULE OF H6K SERIES BY KAWANISHI KOKUKI K.K. AT THEIR NARUO PLANT
FROM 1936-43**

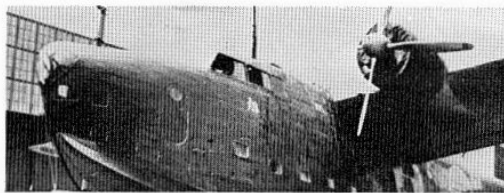
Year	H6K1 9-SHI Experimental	H6K2 Model 1-1	H6K3	H6K4 Model 2-2	H6K5 Model 2-3	H6K2-L	H6K4-L	H6K4-L from H6K4 Airframes	Yearly Total
1936	1	—	—	—	—	—	—	—	1
1937	2	—	—	—	—	—	—	—	2
1938	1	8	—	—	—	—	—	—	9
1939	—	—	2	18	—	—	—	—	20
1940	—	—	—	33	—	5	—	—	38
1941	—	—	—	65	—	3	—	—	68
1942	—	—	—	13	36	6	19	2	76
1943	—	—	—	—	—	—	1	—	1
Total	4	8	2	129	36	14	20	2	215

**PRODUCTION SCHEDULE OF THE H8K SERIES BY KAWANISHI KOKUKI K.K. AT
THEIR KONAN AND NARUO PLANTS FROM 1940-45**

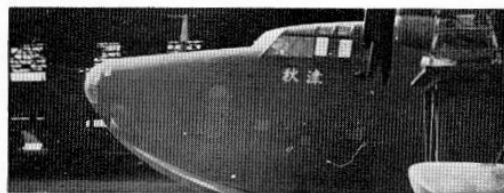
Year	H8K1 13-SHI Experimental	H8K1 Model 1-1	H8K2 Model 1-2	H8K3 Model 2-2	H8K4 Model 3-2	H8K2-L Model 3-2 Seiku	Yearly Total
1940	1	—	—	—	—	—	1
1941	—	3	—	—	—	—	3
1942	—	13	—	—	—	—	13
1943	—	—	80	—	—	5	85
1944	—	—	31	—	—	26	59
1945	—	—	1	2	(2)	5	6
Total	1	16	112	2	(2)	36	167

TABLE OF DEVELOPMENT OF THE KAWANISHI H6K SERIES ('MAVIS')

Aircraft type	Naval short designation	Crew	Span metres	Length metres	Motors	Motor designation	H.P.	Date when first completed	Quantity	Remarks
Experimental 9-Shi Large Flying Boat	H6K1	9	40.0	24.9	4	Nakajima Hikari 2	840	July 1936	4	First prototype had hull modified after initial flight. 2nd-4th prototypes had larger ailerons and increased fin area. The four prototypes re-motored with Kinsei 43s.
Type 97 Flying Boat, Model 1	H6K1	9	40.0	24.9	4	Mitsubishi Kinsei 43	1,000	Jan 1938	4	
Type 97 Flying Boat, Model 2 later Model 1-1	H6K2	9	40.0	25.62	4	Mitsubishi Kinsei 43	1,000	1938	10	First production model; Nos 7 and 8 were modified as Transport Flying Boats. Aircraft same re-motored H6K1s.
—	H6K3	8	40.0	24.9	4	Mitsubishi Kinsei 43	1,000	1939	2	Built as Staff Transport Flying Boats.
Type 97 Flying Boat, Model 2-2	H6K4	9	40.0	25.63	4	Mitsubishi Kinsei 43 and later 46	1,000 and 930	1939	127	Increased fuel capacity, modified armament, principal service variant. Late production aircraft had Kinsei 46. Two of this batch modified as H6K4-Ls.
Type 97 Flying Boat, Model 2-3	H6K5	9	40.0	25.63	4	Mitsubishi Kinsei 53	1,300	1941	36	Built as a safeguard in case H8K was not accepted by IJNAF. Revised armament and re-engined with Kinsei 53.
Type 97 Transport Flying Boat	H6K2-L	8 up to 18 pass.	40.0	24.9	4	Mitsubishi Kinsei 43	1,000	July 1939	16	Modified as Transport Flying Boats. No armament, increased fuel capacity, up to 18 passengers and freight could be accommodated. Some used by Civil Airlines.
Type 97 Transport Flying Boat	H6K4-L	8 up to 18 pass.	40.0	24.9	4	Mitsubishi Kinsei 46	930	1942	20	Modified H6K2-Ls with Kinsei 46 motors. Additional glazing on cockpit. Tail turret retained but no armament carried.



A H8K2-L Seiku (Clear Sky) Transport Flying-Boat which has retained the nose turret of the H8K1 series. (Photo: I.J.N.)



The nose of a H8K2, with an individual inscription Syuuren (Autumn Range).

LOAD/RANGE DATA CHART FOR KAWANISHI H6K4 MODEL 2-2

Mission	Offensive Load	Normal Loaded Weight	Fuel Load	Range	Average Cruising Speed at Rated Altitude	Duration
Torpedo Attack	2 x 800 Kg. Torpedoes 3,520 lb.	23,000 Kg. 50,706 lb.	9,943 Litres 2,180 Imp. gal.	2,590 N.M. 3,000 St. M.	124 Knots at 2,000 m. 144 m.p.h. at 6,550 ft.	21-6 Hours
Bombing Attack	12 x 60 Kg. Bombs 1,586 lb.	23,000 Kg. 50,706 lb.	11,700 Litres 2,570 Imp. gal.	3,120 N.M. 3,600 St. M.	95 Knots at 2,000 M. 110 m.p.h. at 6,550 ft.	20-5 Hours
Reconnaissance	Nil	21,500 Kg. 47,300 lb.	10,195 Litres 2,410 Imp. gal.	2,700 N.M. 3,170 St. M.	126 Knots at 2,000 M. 146 m.p.h. at 6,550 ft.	22-5 Hours
Reconnaissance	Nil	23,000 Kg. 50,706 lb.	12,222 Litres 2,700 Imp. gal.	3,283 N.M. 3,790 St. M.	97 Knots at 2,000 M. 112 m.p.h. at 6,550 ft.	26-9 Hours

LOAD/RANGE DATA CHART FOR KAWANISHI H6K5 MODEL 2-3

Mission	Offensive Load	Normal Loaded Weight	Fuel Load	Range	Average Cruising Speed at Rated Altitude	Duration
Torpedo Attack	2 x 800 Kg. Torpedoes 3,520 lb.	23,000 Kg. 50,706 lb.	9,943 Litres 2,180 Imp. gal.	2,590 N.M. 3,000 St. M.	124 Knots at 2,000 M. 144 m.p.h. at 6,550 ft.	21-6 Hours
Bombing Attack	12 x 60 Kg. Bombs 1,586 lb.	23,000 Kg. 50,706 lb.	11,700 Litres 2,570 Imp. gal.	3,120 N.M. 3,600 St. M.	95 Knots at 2,000 M. 110 m.p.h. at 6,550 ft.	20-5 Hours
Reconnaissance	Nil	23,000 Kg. 50,706 lb.	11,758 Litres 2,580 Imp. gal.	3,656 N.M. 4,230 St. M.	140 Knots at 4,000 M. 162 m.p.h. at 13,100 ft.	26-07 Hours

TABLE OF DEVELOPMENT OF THE KAWANISHI H8K SERIES ('EMILY')

Aircraft Type	Naval Short designation	Crew	Span metres	Length metres	Motors	Motor designation	H.P.	Date when first completed	Quantity	Remarks
Experimental 13-Shi Large Flying Boat	H8K1	10	38-0	28-13	4	Mitsubishi Kasei 11 MK4A	1,530	Dec. 1940	1	Prototype, which had to have extensive hull modifications due to poor water handling, fin area increased
Type 2 Flying Boat, Model 1-1	H8K1	10	38-0	28-13	4	Mitsubishi Kasei 12 MK4B	1,530	1941	16	First two aircraft pre-production types and incorporated modifications found necessary on the prototype. Modified armament
Type 2 Flying Boat, Model 1-2	H8K2	10	38-0	28-13	4	Mitsubishi Kasei 22 MK4Q	1,850	1943	112	Re-motored with Kasei 22, armament and armour protection increased. Late production aircraft had flush waist gun positions and ASV Radar
Type 2 Flying Boat, Model 2-2	H8K3	10	38-0	28-13	4	Mitsubishi Kasei 22 MK4Q	1,850	1944	2	Experimental aircraft with retractable wing tip floats. Flush waist gun positions and retractable dorsal turret
Type 2 Transport Flying Boat, Model 3-2 Seiku	H8K2-L	9 up to 29 pass.	38-0	28-0	4	Mitsubishi Kasei 22 MK4Q	1,850	Nov. 1943	36	Hull modified to have two decks for cargo and passengers. Fuel capacity reduced, armament only in nose and tail turrets. Company designation K-30. 64 fully armed troops could be accommodated
Type 2 Flying Boat, Model 2-3	H8K4	10	38-0	28-13	4	Mitsubishi Kasei 25b MK4 T-B	1,825	1945	(2)	The two H8K3 aircraft re-motored with Kasei 25bs — development not proceeded with

Acknowledgements

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An example of the Yokosuka P1Y1 Ginga two-motor bomber found in a hangar by the occupying U.S. forces at the end of the Pacific War. H8K2 flying-boats escorted the Ginga bombers on their first mission, a Kamikaze strike on the U.S. fleet anchored at the Ulithi Atoll in March 1945. (Photo: via Heinz Nowarra)

Series Editor: CHARLES W. CAIN

LOAD/RANGE DATA CHART FOR KAWANISHI H8K1 MODEL 1-1

Mission	Offensive Load	Normal Loaded Weight	Fuel Load	Range	Average Cruising Speed at Rated Altitude	Duration
Torpedo Attack	2 x 800 Kg. Torpedoes 3,520 lb.	24,500 Kg. 54,000 lb.	5,754 Litres 1,270 Imp. gal.	1,270 N.M. 1,460 St. M.	160 Knots at 4,000 M. 184 m.p.h. at 13,100 ft.	7-93 Hours
Torpedo Attack	2 x 800 Kg. Torpedoes 3,520 lb.	31,000 Kg. 68,000 lb.	13,947 Litres 3,070 Imp. gal.	2,928 N.M. 3,380 St. M.	160 Knots at 4,000 M. 184 m.p.h. at 13,100 ft.	18-35 Hours
Reconnaissance	Nil	31,000 Kg. 68,000 lb.	16,505 Litres 3,540 Imp. gal.	3,888 N.M. 4,460 St. M.	160 Knots at 4,000 M. 184 m.p.h. at 13,100 ft.	24-3 Hours

LOAD/RANGE DATA CHART FOR KAWANISHI H8K2 MODEL 1-2

Mission	Offensive Load	Normal Loaded Weight	Fuel Load	Range	Average Cruising Speed at Rated Altitude	Duration
Torpedo Attack	2 x 800 Kg. Torpedoes 3,520 lb.	31,000 Kg. 68,342 lb.	14,100 Litres 3,100 Imp. gal.	3,020 N.M. 3,550 St. M.	116 Knots at 4,000 M. 140 m.p.h. at 13,100 ft.	26-0 Hours
Bombing Attack	16 x 60 Kg Bombs 2,213 lb.	24,500 Kg. 54,500 lb.	3,668 Litres 805 Imp. gal.	910 N.M. 1,150 St. M.	160 Knots at 4,000 M. 185 m.p.h. at 13,100 ft.	5-70 Hours
Reconnaissance	Nil	31,000 Kg. 68,342 lb.	13,915 Litres 3,070 Imp. gal.	3,468 N.M. 4,000 St. M.	160 Knots at 4,000 M. 185 m.p.h. at 13,100 ft.	21-67 Hours
Reconnaissance	Nil	32,500 Kg. 71,500 lb.	15,956 Litres 3,500 Imp. gal.	3,862 N.M. 4,460 St. M.	160 Knots at 4,000 M. 185 m.p.h. at 13,100 ft.	24-14 Hours

LOAD/DATA CHART FOR KAWANISHI H8K2-L MODEL 3-2 (SEIKU) TRANSPORT

Condition	Pay Load	Normal Loaded Weight	Fuel Load	Range	Average Cruising Speed at Rated Altitude	Duration
Lightly Loaded	25 passengers plus 500 Kg. Hand Luggage and 1,200 Kg. of cargo 25 pass.—1,100 lb. —2,640 lb.	23,435 Kg. 50,050 lb.	4,420 Litres 972 Imp. gal.	1,200 N.M. 1,390 St. M.	160 Knots at 4,000 M. 184 m.p.h. at 13,100 ft.	7-5 Hours
Normal Load	25 passengers plus 1,200 Kg. of cargo 25 pass.—2,640 lb.	26,685 Kg. 58,600 lb.	8,840 Litres 1,940 Imp. gal.	2,397 N.M. 2,750 St. M.	160 Knots at 4,000 M. 184 m.p.h. at 13,100 ft.	14-98 Hours
Over Loaded	29 passengers plus 500 Kg. Hand Luggage and 1,200 Kg. of cargo 29 pass.—1,100 lb. —2,640 lb.	27,363 Kg. 60,000 lb.	8,840 Litres 1,940 Imp. gal.	2,397 N.M. 2,750 St. M.	160 Knots at 4,000 M. 184 m.p.h. at 13,100 ft.	14-98 Hours