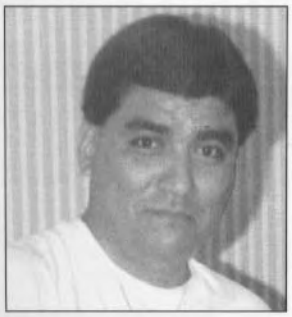
Elite

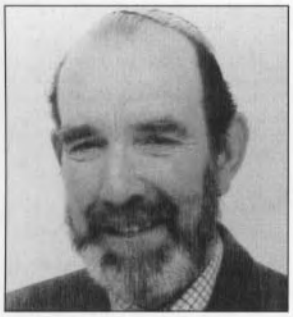
OSPREY PUBLISHING

Japanese Naval Aviation Uniforms and Equipment 1937–45

Gary Nila • Illustrated by Bill Younghusband



GARY NILA is a former Los Angeles Police Officer and FBI Special Agent who now works *as an investigator with* Northrop Grumman Corp. Air Combat Systems. He has been a collector of World War II Japanese military uniforms and equipment for over 30 years, but specializes in researching and collecting Japanese naval flight equipment and dress. He has interviewed many former IJN pilots including Saburo Sakai, Sudamu Komaichi, and Masajiro Kawato. Gary lives in Lakewood, California.



BILL YOUNGHUSBAND has been interested in all things military since childhood, and this interest was compounded through the reading of authors such as G A Henty. In 1954 he joined the Life Guards and saw service in Egypt and Cyprus. Bill is a respected military illustrator of many years' experience, and for this title contributes the detailed insignia illustrations. He is married, and lives in Ireland.

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First published in Great Britain in 2002 by Osprey Publishing
Elms Court, Chapel Way, Botley, Oxford OX2 9LP, United Kingdom
Email: **info@ospreypublishing.com**

ISBN 1 84176 465 5

CONSULTANT EDITOR: Martin Windrow

Editor: Anita Hitchings
Design: Alan Hamp
Index by Alan Thatcher
Originated by The Electronic Page Company, Cwmbran, UK
Printed in China through World Print Ltd.

02 03 04 05 06 10 9 8 7 6 5 4 3 2 1

FOR A CATALOG OF ALL BOOKS PUBLISHED BY
OSPREY MILITARY AND AVIATION PLEASE CONTACT:
Osprey Direct USA, c/o MBI Publishing
P.O. Box 1, 729 Prospect Ave, Osceola, WI 54020, USA
E-mail: **info@ospreydirectusa.com**

Osprey Direct UK
P.O. Box 140, Wellingborough, Northants, NN8 2FA, UK
E-mail: **info@ospreydirect.co.uk**

www.ospreypublishing.com

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Acknowledgements

This project is dedicated to my daughter Allison Courtney Nila for her love, patience and understanding while living with my IJN aviation passion.

A special thank you to my mentor, Henry Sakaida, for his inexhaustible comradeship, encouragement, persistence, and contributions in making this project a reality.

This project was also made possible with the assistance of the following individuals:-
MaryLou Bannister, Andrew Bolland, David Enter, Dave Hooker, Masajiro Kawato, Sadamu Komachi, Yasuo Kumoi, Richie J. Martin, Alexander Mac Iver, the late Yutaka Morioka, Kazuhiko Osuo, Shin Nimura, Jerry Price, Mick J. Prodger, Nancy C. Reagan, Robert Reichelderfer, Timothy Richeson, David Roper, Robert Rolfe, Shigeo Saito, Warren Sessler, the late Saburo Sakai, Donna Sakaida, Kazuo Shiba, Kenzo Taniguchi, Takeo Tanimizu, Ron Werneth, Doss White, Shelton Yokomizo, and John Ziobro

Photography by Tony Chong of Skyshadow Studios, Burbank, California, who photographed all the original equipment, unless identified otherwise.

The live models used in the preparation of the color plates were Russell Hashimoto and Junichi Gondai.

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JAPANESE NAVAL AVIATION UNIFORMS AND EQUIPMENT 1937–45

INTRODUCTION

FROM 1868 TO 1989, WHEN HIROHITO DIED, the Japanese had three reigns of emperors. These reigns are referred to by the following throne names within the designated time periods:

MEIJI Era – 1868 to 1912
TAISHO Era – 1912 to 1926
SHOWA Era – 1926 to 1989

For the purpose of this book and the dating of Japanese equipment manufactured during World War Two, only the Showa (*Enlightened Peace*) Era will be discussed.

The Japanese calendar begins in January, which is referred to as "1" or the first month, and ends in December or "12" (twelfth month).

The Japanese calendar begins during the year following the enthronement of the new emperor. Emperor Hirohito ascended to the chrysanthemum throne in 1925.

In order to arrive at the Showa years leading up to 1989, simply add the Showa year number to 1925. For example, Showa 15 is 1940 since 25 + 15 = 40. The following table will help the reader to convert quickly to the Showa calendar.

Showa

11 = 1936	**12 = 1937**	**13 = 1938**	**14 = 1939**	**15 = 1940**
16 = 1941	**17 = 1942**	**18 = 1943**	**19 = 1944**	**20 = 1945**

English	Japanese Kanji	Japanese Pronunciation
0	零	Rei
1	一	Ichi
2	二	Ni
3	三	San
4	四	Shi
5	五	Gō
6	六	Roku
7	七	Hichi
8	八	Hachi
9	九	Ku
10	十	Jū
11	十一	Jū ichi
12	十二	Jū ni
13	十三	Jū san
14	十四	Jū shi
15	十五	Jū gō
16	十六	Jū roku
17	十七	Jū shichi
18	十八	Jū hachi
19	十九	Jū kū
20	二十	Ni jū

(RIGHT) Listing of Japanese numbers that can be used with the above formula

(RIGHT) Additional useful terms for this text.

Year	年	Nen
Month	月	Gatsu
Day	日	Nichi
Type/Model	式	Shiki
Air Force	空軍	Kugun
Navy	海軍	Kaigun
Army	陸軍	Rikugun

FLIGHT HELMETS

The early Japanese Navy flight helmet of 1937 was a product of what was learned during and after World War One, and throughout Japan's aviation growth of the 1920s. While the Japanese Army Air Force had closer relations with the French Air Force after World War One, the Japanese Naval Air Force based their early flight helmets on the British and American helmets. Because the Japanese were allies to these large powers during and after World War One, the Japanese military was in a comfortable position to obtain advances in headgear design from its new allies. Japanese Navy flight helmets were well documented by Mick J. Prodger in *Vintage Flying Helmets – Aviation Headgear Before The Jet Age* (Schiffer Ltd., Pennsylvania 1995). In that book, Prodger discusses many details and variations of the early Japanese Naval flight helmets. This chapter will not compete with Prodger's discussion. It is designed to assist the reader by giving a quick guide to identifying the following three categories of Japanese Naval flight helmets used from 1937 to 1945. These are the Model Type 30, the Model Type 2 (1942–45), and the Model Type 3 (Hard Earphone).

Model Type 30

The early Model Type 30 flight helmet is elaborate in design and made of high-quality cowhide leather. The helmet is sewn in a six-triangle pattern on the crown, with an extended "D" shaped ear cover (for Gosport receiver apparatus) that snaps towards the back of the ear. The snap itself is a unique ½-inch round size. The chinstrap has metal grommet eyelet adjustment holes and a leather-covered buckle with a metal chrome keeper.

(LEFT) An early Model Type 30 summer flight helmet with snap visor and "D" shaped ear covers for Gosport receiver apparatus.
(RIGHT) The rear view of the early Model Type 30 summer flight helmet with goggle retention straps and triangular pattern sewn crown. Some later Type 30 helmets had a green sewn-on label, for the user's name or unit designation, under the button-down straps.

The front of the helmet has a 1-inch brim that could be worn downward or snapped upward by a leather-covered snap. This brim, when worn in the down position, acted as a seal between the wearer's forehead and goggles.

On the rear of the helmet are two leather straps that are secured by sewn-on plastic buttons, used to retain the wearer's goggle strap. The helmet has two thin leather straps that begin near the front left and right temples of the wearer's head. Each strap runs along both sides of the helmet to the rear and under the two-goggle retention straps. The straps fasten at the rear with the use of a small buckle and eyelet keeper. These straps were initially used as an adjustment to tighten the helmet to the wearer's head. Flight personnel commonly used these straps to hold up the sides of the flight helmet, in order to keep cool during warm periods. The inside linings of the summer issue flight helmets were in either green cotton twill or a cotton velveteen material. The winter issue flight helmet was of the same design as the summer helmet, except for the inside lining of rabbit fur for added warmth. Sewn into the lining of both the summer and winter flight helmets was a 1¼-inch x 1¾-inch white cotton cloth label with printed *kanji* that designated the date and location of the issuing Japanese Naval supply depot, which in many cases was Yokosuka, Sasebo or Kure. Additional columns on the printed label allowed the wearer to add his personal information.

A winter Model Type 2 flight helmet with sewn-on oval pocket ear covers and front-to-rear sewn seam; the summer helmet was identical but without the fur.

During the beginning of the war effort, the Japanese Navy appointed independent civilian contractors to manufacture their flight helmets to strict military specifications. The Iida & Takashimaya Company and Nagata & Co. were already making fine men's and women's clothing before the war, which accounted for their company names appearing in English on sewn-in labels of early naval flight helmets.

From 1937 to the end of the production period (1941), some Model Type 30s had a c.1-inch x c.2-inch green cotton patch that was sewn to the rear neckline of the flight helmet, so that the wearer could write his name or unit designation.

Model Type 2 (1942–45)

By late 1941, the Model Type 30 naval flight helmet was being modified to accommodate shortage of materials and to shorten production time. The Model Type 2 helmet was now being sewn with five front-to-rear seam patterns, but kept the 1-inch front brim. The button-down ear covers were eliminated and replaced with a sewn-on oval pocket with a finger-sized narrow opening at the bottom, where a Gosport receiver or radio receiving cable could be inserted. The rear goggle retention strap was reduced to one single downward-buttoned strap, and the leather adjustment straps were eliminated. Throughout production, the sewn-on exterior 1-inch x 2-inch green cloth label remained on the back of the flight helmet for the wearer's personal identification as well as the sewn-in 1¼-inch x 1¾-inch white cotton cloth naval supply depot label.

A side view of a Model Type 3 flight helmet showing lace-up rear, a fixed socket, and a nickel-plated "D" shaped clip that was intended for an oxygen mask. The orange *kanji* on the earphone translates to "Panther" squadron. (Robert Reichelderfer)

Eventually, the navy contracts expanded to other civilian manufacturers such as Asahi Aerial Clothing Manufacturing Co., Yaguchi Industry Co. Ltd, and Goni Leather and Hides Co. to mention a few. Although the manufacturer labels remained sewn into the flight helmet, they were now written solely in Japanese.

The Model Type 2 flight helmet remained simple in design until the end of the war. By 1944, due to shortages in cowhide leather, the civilian manufacturers also began producing helmets made of cured shark and eel skins. Shark and eel skin was much thinner than cowhide, less durable and often hardened after being wet. Also by 1944, the winter issue flight helmets were lined with goat, sheep, and horse pelts.

Former Japanese Navy pilot, Saburo Sakai, stated that naval pilots commonly wore a winter issue flight helmet with a summer issue flight suit. He added that this manner of dress was a statement of masculine toughness among the naval air group.

In 1945, synthetic material was used for the inside lining of the helmets, and all external buttons were now made of wood.

Model Type 3 (Hard Earphone)

By late 1942, the Japanese Navy had acquired much technical knowledge

Variations of the sewn-in cloth labeling found in navy flight helmets and gauntlets
(Left-hand column, top to bottom) Yokosuka Naval Supply Depot issue, with Showa date 19.3 (March 1944), Size 2 (Medium); Nagata & Co. (In English; early war); Nagata & Co. (In *kanji*; late war)
(Centre column, top to bottom) Iida & Takashimaya Co.; TTK or Toyo Telecommunication Equipment Co.; Asahi Aerial Clothing Mfg Co. (Eagle logo); Yaguchi Industry Co.
(Right-hand column, top to bottom) Yokosuka Naval Supply Depot, with *kanji* Showa date 19 (1944), Size 2 (Medium); Kawai Mfg Co.; Goni Leather and Hides Co.

through their alliance with Germany. In 1943, the Toyo Telecommunication Equipment Company Ltd, also known as TTK, produced and registered a prototype flight helmet, patterned after the German Siemens Model Lkp W100, specifically for the Japanese Naval Air Forces. From the beginning of World War Two, TTK had been producing telecommunication equipment for the Japanese Navy Submarine Service. Electronic intelligence was shared and filtered between the German and Japanese submarine command.

TTK used a high-quality soft leather cowhide exterior with a fully lined rabbit fur interior. Their helmet eliminated the front brim and used cotton string laces on the rear to provide a snug fit on the wearer's head. The helmet had two leather-covered metal earphones. Cushioned inside these, with soft rubber, were the best contemporary sound electronics.

Two nickel-plated "D" clips were fitted under the electronic earphones (like the German model) for a proposed oxygen mask that was never developed. The rear of the flight helmet maintained two goggle retention straps. Although TTK placed their brown and orange manufacturer's label inside the helmet, no internal sewn-in labels specifying the naval supply depot or external green labels were placed on the helmet.

The helmet's chinstrap had two functions. One was to secure the flight helmet to the wearer's head in the normal fashion. The second was to attach a leather-belted Bakelite throat mike to the chinstrap on the flight helmet. A 12-inch rubber cable with a metal plug was suspended from the right side of the helmet, where this plug could be attached to the aircraft's electronic radio receiver.

Petty Officer Second Class Saburo Sakai is standing at Hankow Air Base, Central China, in September 1939. Sakai is wearing a winter Model Type 30 flight helmet with the standard "cat's eye" goggles. (Gary Nila)

FLIGHT GOGGLES

As mentioned earlier, Japanese Navy and Army flight goggles were well documented by Mick J. Prodger in *Vintage Flying Helmets – Aviation Headgear Before The Jet Age* (Schiffer Ltd., Pennsylvania 1995). In that book, Prodger identifies many variations of Japanese flight goggles from 1930 to 1945. Again, this chapter will not compete with Prodger's discussion. It is clear that from the end of World War One (1918) to the 1930s, Japanese aviation was greatly influenced by French, British, German, and American developments. During this period, the Japanese military was able to pick and choose equipment from its foreign neighbors, until it subsequently designed and developed its own.

This chapter is designed to assist the reader by providing a quick way of identifying the variations of Japanese Navy flight goggles referred to as the "cat's eye" style. This "cat's eye" style goggle was more common in Japan from 1939 to 1945.

It is agreed that the Takashimaya and the MAN (an abbreviation for Manchuria, where the factory was said to be located) Companies produced navy

Variations of navy flight goggles used in World War Two. (Top row, left to right) Green tinted lenses; winter fur mask; electrically heated lenses; experimental vented anti-fog lenses (David Roper) (Bottom row, left to right) Pre-1939 winter flight goggles, which are the non-"cat's eye" style (*Dave Hooker*); standard clear glass lenses (maroon-colored aluminum frames with brown velveteen cloth cushion); private purchase (light-colored frames with white cushion); amber tinted lenses

flight goggles for the war effort. There were many additional goggle manufacturers, including Mitsubishi and Aomizu to mention just two. However, no evidence has surfaced to date to support the theory that such goggles were manufactured specifically for the navy or army air forces.

It can be assumed that the MAN goggles were clearly naval issue, due to their unique oval cardboard box with its gold-painted anchor and propeller on the lid that translated to "Goggles – Eagle's Eye Type." On both upper corners of the goggles, between the goggle strap screws, were the embossed Arabic letters "MAN" under a seven-rayed half *Asahi* (rising sun) logo. The MAN goggles had aluminum frames that ranged in color from light brown to dark brown or from a light maroon to a bright glossy maroon. A dark brown velveteen padded cushion was hand sewn onto these aluminum frames. The goggle frames were then attached to an open-ended metal ring by a loosely fitted leather keeper that was sewn directly onto a brown or maroon-colored adjustable elastic strap.

The colors of the aluminum frames from other goggle manufacturers varied between the following: dull silver, platinum, brown, maroon, and black. The velveteen cushions, sewn to the aluminum frames were varied in color as well, being either white, brown, or green.

Fitted between the aluminum frames and velveteen cushions were two curved elliptical glass lenses within each eye frame. Fitted tightly between the two glass lenses was thin clear plastic, cut in the same elliptic shape as the lenses. This plastic was an early innovative attempt by the Japanese at safety glass in case the goggles shattered or broke during use.

Each set of flight goggles had its own individual oval cardboard box with its lid supported by a silk drawstring. This box resembled a miniature hatbox. The box lid bore the name and/or logo of the civilian manufacturer for the military contract. Accompanying the goggles within the box was an approximate 6-inch x 6-inch soft cotton goggle lens wiping cloth. Again, the name and/or logo of the manufacturer were printed on the wiping cloth.

Between 1939 and 1945, the Japanese Navy Air Force used seven "cat's eye" styles of flight goggles. These were standard clear glass (dark frames and cushion), private purchase (light-colored metal frames with white cushion), amber tinted, green tinted, fur mask, electrically heated, and experimental anti-fog.

Standard clear glass

The standard clear glass flight goggles used by the navy and army air forces were as described previously, with the aluminum frames, velveteen-padded cushion, and dual glass lenses divided by plastic. The pilots used the goggles mainly during take-off and landing, to protect their eyes from dust and debris, and strong wind in the cockpit. In a closed cockpit the goggles could protect the eyes from draughts. According to former navy pilots, Saburo Sakai and Sadamu Komachi, during flight, flight goggles were only worn in the cockpit when needed. They argued that the goggles, although necessary, often decreased direct visibility and hampered their peripheral vision.

Saburo Sakai's torn Model Type 30 flight helmet and silk muffler, which he wore on the Guadalcanal mission. "I escaped death by an inch," recalled Sakai, pointing to the indentation left by an incendiary or tracer bullet, on his goggles. (Henry Sakaida)

However, Sakai said that in a tropical environment such as Rabaul, pilots were known to trail mud into the cockpits on their boots. This mud would eventually dry and gather on the floorboard of the aircraft. During flight, and subsequent maneuvering of the aircraft, this dried mud would become dust, and could get in the eyes. During this time, the goggles were most useful.

Sakai further said that he did not wear goggles during dogfights against other fighters, but that he did wear goggles when he attacked bombers only because they shot back, and he wanted to protect his eyes in case of flying shrapnel.

Sakai advised that early in the war, if his goggle glass cracked during use, he would merely go to the quartermaster and obtain a new pair of goggles. However, there is evidence of replacement lenses wrapped in tissue paper in current-day collections.

Private purchase

The flight goggles referred to in this section as "private purchase" are identified by their unique dull silver or platinum-colored aluminum frames with white velveteen-padded cushion. The brown oval cardboard goggle box lid and internal wiping cloth bear the image of a flying eagle with a circular logo in its claw grip. This logo represents the TOA (pronounced Toh-ah) Safety Glass Manufacturing Company, located at Kamata, Tokyo. These goggles were of very high quality. According to Sakai and Komachi, these "private purchase" goggles were in high demand amongst naval flight petty officers and above.

Amber tinted

The amber tinted goggles were of the same design as the standard clear glass goggles except for the fact that they had partial amber-colored

lenses. Unlike the US military's AN6530 Model goggles that had removable colored lenses, which were clear, amber or green, the Japanese goggles did not have removable lenses. Japanese pilots had to switch goggles, from a clear set to a tinted set, when flying into direct sunlight.

Green tinted

As with the amber tinted goggles, the green tinted goggles had the same standard design as the clear glass goggles but the lenses had a dark green tint.

Fur mask

The reference in this section to "fur mask" identifies goggles for use in cold weather. These goggles had the standard aluminum frame with velveteen-padded cushion, and dual glass lens design, but had a leather exterior mask that extended beyond the bridge of the wearer's nose. These goggles were commonly used in an open cockpit (e.g. by the gunner or for photo reconnaissance), on high-altitude bombing missions, and in cold weather. The fur mask goggles were normally worn in association with a leather winter fur-lined flight helmet and a silk or wool muffler that the wearer used to cover the bottom portion of his face for added warmth. These fur mask goggles were manufactured by MAN, and had all the above MAN qualities and characteristics.

Rare portrait of a young aviator wearing the experimental vented anti-fog goggles with a winter Model Type 30 flight helmet, summer white sailor tunic, and summer flight gauntlets. Note the "G" shaped bracket on the goggle strap. (Gary Nila)

Electrically heated

There was a common dilemma in all air forces during World War Two when wearing flight goggles in a high-altitude environment. This was how

(Left) A close-up view of the electrically heated goggles with the wire coil in the clear glass lenses and the embossed MAN logo in the aluminum frames. Note the remnants of the cut electrical cable. (Right) Experimental vented anti-fog goggles with unique "G" shaped bracket.

to adjust or coordinate the outside cold weather temperature with the warm human body temperature. Condensation, freezing, and fogging were common enemies to all. The MAN Manufacturing Company attempted (on a limited distribution basis) to remedy this problem by using the standard "cat's eye" goggle design, but incorporating a copper wire coil between the dual glass lenses. The thin safety plastic was eliminated during this production design. The wire coil was routed from the lens, through the velveteen-padded cushion, to the upper left portion of the goggle frame, which attached to an electrical cable and plug.

Experimental anti-fog

In conjunction with the dilemmas discussed in the previous section, the tropical weather during the Pacific Campaign offered additional difficulties, causing the fogging of flight goggles because of the high humidity. For this reason, the Japanese experimented with a limited prototype flight goggle with adjustable vents. Using the standard issue flight goggle, this proto-type was equipped with a pop-up aluminum vent on the top of each goggle frame. By turning a semicircular metal knob, each vent could be activated individually or closed shut, as deemed appropriate.

Because the added hardware resulted in the frames being fractionally heavier, the goggle strap was modified. The open-ended metal ring was replaced with a flat triangular nickel-plated hook that slipped into an upside-down "G" shaped bracket. The aluminum frames were more orange-copper in color and, although the brown velveteen material was used around the frame, the inside padding was filled with cork.

Currently, due to inappropriate storage in moist or extremely hot climates, World War Two Japanese goggle specimens have been known to fog or crystallize. This is due to the accumulation of moisture on the plastic between the two glass lenses, which causes a form of fungus or bacteria to develop. This process often worsens as the plastic begins to dry from age, thus giving the appearance that the glass lenses have deteriorated, when in reality only the center plastic has deteriorated.

This damaging process can be delayed or avoided by storing the goggles in a cool dry environment. Removing the damaged plastic from between the two glass lenses is an extremely delicate process. The end result is that the goggles maintain a clear glass appearance, but will be loose to the touch in the frames. Also, some damage may occur to the stitching in the velveteen cushion during the removal process.

Naval pilot (c.1942) wearing a parachute silk muffler with standard clear glass goggles, winter Model Type 2 flight helmet, and a two-piece summer wool gabardine flight suit. (Gary Nila)

FLIGHT MUFFLERS

A signature article of aviation clothing from the early open cockpit biplane era was the "Muffler" or, in simple terms, a scarf resembling an ascot

that flight personnel wore around their necks for added warmth. Japanese Navy flight personnel commonly wore mufflers made of either silk or knitted wool. The silk mufflers were normally salvaged and cut from unusable parachutes. They were sewn into double-sided tubes that were approximately 5 feet long x 1 foot wide. The silk mufflers were initially manufactured and issued by Japanese Naval Air supply depots and training facilities such as Kure, Sasebo, Tateyama, and Yokosuka. As early as 1939 to 1942, a 2-inch x 1-inch white cotton sewn-on issue label appeared on the garments. Mufflers manufactured from 1943 to 1945 had a black ink issue stamp. However, it is not uncommon to find navy mufflers without any issue labels, as many were cut from used parachute silk.

The knitted wool mufflers were issued by the same naval air supply and training facilities, but were manufactured in shorter lengths or sewn in a ring-like band formation to be worn around the neck. The early wool mufflers also had the 2-inch x 1-inch white cotton sewn-on issue label. The wool mufflers were beige, olive drab, or dark navy blue in color. Few, if any, naval woolen mufflers survive to date, because the Japanese wore them as warm and useful clothing long after the war.

This naval pilot wears c.1942 wool mufflers. They were knitted in a ring-like band formation to be worn around the neck, as shown, with an early summer two-piece flight suit (note the seam pattern of the internal semicircular pocket under the name tag), winter Model Type 30 flight helmet, standard goggles, and summer flight gauntlets. (Gary Nila)

Japanese Army flight personnel also used both types of mufflers described. In addition, army flight personnel were issued a knitted wool hood that extended under the chin and neck area, with an oval cutout for the eyes, nose, and mouth. This article of cold weather clothing, in French or Canadian terms, is commonly referred to as a "Toque." Although Japanese Navy flight personnel were not issued toques during World War Two, there are rare instances where navy flight personnel were photographed wearing the toque prior to World War Two.

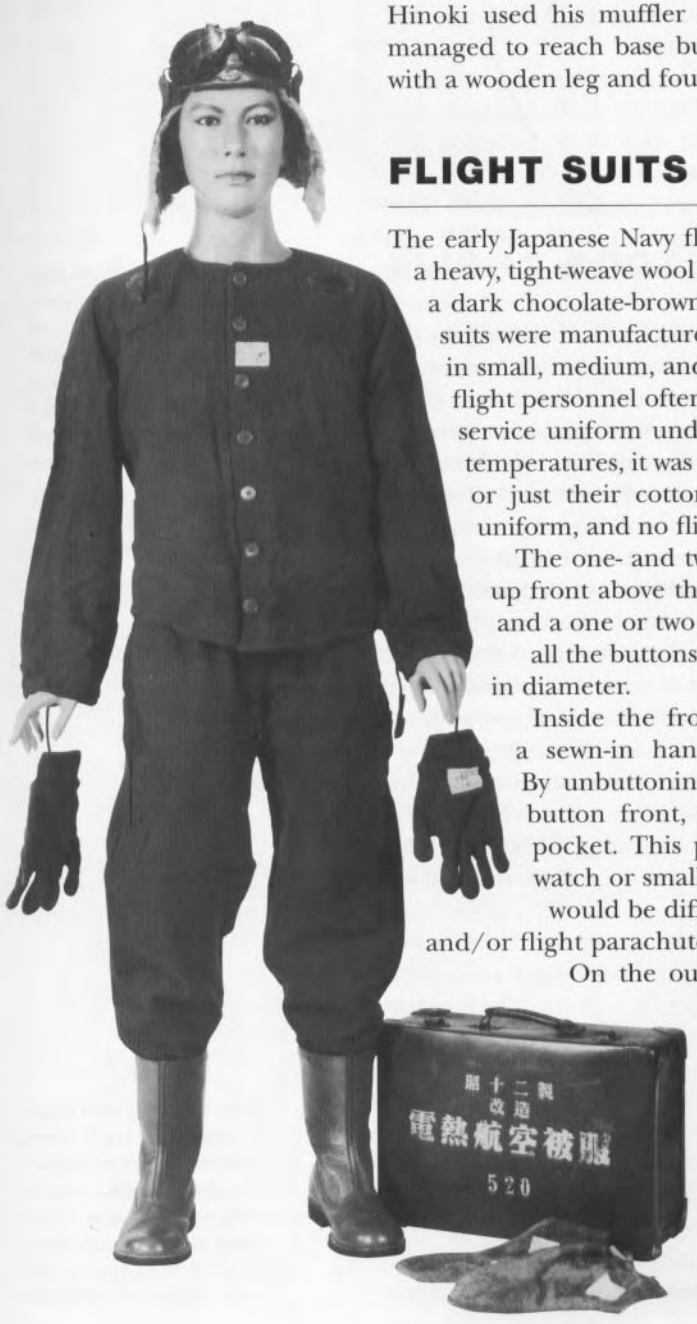
Former Japanese Navy fighter pilot, Warrant Officer Takeo Tanimizu, when asked why they wore the silk muffler, simply responded that navy pilots considered themselves to be "dandies."

Former Japanese Navy fighter pilot, Warrant Officer Sadamu Komachi, had commented that he was instructed in flight school that if he crash-landed his aircraft in the ocean, he should take off his silk muffler and let it trail in the water. Komachi was informed that a shark would not attack anything larger than itself. It is also interesting to note that not all silk mufflers were white in color. For example, in the elite Japanese Navy 343rd *Kokutai* (Air Group), the pilots of the 301st *Chutai* (Squadron) all had purple mufflers embroidered with the pilot's name. They flew the *Shiden-Kai* (N1K2-J). The name *Shiden* means violet (purple) lightning, hence the purple color. The white cloth or silk was dyed purple and embroidered by high school girls (volunteers) and presented to the pilots. CPO Shoichi Sugita's division (four pilots in a division) all had their mufflers embroidered with the same saying: "Smile sweetly and shoot him [the enemy] down."

OPPOSITE **The mannequin wears the electrically heated goggles, a winter Model Type 2 flight helmet (non heated), the tunic and pants portion of the navy electrically heated suit, heated gloves (hanging by cables), heated booties (on the floor), and standard early model flight boots (non heated). This heated suit was worn underneath the actual flight suit. Also shown is the carrying case for the heated equipment. (Robert Reichelderfer)**

On August 7, 1942 the silk muffler was put to a more practical use when the Zero ace, Saburo Sakai, used his to stem the bleeding from severe head wounds. He attacked a formation of eight US Navy SBD dive-bombers over Tulagi (Guadalcanal). The rear gunners opened fire on him; bullet fragments hit him in both eyes, his chest, and head. Sakai subsequently lost the full sight of his right eye, but often claimed that the muffler helped save his life.

The silk muffler also saved the life of First Lieutenant Yohei Hinoki, the army ace of the famous 64th *Sentai* in Burma. On November 27, 1943 while flying an Oscar (Ki-43), he was hit and wounded in a dogfight by a P-51. A .50 caliber bullet nearly severed his right leg but Hinoki used his muffler as a tourniquet to stop the bleeding. He managed to reach base but lost his leg. He later returned to combat with a wooden leg and fought to the end of the war.



FLIGHT SUITS

The early Japanese Navy flight suits, from 1937 to 1941, were made of a heavy, tight-weave wool gabardine material that ranged in color from a dark chocolate-brown to dark brown with a dark green tint. The suits were manufactured in one- or two-piece styles, and were fitted in small, medium, and large sizes. Depending on the climate, navy flight personnel often wore their flight suit as an overall with their service uniform underneath. During periods of extremely warm temperatures, it was common for pilots to wear only the flight suit or just their cotton (beige or white) shirt and short service uniform, and no flight suit.

The one- and two-piece flight suits had a five or six button-up front above the waist, a one or two button adjustable cuff, and a one or two button adjustable ankle. On the early suits all the buttons were round, made of plastic and were 1 inch in diameter.

Inside the front left chest portion of the flight suit was a sewn-in hand-sized semicircular button-down pocket. By unbuttoning the top portion of the five or six main button front, the wearer's right hand could access this pocket. This pocket could easily accommodate a pocket watch or small handgun, although immediate access would be difficult if the airman was wearing his float vest and/or flight parachute harness.

On the outside upper left chest, just above this semi-circular pocket, was a sewn-on 2-inch x 2-inch olive drab cotton patch where the wearer could write his name or unit designation.

Under the collar of both styles of flight suit was a button flap that, when the collar was turned up, could be worn in a turtle neck fashion for added warmth.

The two-piece summer issue flight suit had a thin black cloth lining about the waist. The pants portion of the suit had one large

pleated button-down pocket on both sides (at the knee) suitable for carrying folded maps, flight gauntlets or personal items.

The pants were held up by a matching wool gabardine belt, with a black-painted square steel buckle, supported by belt loops at the waist. When worn, the top tunic portion of the flight suit was tucked into the pants. Normally, the top button of the tunic was left undone so that a silk or wool muffler could be exposed.

Sewn individually into the left inside tunic and pants sections of the summer two-piece flight suit was a 2-inch x 2-inch white cotton cloth label. On this cloth label was printed *kanji* that designated the date and location of the issuing naval supply depot, which in many cases was Yokosuka, Sasebo or Kure. Extra columns on the printed label allowed the wearer to add his personal identification.

The majority of naval flight suits did not have a sewn-in manufacturer's label. After examining no less than 50 specimens of various World War Two Japanese Navy flight suits over the years, the author found one 1941 model two-piece summer naval flight suit with a sewn-in maker's label in both the tunic and matching pants. This maker's label was the blue and red eagle logo from the Asahi Aerial Clothing Manufacturing Company, which was also known to make Japanese Naval flight helmets and gauntlets.

The one-piece summer issue flight suit had a black cotton diamond-patterned quilted lining. Sewn into the left inside center section of the one-piece flight suit was the same 2-inch x 2-inch white cotton cloth label bearing the name of the issuing naval supply depot. The summer issue one-piece flight suit had the same pleated knee pockets and matching wool gabardine belt with black-painted steel buckle as the two-piece summer issue flight suit.

The winter issue naval flight suits were only produced in the one-piece style and had heavy cloth insulation under the quilted lining. The winter issue suits were identical to the summer issue suits except for the addition of a rabbit fur collar. The rabbit fur did not extend down past the collar. A centered brass zipper (from waist to neck) was added under the five or six main button front for added closure to the flight suit.

In contrast, the Japanese Army winter flight suits were lighter brown in color and fully lined from the waist up with rabbit or animal fur. The army flight suits did not have sewn-in internal or external labeling like the navy suits, but instead had black *kanji* stamping identifying the issuing army supply depot, with extra columns for the wearer to write his name or air regiment.

It should be noted that neither the navy nor army flight suits were fireproof. There has been speculation that the early flight suits were fire resistant, but no documentation or flight suit internal labeling has supported this conjecture. In addition, former navy pilots commented that during aircraft rescue training drills in the ocean, the winter flight suit, in particular, absorbed so much water that it became heavy, and made swimming almost impossible.

From 1942 to 1945, the navy continued to produce flight suits made of wool gabardine, when available. Lack of materials resulted in production limitations. The pleat in the knee pockets was eliminated. The plastic buttons were switched to wood on the one- and two-piece summer style flight suits. The one-piece winter flight suit kept the wooden

This naval pilot wears the early model naval flight boots which had an upper bell shaped flair for easily tucking in the wearer's pant bottoms, top pull grips for pulling on the boot, and reinforced toecaps. (Shelton Yokomizo)

buttons on the main front, but the sleeve and ankle buttons were switched to aluminum zippers. Worse still, the aluminum zippers often broke after only a few uses. The manufacturers of the summer issue flight suits began to make them out of cotton-silk and cotton-satin materials.

During 1943, the summer suits had a matching belt with steel or plastic belt buckles but, by late 1944, the belt had been reduced to two wrap-around waist ties. The ankle buttons had been eliminated and replaced by two small ties. The internal and external sewn-on cloth labels remained, as well as the tunic's left front semi-circular exterior pocket.

It is interesting to note that pilots of the navy *Kaiten* human torpedo units used the one-piece summer flight suits during their missions.

FLIGHT BOOTS

The Japanese Naval flight boot was unique in design, and unlike any other country's flight boot during World War Two. The naval flight boot was very different from its Japanese Army flight boot counterpart.

In discussion of the naval flight boot, it must be kept in mind that, although the basic design of the boot remained the same from 1936 to 1945, the resource and availability of materials had a significant impact on all modifications.

Early and prewar (1936–39)

The early naval flight boots were brown in color, with an exterior made of a high-quality heavy grade leather cowhide and with a lambskin insole lining. Most of the leather used during this period was confiscated from China, which was occupied by the Japanese military.

(Left) Pair of brown early naval flight boots with pull grips and toecaps. (Right) Later issue black boots with sewn-on green cloth tag for user's name, but no pull grips or toecaps. (Shelton Yokomizo)

The toe of the boot was rounded and had a 2-inch toecap with a decorative hole pattern design at the cap seam. The bottom seam portion of the boot that covered the ankle was rounded at the front (towards the toe), where the left and right halves were joined, with a center seam that extended up to the top of the boot.

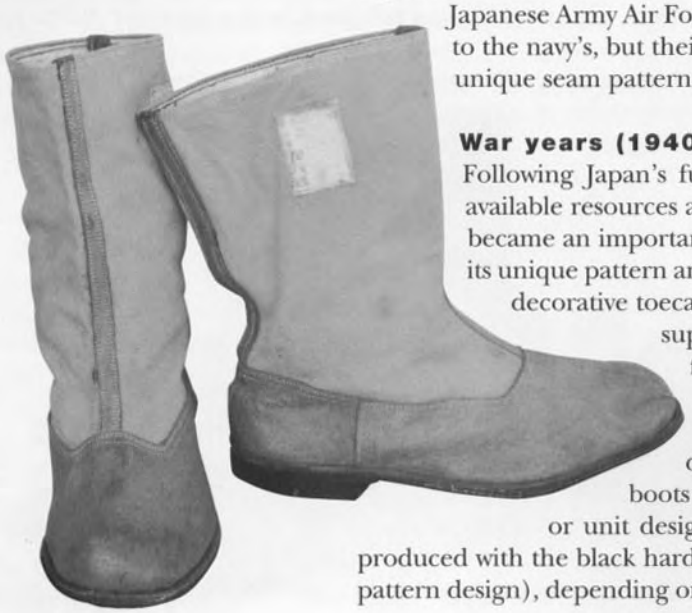
This unique seam pattern is the biggest difference from the Japanese Army flight boot, whose seam pattern was adopted from the Western style boots and used throughout the war.

When viewing either side of the naval flight boot, the top of the boot has a slight flair, much like an upside-down bell shape. This large flair opening enabled the wearer to easily tuck a pant leg into the boot. On the inside and outside top portion of the boot was a 2-inch padded grip that would assist the wearer's fingers to grasp while he put on the boot.

The navy flight boots had a 1-inch x 2-inch exterior olive drab label sewn to the outside ankle position, where the wearer could write his name or unit designation. Inside the boot was a 1-inch x 2-inch sewn-in white cloth label that had printed *kanji* that designated the issuing navy supply depot.

The heels and soles of the naval flight boots were a black hard rubber, molded in a small diamond pattern design. When the author examined several original pairs of naval flight boots, he noticed embossed lettering "L.G.W." on the rubber soles, which could have been the manufacturer's initials. Other than this small indicator on the rubber soles, the naval flight boot did not have a maker's label. The original black hard rubber soles were known not to wear well and would often crack, and needed to be replaced by other materials. It should be noted that the heels and soles of the Japanese Army flight boots were a black hard rubber, but were molded in a suction cup design. This design was clearly different from the design of the naval flight boot. The army flight boot did not have the sewn-on external olive drab cloth label or the internal supply depot labeling.

The naval flight boot came to mid-shin level, while the standard army flight boots were a few inches lower than the knee. Later in the war, the Japanese Army Air Force eventually had a short boot style, similar to the navy's, but their boot did not have the top bell flair or the unique seam pattern of the naval flight boot.



By 1945, Sources of leather in Japan were becoming scarce and although the rubber soles on flight boots remained the same, the bottom portions of the boots were made of black or untanned leather, while the top portions of boots were either yellow-beige or olive drab canvas. (David Johnson)

War years (1940–44)

Following Japan's full involvement in the war in the Pacific, available resources and production time of the navy flight boot became an important issue. Although the navy flight boot kept its unique pattern and design, minor extravagances (such as the decorative toecap, padded grips, and the inside cloth naval supply depot label) were eliminated. The flight boots were now only made with black cowhide leather exteriors, with a white canvas insole lining. The sewn-on olive drab labels remained on the exteriors of the boots so that the wearers could write their name or unit designation. Some flight boots were still being produced with the black hard rubber heels and soles (with the diamond pattern design), depending on the availability of rubber, but a majority of

(Left) The diamond pattern on the hard rubber sole of the naval flight boot. (Right) The circular pattern on the rubber sole of the army flight boot. (Shelton Yokomizo)

the flight boots were being issued with plain leather heels and soles.

Late war years (1944–45)

By 1944, Japan's material resources were spread very thin, not to mention the fact that the people who were once employed in manufacturing were now the actual physical defenders of the Imperial homeland.

The manufacturers of the naval flight boots began to experiment with shark and eel skin leathers, which proved to not wear well for their intended purpose. They began to produce naval flight boots in natural untanned pigskin.

Naval flight boot combinations of black leather cowhide or untanned pigskin bottoms with olive drab canvas tops began to appear until the war's end, still with the unique seam style design. Although the exterior olive drab tags remained, the heels and soles were strictly leather, due to the lack of rubber resources.

Before the end of the war, the Japanese Navy Air Forces suffered many losses of personnel. After the war ended, the surviving navy pilots and flight personnel continued to wear their flight boots as necessary civilian shoes. These shoes eventually became worn and were discarded by most. This accounts for the small numbers of Japanese Navy flight boots in existence today.

FLOAT VESTS

For discussion purposes, the term "Float Vest" has been designated to describe a form of sleeveless jacket, well known in other parts of the world as a life jacket, life preserver or life vest. Each term identifies an article of clothing that is worn on the human upper torso, mostly in an emergency, where it is necessary to keep the body buoyant so that it may float in water.

From the early 1900s, the Japanese military examined other countries' military and civilian flotation devices in order to adapt their own for the large and growing Japanese Naval fleet. They explored certain forms of lightweight woods, bamboo, cork, and combination rubberized canvas materials. Rubber was still in its early stages of development and was not readily available since it was not a common natural resource in Japan.

During the mid-1930s, the Japanese military adopted a high-quality pin cotton cloth material that was sewn into independent tube-shaped chambers. Each individual cloth chamber was filled with "kapok," which is the silky down material that originates from a silk-cotton tree that was an abundant natural resource throughout the East Indies.

The cotton cloth on the float vest was a dark chocolate-brown after manufacture and production. If the vest got wet and then dried, it had an almost dark green appearance.

The navy float vest has an approximately 24-inch long x 3-inch wide groin cloth (nowadays, nicknamed a "diaper") that is sewn to the bottom-rear of the float vest and is suspended between the wearer's legs. At the

forward unattached end of the diaper are two loose 12-inch heavy cotton herringbone twill straps that the wearer secures through two oval-shaped loops (of heavy cotton herringbone twill) sewn in the bottom-front of the vest. The diaper assists the wearer by ensuring that the vest does not slip up, go over his head or fall off.

Along with the straps and loops securing the diaper, the float vest is secured on the outside by two approximately 24-inch x 1-inch left and right straps (of heavy cotton herringbone twill) that come from behind at waist level and which the wearer secures in front. In addition, four 3-inch cotton tie straps, placed on two left and right positions on the chest, secure the top portion of the vest to the wearer. For production purposes, the vest was "one size fits all," and the wearer could adjust it by the way he tied the various straps.

Although the Japanese Navy and Army float vests are similar in design, the army float vest used a shorter, approximately 8-inch, diaper secured by several heavy duty cotton herringbone twill straps in front.

The navy and army float vests have different characteristics, as will be discussed below. There are also many differences that depend on whether the float vest was made early in the war, or late in the war when the float vest fell victim to the shortage of materials and the strains of shorter production times. The float vests for both services were manufactured under navy or army supply depots and no private Japanese contractors were used. Therefore, no private trademark labels appear on the garments.

Navy float vest (1937–42)

Characteristic features of the early naval float vest are as follows:

Number of kapok chambers A total of 22 independent tube-shaped chambers. The left and right front sides of the vest are divided into two rows of cloth chambers: four long (waist area) and three short (upper-chest area), totaling seven chambers on each side. On the back of the vest is one row of eight long cloth chambers.

Snap pocket An approximately 2½-inch x 3-inch top-snapped pocket with a metal circle rivet drain (on the bottom) is sewn on the right side of the vest. This pocket was commonly used to carry a pencil, pen or pocket watch.

Large sewn-on label On the back of the float vest is an approximately 3½-inch x 9-inch olive drab cotton sewn-on cloth patch, where the wearer could write his name or unit designation number.

Sewn-in issue label On the inside right section of the float vest is a 2-inch x 2½-inch white cotton sewn-in cloth label with printed *kanji* nomenclature that designates the date and location of the garment manufacturer. Extra columns on the printed label allow the wearer to add his additional personal identification.

Navy float vest (1943–45)

Although the navy's float vest remained the same in design throughout the war, the following minor changes were made because of material shortages and lack of production time:

Number of kapok chambers A total of 22 independent tube-shaped chambers. The left and right front sides of the vest are divided into two rows of cloth chambers: four long (waist area) and three short (upper-chest area), totaling seven chambers on each side.

On the back of the vest is one row of eight long cloth chambers.
No snap pocket Discontinued because it was unnecessary and lengthened production time.
Small sewn-on label On the back of the float vest, the olive drab patch was reduced in size to approximately 3 inches x 3½ inches, where the wearer could still place his name or unit designation number. The label was smaller due to shortages of material.
Sewn-in issue label Remained unchanged.

Navy float vest (1945)

Because of extreme material shortages and lack of production time, a limited number of last-ditch navy float vests were made:
Number of kapok chambers A total of 16 independent tube-shaped chambers. The front left and right sides of the vest are divided into four long cloth chambers on each side, totaling eight on the front. On the back of the vest is one row of eight long cloth chambers.
No snap pocket Discontinued because it was unnecessary and lengthened production time.
Small sewn-on label On the back of the float vest, the olive drab patch was reduced in size to approximately 3 inches x 3½ inches, where the wearer could still write his name or unit designation number. The label was smaller due to shortages of material.
Sewn-in issue label Remained unchanged.

Army float vest (1939–45)

During the beginning of the war with China, the Japanese Army Air Force flew largely from land-based sites towards land-based targets. As there were no large expanses of water to fly over, the float vest was rarely issued to army flight personnel. The army float vest became more actively used during the later part of the Pacific Campaign (1943–45), when the Japanese Army Air Force was participating in the island and Japan home defense engagements. Characteristic features of the army float vest are as follows:
Number of kapok chambers A total of 34 independent tube-shaped chambers. The left and right front sides of the vest are divided into three rows of cloth chambers: five long (waist area), three short (stomach area), and three short (upper-chest area), totaling 11 chambers on each side. On the back of the vest are two rows of cloth chambers: four chambers at the top and eight beneath them.
Float flag pocket An upside-down "L" shaped pocket sewn on the outside front-right section of the float vest is used to store an emergency-rescue flag with pole. The white silk flag bears the red centered *hinomaru* of the Japanese National symbol, and measures, unfolded, approximately 18 inches x 24 inches. Along the entire bordered edge of the flag is a sewn-in seam filled with kapok. Several ties attach the flag to an unfolding section of six telescope style bamboo poles. This flag was to be used by army flight personnel if they needed to be rescued. Either the flag could be waved, with the assistance of the pole, or the flag could float on water, assisted by its kapok-filled edges.
Shark attack prevention cloth An approximately 8-foot long x 3-inch wide red cloth is sewn into the inside of a 3½-inch button-flapped

An unusual image of a naval paratrooper, c.1942, wearing an early model navy pilot's float vest (without the diaper) and a pair of summer flight gauntlets; the float vest was not standard issue paratrooper equipment. (Andrew Bolland)

pocket located near the buttocks section of the diaper. At the long end of the red cloth are three sewn-in lead weights. When not in use, the red cloth is rolled up tightly in the pocket. When the wearer unbuttons the pocket, the red cloth is deployed, assisted by the lead weights.

No sewn-in issue label Although the navy float vest had a sewn-in issue label as described previously, the army vest had a series of *kanji* stamps printed on the inside left-front section of the vest. Within the column of *kanji* was a location where the wearer could write personal identification.

No sewn-on label Unlike the navy float vest, the army vest did not have a sewn-on exterior label. However, this did not prevent army flight personnel from writing their name or unit number on the vest itself.

The Japanese Navy Air Forces did not adopt the army emergency rescue flag with pole or the shark attack prevention cloth. There has been speculation that the shark attack prevention cloth was treated with a chemical that allegedly repelled a shark from coming close to the user, but that rumor has been neither confirmed nor denied. There is no further evidence to prove that the shark attack prevention cloth actually worked.

In discussion with former Japanese Navy pilots about their use of the float vest, it was noted that the float vest initially worked well if it was in water for only one or two hours. However, the float vest became almost useless after four hours, and started sinking when the kapok absorbed too much water, and there were no longer any air pockets.

Another interesting fact emerged in a 1992 letter from a former navy lieutenant, Yutaka Morioka of the 302nd *Kokutai* at Atsugi. He recalled, "We used the float jackets as protection against shrapnel..." This statement is supported by photographs of naval flight personnel working and at leisure in their float vests. It is important to add that the float vest would add a false sense of security because in a serious close-up explosion, shrapnel particles would penetrate what was basically only padded cloth.

On February 17, 1945 CPO Takashi Yamazaki was a member of a fighter group composed of about ten Zeros, *Shiden-Kais* (N1K2-J) and *Raidens* (J2M) from Yokosuka Kokutai Fighter Group under the command of Lt. Cdr. Masanobu Ibusuki, Lt. Yuzo Tsukamoto and Lt. Shigehisa Yamamoto. That afternoon they took off in snowy weather and surprise-attacked 19 US F6Fs and F4Us assembling over Atsugi, shooting down all the enemy fighters. During this action, CPO Yamazaki was hit and parachuted out, but Japanese civilians mistook him for an enemy pilot and beat him to death. Although there is no evidence of a special military directive, Japanese Navy and Army flight personnel began wearing the *hinomaru* (red sun symbol of the Japanese national flag) on their flight suit sleeves and on obvious locations on the float vests.

GAUNTLETS AND GLOVES

The glove known as the "Gauntlet" has a fine warrior reputation that dates back to the 15th-century English and French military, as well as to the American Civil War (in the 1860s), when it was used by the cavalry. Whether this influence had anything to do with the Japanese Navy adopting the gauntlet for their flight and paratrooper personnel will probably never be known. In any event, what better article of

clothing could have been deployed to such comrades-in-arms? It should be noted that the Japanese Army did not adopt the gauntlet style of glove for their flight personnel.

The Japanese Naval flight gauntlet extended above the wearer's wrist and protected the exposed area, from the hand to the cuff of the long sleeves of the flight suit, from the elements.

The gauntlet was issued for both summer and winter use. The main difference in the winter gauntlet was the addition of animal fur to the inside of the glove, for added warmth. Animal furs such as rabbit, goat, sheep, and horse were commonly used to insulate the inside of the gloves. By early 1945, until the end of the war in August, man-made synthetic materials began to appear, largely due to the shortage of animal furs.

The front five-finger glove section of the gauntlet was made of high quality deer hide suede, which was tanned into three different colors: light beige, medium brown, and dark brown. Deer hide was used largely because it was an abundant resource in Japan. Deer hide could also be manufactured thin enough as a suede material and thus offered greater elasticity. This thin lightweight material enabled the gauntlet wearer's fingers to be flexible enough to perform small intricate tasks such as writing or winding a watch.

The top portion of glove that extended beyond the wrist was made of heavy brown cowhide leather, that was double sided and over-sewn with thread reinforcement for added strength. Again, by early 1945 until the end of the war, due to material shortages, synthetic or composite materials replaced the cowhide leather and thus appeared on the top portions of the gauntlets. An olive drab heavy cotton cloth label measuring 2½ inches x 1½ inches was sewn to the outside top center section of the gauntlet, where the wearer could write his name or unit designation.

The gauntlet was tightened and secured by a 6-inch cotton-silk strap just above the wrist. This strap was doubled through a sewn-on brass ring grommet (on the outer side of the wrist) and snapped at the inner wrist position. The snap itself was a unique ½-inch round in size. These same unique snaps also appeared on the earflaps of the early navy flight helmets.

On the inside top section of the gauntlet was a 1-inch x 2-inch white cotton sewn-in cloth label with printed *kanji* that designated the date and location of the issuing naval supply depot, which in many cases was Yokosuka, Sasebo or Kure. Extra columns on the printed label allowed the wearer to add his personal information.

(From left) Front and back of the summer naval flight gauntlets; winter gauntlet showing interior upper fur portion with the naval supply depot and manufacturer (Kawai Mfg Co.) labeling; back of winter gauntlet.

A member of the 302nd *Chutai* at Kisarazu Air Base, Japan, wearing an electrically heated glove while simulating the flight of a US B-29 bomber. The 302nd *Chutai* guarded the Imperial Capital against B-29 attacks and also fought over Okinawa. (Yutaka Morioka)

The Japanese Navy appointed independent civilian contractors to manufacture the flight gauntlets to strict military specifications. To be selected for such a task was a great honor, as well as a patriotic duty in the time of war. Many of these selected manufacturers were in the clothing business prior to the war, and were accustomed to making western style leather products such as hats, purses, and gloves. This is particularly apparent when the company label is written in English. Each manufacturer attached their own company label, which was sewn into the left gauntlet, immediately adjacent to the white cloth naval supply depot issue label described above.

Some of the Japanese civilian manufacturers are listed below:
Nagata & Co. (Kojimachi, Tokyo)
Asahi Aerial Clothing Manufacturing Co.
Yaguchi Industry Co. Ltd
Goni Leather and Hides Co.
Iida & Takashimaya Co.
Kawai Manufacturing Co. Ltd

Interestingly, the Nagata Shoten's company trademark is a smiling face rising sun, which would be considered a very unusual display for wartime, let alone for the serious Japanese demeanor. It is also interesting to note that the Takashimaya Co. is still in the clothing business today.

Electrically heated gloves

During the early part of 1942, the Mitsubishi Manufacturing Co. produced electrically heated gloves that were designed and designated for use by flight personnel of high-altitude bombers. The gloves consisted of a cotton-silk or wool gabardine (with a wool elastic wrist-band) material filled with small wire filaments that joined to a black wire cable attached to leather-wrapped double male snaps. The double male snaps plugged into an electrically heated undergarment flight suit that could also accommodate electrically heated booties, flight helmet, and goggles. A master electrical plug attached the flight suit to a panel socket in the aircraft.

Although the concept was good, naval flight personnel complained that the electrically heated garments became too hot in some areas of the clothing or, in other cases, did not function properly due to broken wires.

FLIGHT HARNESSES AND PARACHUTES

Between 1939 and 1945, most Japanese naval parachutes and harnesses were manufactured by Fujikura Aircraft Industry Co. Ltd, the predecessor of the current Fujikura Aviation Equipment Corporation. During World War Two, the Fujikura plant assigned to produce naval parachutes was located at Ebara, Shinagawa-ku, Tokyo, which is the location of the current headquarters of the Fujikura Aviation Equipment Corporation. There was also an Oji factory, located at Oji, Kita-ku, Tokyo and three other plants whose locations are not known exactly.

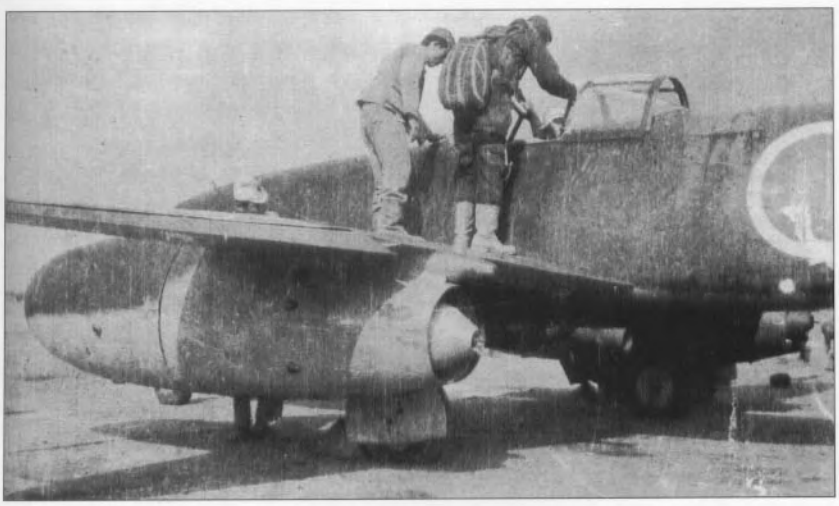
Another manufacturer of parachutes and harnesses was the Mitsubishi Denki Co. Ltd, located at Mishuku, Setagaya-ku, Tokyo. The Fujikura plant assigned to produce army harnesses and parachutes was located at Honjou Fukagawa, Koto-ku, Tokyo. There was also a parachute research center, located at Nihonbashi, Chuo-ku, Tokyo.

After the war, Fujikura Aircraft Industry Co. Ltd, became Fuji Sangyo Co. Ltd. Between 1945 and 1950, the parachute section was discontinued and only civilian products were produced and sold. Business consisted of producing dyed silk stockings, insoles for shoes, tricot synthetic materials, and the insulation for wire cables.

The Korean War started (1950) and production of special orders and repairs began. Parachutes for flare bombs were produced for export and US G-8 and G-9 parachutes were repaired. Between 1952 and 1953, large-sized US military parachutes, such as the A-5 and G-12, were repaired.

During 1954, the company produced and sold parachutes for *Hoan-Tai*, which was the old name for Japan's Self-Defense Forces. From 1955 through to 1959, the company produced and sold parachutes for the Self-Defense Forces' air crew.

From 1959 to the present, the company's name has been Fujikura Koso Kabushiki Kaisha (Fujikura Parachute Co. Ltd), again located at Ebara, Shinagawa-ku, Tokyo. On October 18, 1989 the parachute



Navy pilot (right) boarding a *Karyu* (Ki-201) experimental jet on August 11, 1945. He is wearing a navy Type 0 (Model 1) fighter pilot parachute with harness. This "Turtle" back pack style parachute could not be removed from the harness and began to be widely used in the A6M5c Zero aircraft. (Saburo Sakai)

section of the company became independent from Fujikura Kogyo Kabushikigaisha (Fujikura Rubber Industry Company), which is located at Gotanda, Tokyo.

The Japanese Naval and Army flight parachute harnesses are dark green in color, and made of a tight-weave combination of cotton and silk webbed material. In 1939, the army used some orange harnesses for a short period. These were believed to be for training purposes only.

The harnesses made prior to 1940 had sewn-in nickel-plated steel buckles, central quick-release devices and "D" ring components. Because of the steel, these metal components were heavier in weight and were prone to rust.

After 1940, the metal components were made of aluminum, which was lighter in weight and less corrosive. Most of the metal components were stamped with either an anchor (navy) or a circled star (army).

Sewn to the bottom, inside-rear (seat position) of all flight harnesses, is a 3-inch white cotton label that has a printed *kanji* nomenclature that indicates the parachute harness type, production serial number, date of manufacture, and the manufacturing company. An anchor or circled star stamp is present; this indicates the military branch of the service. An example translated into English is shown below.

Type	Special Type 97 Parachute (Type 2)
Manufacture. Number	1591039 (Navy Anchor or Army Star)
Date of Manufacture	16.3.5 (Showa 1941.March.5th day)
Name of Manufacturer	Fujikura Aircraft Industry Co. Ltd

The naval parachute silk is folded tightly into a cotton canvas pack bound together with a series of hook-ended bungee cords. The naval parachute pack is dark green like the harness, and the edges are trimmed with bright orange piping. The army parachute pack is bright orange and the edges are trimmed with dark green piping.

On every parachute pack is a 1½-inch x 3½-inch sewn-on pocket with edges trimmed in orange or green piping, depending on the branch of the military service (navy or army), as described above. Inside this pocket is a paper card that is used to record each date the parachute was re-packed and by whom. On the outside of the sewn-on pocket is printed *kanji*, shown translated into English in the example below.

A Type 97 parachute issue label. For a full translation see main text above.

C	– [printed in red]
A	PARACHUTE
U	MUST BE
T	FOLDED
I	ONCE EVERY
O	MONTH
N	

All navy parachutes were supplied with a large

(suitcase-sized) dark green canvas (two-handled) storage bag. On one side of the canvas storage bag was a 5-inch x 5-inch white sewn-on (anchor-marked) cloth label that had the same information as the corresponding matching harness label. The army parachute storage bags were initially orange canvas up until late 1942, when they were changed to beige or olive drab until the end of the war. The army canvas bag had the same labeling as described for the navy style, except for the army circled star markings.

Naval flight personnel used the following three types of harnesses with parachutes: the Type 97, the Type 89 (Model 3), and the Type 0 (Model 1).

Naval paratrooper personnel used the Type 92 Model harness with their parachutes. The Type 92 Model will be discussed later in this chapter to identify how it differed from the flight-related parachutes. All four of the harnesses mentioned above used the same metal center quick-release device. However, each harness had a different unique combination of "D" rings or related restraints, as described below.

The "Caution" tag that was on all navy and army parachute packs. The parachute's packing history card was stored under this label. For a full translation, see page 24.

Type 97

The Type 97 was the most widely used parachute harness in the war, and is commonly identified as the "Fighter Pilot harness." It had a removable seat pack parachute that was manually deployed, and opened in 2½ seconds. Most pilots in single-seat Japanese aircraft used the Type 97.

The Type 97 flight harness had the following characteristics:

- Metal center quick-release device
- Front left and right "D" rings, located at the same level as the wearer's lower rib cage, where the seat pack could be attached
- Green cotton quilted back pad to keep the harness straps in place
- Square metal nickel-plated slot on the upper left harness strap, where the seat pack parachute rip cord device was snapped into position

The Type 97 parachute pack acted as an aircraft seat cushion during flight as well as a parachute. Up until late 1942, the Japanese A6M2, Model 21 Zero, was fitted with an aluminum bucket seat that the parachute pack would fit into. A straw-filled combination green canvas with brown velveteen seat cushion snapped on to the parachute pack for added seat padding.

The Type 97 was a favorite parachute harness, used by both navy and army fighter pilots throughout the war because the parachute pack could be removed simply by detaching the two spring-loaded hook straps from the two described rib-location "D" rings. Therefore, the parachute pack could remain in the aircraft bucket seat, while the pilot wore the harness comfortably while on stand-by.

According to former navy pilot, Saburo Sakai, because of the success rate of the A6M fighters against enemy aircraft in the early part of the war, a few pilots became over confident. While flying their aircraft, they never attached the two spring-loaded hook straps to their harness "D" rings, assuming that they could attach them during flight if the need arose. The result in some of these cases was that the pilot was either so badly wounded or so panic stricken that he could not attach the

components necessary to bail out of the aircraft. Sakai said that this theory was verified when ground crew examined the remains of pilots with their crashed aircraft, and found that the hooks were not attached to the "D" rings of the harness.

Sakai further mentioned that during a long four or five hour flight, the pilot's bladder would fill. The situation might be made worse by a possible dogfight with enemy aircraft. Because of the G forces in flight, coupled with a full bladder, some pilots urinated in their flight suits, and the urine would leak into the parachute seat pack. Upon return to the base, the parachute pack was opened, air dried and repacked by ground crew.

On a similar note, former navy pilot Masahiro Mitsuda said that some inexperienced pilots would urinate from fright when they saw enemy fighters. Mitsuda said that the parachute packs would be left in the seat of the aircraft after landing and would become useless because the urine would rot the silk.

Type 89 (Model 3)

The Type 89, commonly referred to as the "Air Crew or Flight Observers' harness," with its parachute, was used in multi-personnel naval aircraft, such as the Kate (B5N) torpedo bomber, or medium bomber aircraft, such as the Betty (G4M). The Type 89 parachute was also removable and separate from the flight harness. The parachute was tightly packed in a briefcase-sized (approx. 15 inches x 12 inches) dark green canvas pack with orange piping trim edges bound together by hook-ended bungee cords.

This parachute was manually deployed, and opened in 3½ seconds.

The Type 89 flight harness had the following characteristics:

- Metal center quick-release device
- No front "D" rings
- No quilted back pad
- The harness straps crossed high on the wearer's back and were joined with a triangular-shaped ring (not "D" shaped)

Attached to the triangular-shaped ring is a fixed 3-foot wire cable. On the opposite loose end of the wire cable is a spring-loaded hook. This hook, when not in use, was holstered in a combination canvas-front leather-backed pouch. The pouch is attached to the lower left front of the harness in alignment with the wearer's elbow and forearm. When in use, this cable was hooked to a briefcase-sized parachute pack, as described above.

Type 0 (Model 1)

In late 1942, the improvements to the Japanese A6M2 Zero led to the modified A6M5c aircraft, Model 52c. One obvious modification in the cockpit of the A6M5 was the changing of the aluminum bucket seat to a backless bucket style seat. With this change, the Type 97 harness and

This naval flight cadet is wearing a navy Type 89 (Model 3) "Air crew or flight observers' harness" with the metal static line looped on his right shoulder and a quick release hook holstered in the combination canvas-front leather-backed pouch attached to his lower left side. (Gary Nila)

parachute became obsolete for use in this aircraft and was completely changed to the Type 0 design. The Type 0 was a one-piece harness with an attached non-removable parachute pack that hung at the wearer's lower back, above the buttocks. Often referred to as a "Turtle" pack, the Type 0 was manually deployed and opened in 2½ seconds.

The Type 0 flight harness had the following characteristics:

- Metal center quick-release device
- No front "D" rings
- A green or dark brown cotton quilted back pad to keep the harness straps in place
- The rip cord came out of the top of the parachute pack and ran up and over the wearer's left shoulder, attaching to the harness at the left front upper shoulder
- The rip cord handle was a large red-painted metal (hand-sized) "D" ring secured in a combination canvas and leather pouch

The parachute pack of the Type 0 fitted into the aluminum back of the bucket seat in the cockpit, where the pack acted as a backrest when in flight. Although the Type 0 harness was more confining than the Type 97, the modified design increased the odds that a pilot could bail out of the aircraft safely.

Type 92 (Paratrooper)

Nowadays, the Type 92 parachute with harness is often mistakenly thought to have been used by pilots or flight crews. In fact, the Type 92 was used specifically by navy and army paratrooper assault troops jumping from transport aircraft. Again, the navy and army Type 92 harnesses were dark green web, similar to the flight-related styles. The naval parachutes were dark green canvas with edges trimmed with orange piping, while the army parachutes remained orange canvas with edges trimmed with green piping. The Type 92 also had a front auxiliary reserve parachute.

The Type 92 paratrooper harness had the following characteristics:

- Metal center quick-release device
- Front left and right "D" rings located at the wearer's shoulder level where the Model 4 auxiliary reserve parachute pack could be attached to the front of the chest
- No quilted back pad
- The harness straps crossed high on the wearer's back and were joined with a "D" ring (not triangular like the Type 89)
- The rip cord came out of the top of the parachute pack and ran up and over the wearer's left shoulder, attaching to the harness at the left front upper shoulder
- The rip cord handle was a large red-painted metal (hand-sized) "D" ring secured in a combination canvas and leather pouch

This picture taken c.1942 shows a naval officer wearing a Type 92 paratrooper harness (with non-removable back pack parachute) with "D" rings on the front left and right shoulder, where the Model 4 auxiliary reserve parachute pack attaches. He wears the navy pilot's style (loops and bars) commander rank insignia. (Andrew Bolland)

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- Metal center quick-release device
- No front "D" rings
- A green or dark brown cotton quilted back pad to keep the harness straps in place
- The rip cord came out of the top of the parachute pack and ran up and over the wearer's left shoulder, attaching to the harness at the left front upper shoulder
- The rip cord handle was a large red-painted metal (hand-sized) "D" ring secured in a combination canvas and leather pouch

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Five styles of timepieces manufactured by Seikosha: (Top left) Stopwatch (navy marked casing, not on photograph) (Bottom left) Pocket watch (with black army aircraft style clock face) (Center) Standard naval wristwatch (navy anchor mark on face) (Top right) Pocket watch (navy marked casing, not on photograph) (Bottom right) Standard navy or army pilot's flight watch. Note the size difference between this and the standard naval wristwatch.

The parachute back pack was non-removable and was secured to the rear "D" ring. In modern times, some Type 92 navy and army harnesses have surfaced without the rear parachute packs, giving the impression that they are flight-related harnesses. Again, distinguishing features are the two front "D" rings at the shoulder position and the rear "D" ring at the high back crossed straps, that separate the paratrooper from the flight harnesses.

FLIGHT WATCHES AND CLOCKS

Time played an important role in the military life of World War Two, as well as in civilian life. Each country – Britain, Germany, Japan, and the United States – had its own variations of flight timepieces, which were all similar in design. The Japanese timepieces primarily bore the manufacturer's name of "SEIKOSHA," which is related to the current Seiko Company Ltd. Timepieces from Swiss and German manufacturers were also used by Japanese flight personnel and were subsequently engraved with their names and/or unit numbers on the case assemblies.

Japanese Navy and Army flight personnel used the following four types of timepieces: wristwatches, pocket watches, stopwatches, and aircraft clocks.

Wristwatches

Flight wristwatches had the following characteristics:

- Primarily manufactured by Seikosha Company Ltd.
- Nickel-plated or other polished metal bodies
- Exposed crystal
- Bezel rotating rim, marking 5-minute increments up to, or including, 60 minutes
- Arabic numerals with large illuminated numbers: 3, 6, 9 and 12 on a black face
- Approximately 2 inches in diameter
- Approximately 3 ounces in weight

These wristwatches normally had two long leather (cowhide or pigskin) wrist straps that were long enough for flight personnel to fasten over their forearm, over the sleeve of their sometimes-bulky flight suits.

These watches were normally not marked with an anchor (navy) or star (army) for either air service, and both types of flight personnel used the same style of watch. In some cases, these wristwatches were issued to flight personnel, and the issuing air service serial numbers were engraved on the back case assembly. Also, many of the wristwatches were privately purchased and so would not have these numbers.

When current watch repair experts looked at the wristwatches' internal movements they discovered that, although these watches were excellently made for the period, they were not shockproof or waterproof. As a result, the watches would stop if they were dropped or roughly treated. Each had a large winding button (or crown), which was easy for the user to turn when wearing gloves or gauntlets.

Pocket watches

Pocket watches had the following characteristics:

- Primarily manufactured by Seikosha Company Ltd.
- Nickel-plated or other polished metal bodies
- Exposed crystal
- Arabic numerals; some illuminated with white radium[1] paint
- Illuminated dots by each number
- Approximately 2½ inches in diameter
- Approximately 3 ounces in weight

The pocket watch is more formal in appearance than the wristwatch. The faces are normally white or black and the numbers are large. On some black-faced pocket watches, the numbers are painted with white radium, for visibility at night. The numbers on the white-faced pocket watches are not illuminated. Instead, illuminated dots are placed near the numbers, and the numbers cannot be seen in the dark. These watches also have variations in seconds hands, pace counters, or built-in stopwatch capabilities. The users often attached a silk parachute cord to the watch, and would wear the watch around their necks. Otherwise, a watch chain or watch fob was used.

Pocket watches like these were not issued. They were considered luxury items and were usually purchased privately. Many naval pilots would receive these watches from friends and family after graduating from flight school.

Pocket watch fobs were normally privately purchased or given as a family gift after graduation from an advanced specialty school. (Right) A watch fob from an Advanced Aviation Mechanics school. (Left) A watch fob from an Advanced Aviation Torpedo school.

Stopwatches

The term "stopwatch" is used to designate an instrument provided with a seconds hand and a

1 Japanese aircraft instruments that included clocks were illuminated with radium. During a study performed by the author during January 1993, several pre-1940 clocks were measured with Geiger counters, which produced readings of between 5 and 8 milliroentgens (mR). On the same note, several post-1940 clocks measured between 2 and 5 mR. The average modern-day color television measures between 2 and 3 milliroentgens. Caution should be used when handling World War Two instruments from any country, and precautions should be taken not to breathe or ingest radioactive dust. Only knowledgeable and qualified repair personnel should repair or disassemble World War Two aircraft instruments.

Photograph of a young aviator wearing a late war summer flight suit, gauntlets, and a winter flight helmet. He is also wearing a Naval Aircraft clock suspended around his neck with red silk parachute cord; the Naval Aircraft clock was not an issued item. (Henry Sakaida)

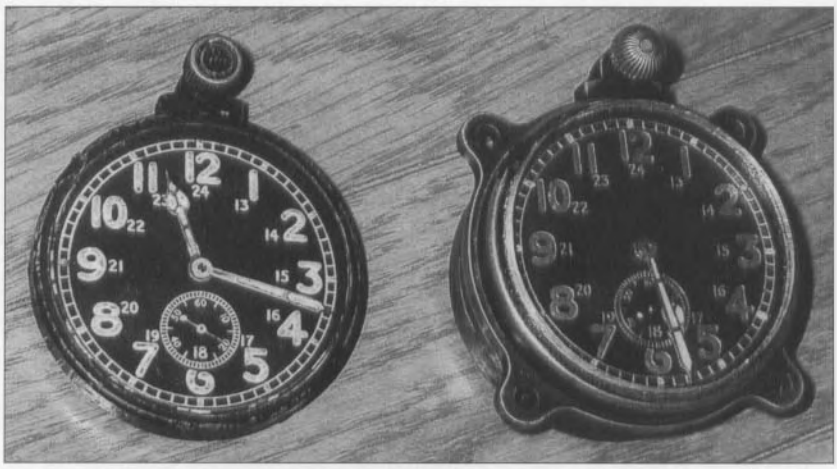
mechanism for instantly starting and stopping the watch at will. Although some time-keeping pocket watches had built-in stopwatch capabilities, some flight personnel – those who were responsible for navigational, attack coordination, or torpedo/bombing calculations – needed time-pieces that could be used specifically for the task at hand. Some stopwatches were issued, and their cases were engraved with serial numbers and had navy or army designation markings.

Stopwatches without serial numbers appear to have been privately purchased. Most stopwatches were finished in polished metal and had white faces. They had large numbers in increments of five and were not illuminated. Their weights and measurements were similar to those of the pocket watches. They had large winding buttons, and were usually hung around the user's neck with silk parachute cord.

Aircraft clocks

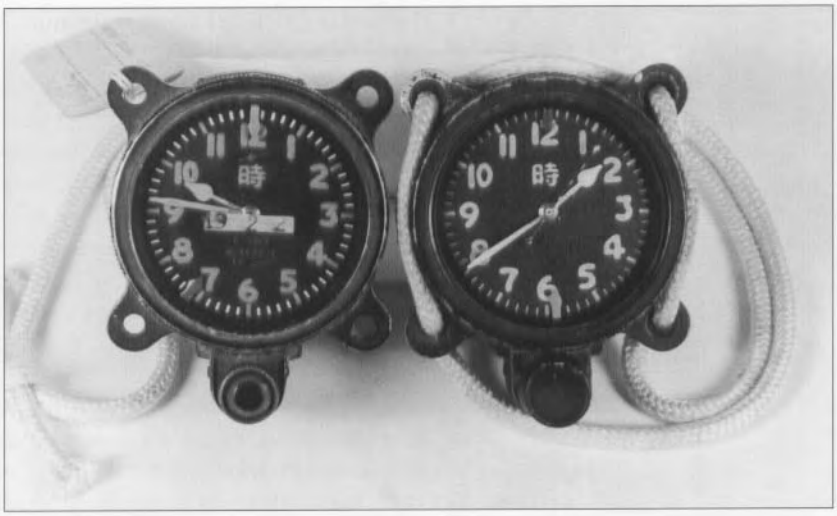
Aircraft clocks had the following characteristics:

- Primarily manufactured by Seikosha Company Ltd.
- Pre-1940 style: heavy brass block metal case assembly and exterior components
- 1941–45 style: light aluminum block metal case assembly
- Rotating rim with red, blue, and green arrows for marking time
- Large Arabic numerals illuminated by radium[1]
- Four cornered screw hole emplacements for fastening to the aircraft's instrument panel
- Large brass winding button (pre-1940)
- Large light aluminum alloy or Bakelite winding button (1941–45)



Two styles of the early model brass Naval Aircraft clocks manufactured by Seikosha. These are extremely rare nowadays, as very few survived the war. (Kazuo Shiba)

1 See footnote on page 29.



Two periods of the Army Aircraft clocks. (left) Pre-1940 clock with heavy brass casing and winding button. (*Dave Hooker*) (right) 1941-45 lightweight aluminum casing with Bakelite winding button. (Gary Nila)

- Size: 2½ inches x 1 inch
- Weight: 5 ounces (pre-1940)
- Weight: 3 ounces (post-1940)

Clocks similar to those described were installed in the instrument panels of most Japanese aircraft. Nowadays, these clocks are referred to as "Zero clocks." In fact, most aircraft instrument clocks that survived World War Two did not come from the A6M Zero fighters. "Zero" is an American term used to refer to the aircraft known to the Japanese as the *Rei Sentoki* (Zero Fighter), contracted to *Reisen*. The American code name for the aircraft was Zeke.

A veteran pilot wearing his pocket watch suspended with silk parachute cord. After February 17, 1945, pilots began wearing the red *hinomaru* on their flight uniforms so that the Japanese population would not mistake them as the "enemy" if they crash-landed on the home front. (Yutaka Morioka)

Aircraft instrument clocks, like all Japanese aircraft instruments, had manufacturing specification data plates that were fixed to the outside of the clock's body. These data plates indicated the type of clock, date of manufacture, serial number, and air service designation.

Most specification data plates, when examined through a magnifier, are seen to bear the navy anchor or army star. On some clocks, the military designation stamp is on the face, nearest the number 6.

There has been speculation that an army clock's winding button is located at the 6 o'clock position and a navy clock's winding button is located at the 12 o'clock position. Examination of numerous aircraft clocks has disproved this theory.

In this section, reference is made to pre-1940 clocks versus 1941–45 clocks. This distinction is based on the fact that brass-bodied clocks were dated as early as 1936 and as late as 1939. They are heavier in weight and have a yellow-gold appearance covered by black paint, which rubs off easily with use. The winding button and the specification data plates are brass as well. Overall, the clock looks sturdy and well made.

The 1941–45 clocks have aluminum bodies, with a Bakelite or light aluminum alloy winding button and aluminum specification data plates. They are painted in dull black, and if the paint is removed, the clock becomes a dull gray metal color.

A piece of silk parachute cord was commonly interwoven through the screw hole emplacements, and the user wore the clock upside down, making the clock visually correct when the wearer looked down for the time.

Many army flight personnel removed the instrument panel clocks from army aircraft, and they wore the clocks suspended by silk parachute cord around their necks. This is one reason why army-designated clocks are currently more generally available.

Japanese Naval pilots were trained to fly using their aircraft flight instruments because they flew over large expanses of water. Army pilots, on the other hand, although trained to fly with instruments, largely flew by visual landmarks or coastline observations (pilotage). Because aircraft instruments in naval aircraft were synchronized in the instrument panel, all instruments had to be in place. Removing an instrument could alter the readings of the other flight instruments, even though the aircraft panel clock was wound and operated independently.

Discipline also varied between the two air services in that removing the clock from a naval aircraft was considered theft and could result in severe punishment.

FLIGHT INSIGNIA

1920–30 Insignia

Since the early 1900s, the Japanese Navy has been greatly influenced by the British Navy. Between 1920 and 1930, Japanese Navy sailors wore high-quality dark blue or black 3-inch wool round rating insignia on the sleeves of their winter service dress uniforms. The term "round rating" refers to the round shape of the patch and to the service rank.

These insignia were hand made and identified the sailor's specialty and/or proficiency (e.g. gunnery, paymaster, or pilot etc.) by a tightly woven gold-colored wire symbol. On the back of the insignia were four (black-painted) sewn-on metal eye clips so that the round rating could be tack-sewn on to the uniform. During this period, the tallies of the sailor's flat cap, more commonly known as the 'Donald Duck' cap, were woven in gold-colored wire as well, and *kanji* characters identified the name of the ship in which the sailor was assigned. Examples of these early round rating insignia (such as pilot, observer, and aviation mechanic) have been found in modern times.

1930s Insignia

During the 1930s, the gold wire style insignia was replaced with three styles of cloth round rating insignia. They can be summarized as follows:

(1) Red felt symbol on dark navy blue wool round rating patch (red on blue)
(2) Dark blue or black felt symbol on white cotton round rating patch (black on white)
(3) Red felt symbol on green cotton round rating patch (red on green)

(continued on page 41)

SUMMER FLIGHT DRESS, 1937–42

1: Chief petty officer in summer flight dress

2: Rear view of Chief petty officer in summer flight dress

3: Chief petty officer in summer flight dress with plotting board

1

2

3

1

2

3

4

5

6

7

TYPE 97 FIGHTER PILOT PARACHUTE HARNESS

1: Lieutenant-JG wearing Type 97 harness

2: Lieutenant-JG wearing Type 97 harness

3: Lieutenant-JG wearing Type 97 harness and parachute seat pack

4–7: See text for details

1

2

3

WINTER FLIGHT DRESS, TYPE 89 HARNESS AND TYPE 0 (MODEL 1) HARNESS

1: Lieutenant-JG in winter flight dress, 1940–45

2: Fighter pilot, 1942–45

3: Chief petty officer

4–6: See text for details

4

5

6

NAVAL AVIATION BRANCH INSIGNIA, 1930–41

See text for details

1

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

Rear-Admiral

Captain

Commander

Lieutenant-Commander

Lieutenant

Lieutenant-JG (Junior Grade)

Engineering Ensign
(the three cherry blossoms would be brass)

Ensign

Midshipman

Warrant Officer
(the three cherry blossoms would be brass)

NAVAL FLIGHT INSIGNIA,
1934–45

Chief Petty Officer

Petty Officer First Class

Petty Officer Second Class

Leading Seaman

Seaman First Class

Seaman Second Class

NAVAL INSIGNIA, 1942–45 AND PROFICIENCY/SPECIALTY SERVICE COLORS

Able Seaman

F8: Seaman
F9: Medical
F10 Paymaster
F11: Bandsman
F12: Engineering
F13: Ground Crew
F14: Aviation
F15: Construction
F16: Mechanic

1

2

3

SUMMER AND
TROPICAL DRESS

1: Naval ensign, Flight Medical Corp, in tropical service dress

2: Flight lieutenant in summer tropical shirt and shorts dress

3: Lieutenant in a variation of the summer uniform with flight equipment

KAMIKAZE PILOTS, 1945

1: *Kamikaze* pilot preparing for a mission
2: *Kamikaze* pilot
3: Young *kamikaze* pilot
4: Officer assisting a young *kamikaze* pilot

1

2

3

4

May 10, 1945: two chief petty officers of the 302nd *Kokutai* still wearing the Type 30 (red on blue) round rating insignia on their flight suits. (Yutaka Morioka)

The naval round rating, red on blue, insignia described as (1) was primarily worn on the winter issue (dark blue) service dress uniform. The red felt was cut into a design symbol to identify the sailor's specialty or proficiency, as described earlier. Red felt in the shape of a wreath identified a petty officer rank, and a red felt *sakura* (cherry blossom) indicated advanced training in a particular study. The red felt was sewn on to the wool cloth round patch and had a white paper exposed backing with no protective lining.

The round rating, black on white, insignia described as (2) was primarily worn on the summer issue (white) service dress uniform, and the red on green, (3), was primarily worn by Special Naval Landing Forces (SNLF) troops, whom the Americans often referred to as the "Japanese Marines." Again, the felt applications were cut into a design symbol as described above in order to identify the sailor's specialty or proficiency. The wreath and *sakura* applied as well. Unlike the red on blue round rating insignia, both black on white and red on green round rating insignia had a white cloth-backed lining.

Navy aviation proficiency insignia were made in all three styles of the cloth round ratings. Aviation symbols such as aeroplanes, wings, propellers, and aeroplane engines were used and adorned in the colored felt.

1940s Insignia

In 1942, after the outbreak of World War Two, the Japanese Navy discontinued all round rating insignia on their service dress uniforms. The navy adopted a black cotton cloth patch insignia that was 1½ inches in width x 3 inches in length. The top and sides were straight in order to

This flight lieutenant is wearing only a simple collar tab rank insignia on the left sleeve of his one piece winter flight suit. (Yutaka Morioka)

form three sides of a square, and the bottom of the insignia came to an arrowhead or slight point. The rear of the insignia was a white canvas cloth.

On the black face portion of the insignia was a yellow tightly woven embroidered anchor pointed towards the bottom of the insignia. On the top portion of the insignia (within the three sides of the square) there might be combinations of one, two or three (or none) yellow tightly woven embroidered bars, which identified the seaman's rank (from basic to first class). A yellow, tightly woven, embroidered wreath was again used to identify petty officer ranks, and the yellow bars were used to identify ranks from chief petty officer to second class rank. Henceforth, this insignia will be referred to as yellow on black.

A sailor's specialty or proficiency was identified on the insignia's center section (between the anchor, bars, and/or wreath) by the placement of one of nine colored *sakuras* (cherry blossoms). The *sakuras* were made of a combination of brass and copper, and were painted or filled with the appropriate colored enamel. Each *sakura* had a double metal prong backing, which was used to secure the item on to the cloth insignia.

The following nine colors identified the sailor's specialty and/or proficiency:

Yellow	–	Seaman
Red	–	Medical
White	–	Paymaster
Dark Blue	–	Bandsman
Violet	–	Engineering
Green	–	Ground Crew
Light Blue	–	Aviation
Brown	–	Construction
Light Purple	–	Mechanic

All naval insignia were tacked in four or six corners and were never fully sewn on a uniform. The wearer did this so that the insignia could be removed easily when, for intelligence or security purposes, he did not want to be identified.

After 1930, the tallies on the sailor's 'Donald Duck' style cap were cotton-silk ribbons with gold-printed *kanji* characters that identified the name of the ship to which the sailor was assigned. By 1935, the cotton-silk ribbons were embroidered in the yellow tight-weave method used on the yellow on black insignia. The *kanji* characters on the cap tallies continued to identify the sailor's ship assignments and even included air base assignments such as Kure, Sasebo, and Yokosuka, to mention a few.

As early as 1940, after the beginning of World War Two, all tallies on the sailors' caps were changed to read only, "Greater Imperial Japanese Navy." This was done for Japanese military security reasons, so that outsiders would not be alerted to which Japanese Navy ships or forces were in port.

Naval flight specific insignia

Prior to 1941, the dual shoulder boards and collar tabs for naval officers incorporated thin silk piping sewn within the insignia, which identified their specialty and/or proficiency. As described earlier, an officer assigned to an aviation branch would have light blue piping visible on both shoulder boards and collar tabs. If officers were assigned to an aviation ground crew unit, they would have green piping on their insignia, and so forth. Again, for the military security reasons mentioned previously, this practice was immediately abandoned on all formal navy service dress uniforms.

From 1934 to 1945, the field officer branches of the Japanese Naval aviation units used a special rank insignia that had suggested influences from other military forces of the world. The insignia consisted of a square folded brown cloth (resembling flight suit material) with a series of hand-sewn gold bullion thread loops, bars, and/or metal *sakuras*. The ranks (gold bullion thread bars and loops) ranged from midshipman to rear-admiral. The paratrooper units began using these same ranks in 1939. By late 1944, because of the unavailability of the gold bullion thread, the bars and loops were made with a gold or yellow ribbon.

The rank on the naval flight suit was worn on the left sleeve, just above the wearer's elbow. As described previously, the rank insignia were tacked in four or six corners and were never fully sewn on a uniform or flight suit. Naval flight personnel assigned to battleships (with aircraft on board), aircraft carriers, and air bases, followed the formal wearing of flight insignia on their flight suits.

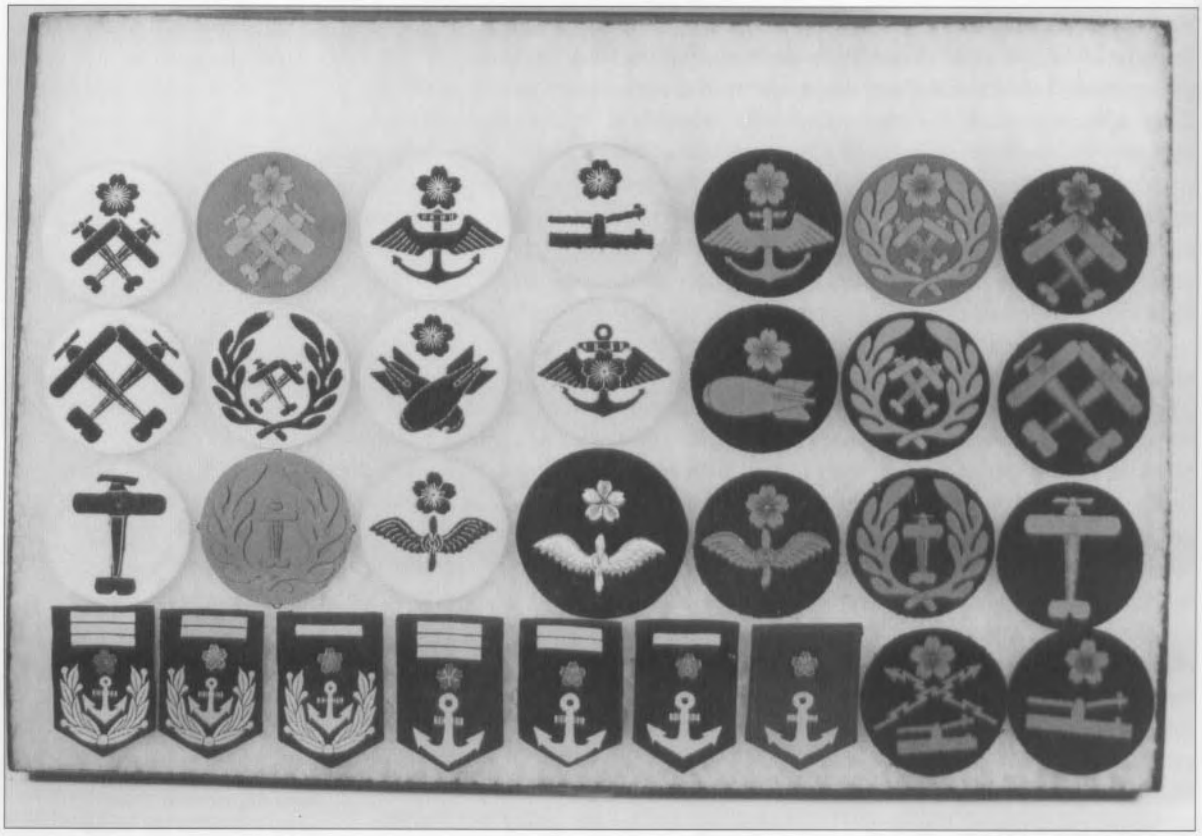
Naval pilots and flight personnel assigned to air units on Pacific islands such as Rabaul, Iwo Jima, and Taiwan were less formal. Flight personnel assigned to these units used all variations of the naval flight insignia mentioned above, primarily based on availability.

The flight personnel wore any combination of the 1930s style round rating insignia; yellow on black, gold bullion thread bars and loops, or just single light blue piped collar tabs were worn in mixed formations.

In some cases, navy flight personnel made their own bars and loops. They are notable because of their small size or because of the crude materials that were used to make them.

Some flight officers chose either not to wear any flight insignia or to wear just a single collar tab rank affixed to the upper left chest.

April 28, 1945: a chief petty officer of the 302nd *Kokutai* plans a B-29 attack. He is wearing the yellow on black (anchor, wreath, and three bars) rank insignia. (Yutaka Morioka)



Variations of early flight insignia that include one rare 1920s co-pilot gold bullion thread pattern (center, third row down) centered between two Type 30 style co-pilot round ratings. There are three rare red on green round ratings (First row, second left and second from right; third row, second left), followed by seven of the later yellow on black style rank ratings (Bottom row, first seven from left). All have the light blue cherry blossom designated for aviation. (Shelton Yokomizo)

The *Kikusui* (floating chrysanthemum)

By late 1944, Japan's future war prospects were looking grim. She began to form air groups, referred to as Special Attack Units, or the "*Kamikaze*," under the command of Vice-Admiral Takejiro Onishi. They were named after the "Divine Wind" typhoon that destroyed the Mongol fleet of Kublai Khan in 1281, when Khan sought to invade Japan. These special attack planes had been successful from the start. On October 25, 1944 they sank two American light carriers and damaged six others, as well as some light warships. This *kamikaze* thrust continued until the end of the war.

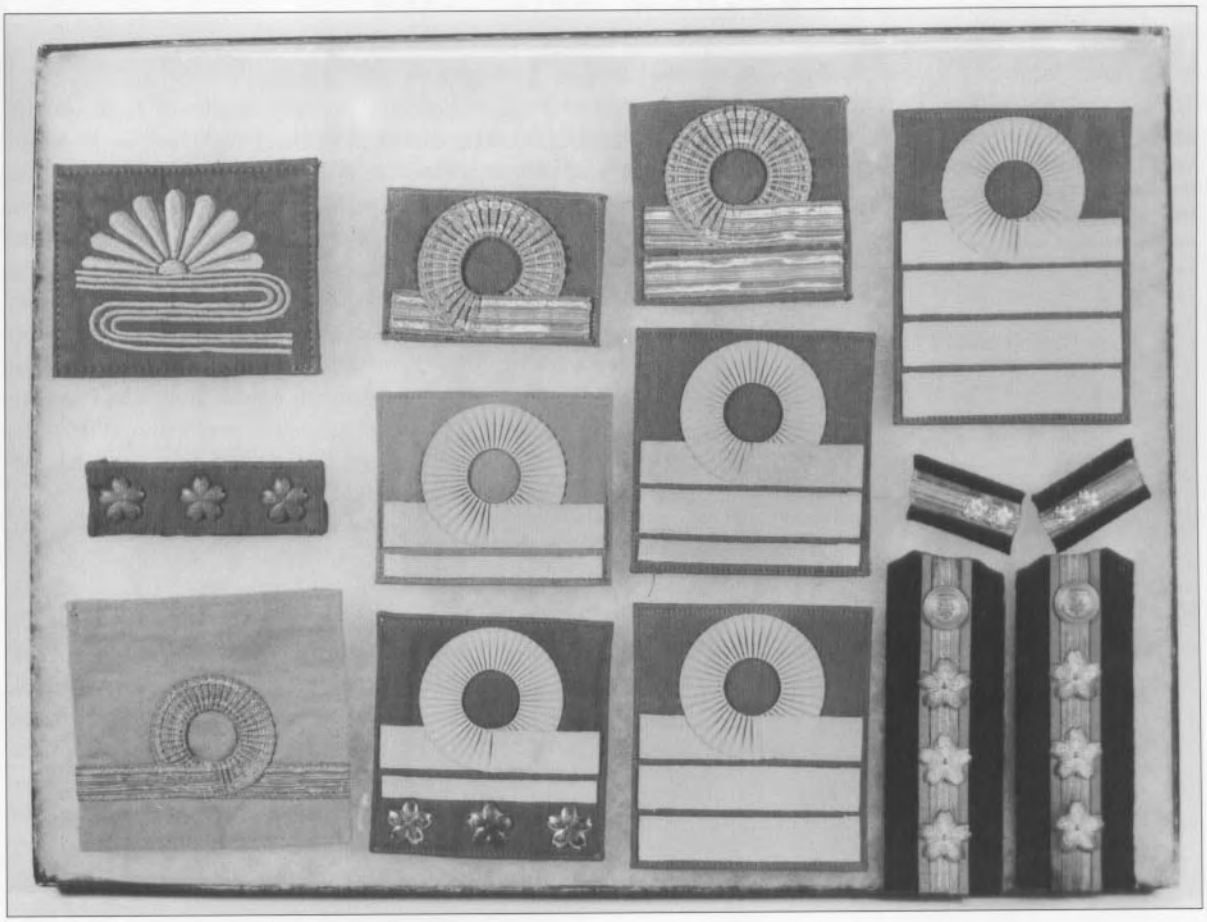
From April 6 to June 22, 1945 ten of these special attack missions were planned and carried out, off the coast of Okinawa, by both Imperial Japanese Navy and Army flight operations. This series of mass suicide attacks on US and Allied shipping adopted the name *Kikusui.* The word refers to a chrysanthemum blossom (*kiku*) floating upon *sui*, or water. This floating chrysanthemum crest, or design, was placed on tail sections of aircraft as well as patch insignia, flags, and *hachimakis* (headbands). The *kikusui* was also placed on the conning towers of Japanese submarines and *Kaiten* human torpedoes.

In early Japan, the *kikusui* was the representative family crest of the Kusunoki clan. According to the Kusunoki family genealogy, this crest originated in 1331, when Emperor Godiago floated a chrysanthemum blossom in a wine cup, handed it to the forefather, Kusunoki Masashige (1294–1336), and spoke the Imperial words, "May the glory of your great achievements be told for a thousand more years to come; Loyalty forever."

In 1331, Emperor Godiago (1288–1399), of the Southern court, plotted a rebellion against Kamakura in order to restore direct Imperial rule. Godiago launched a military campaign, which came to be backed by the formidable wealth and resourcefulness of such loyalist allies as Kusunoki Masashige and his entire clan. This rebellion was successful, and led to the demise of the Hojo Regency, whose influence dominated the Shogunate of Kamakura. This was followed by a brief restoration of Imperial rule in the Kemmu Era (1334–1336). In 1336, Kusunoki Masashige fought for his emperor for the last time when his forces of 300 samurai warriors faced ten times that many at the Battle of Minatogawa, near Kobe. Masashige knew that he was outnumbered at the time, yet stood his ground, thus dying in the futile battle. Coincidently, no emperor ever held any real power after Godiago until Meiji, grandfather of Emperor Hirohito, was restored in 1868.

Kusunoki Masashige has, traditionally, been revered as the perfect Japanese model of loyalty to the throne, or "Loyalty in the face of defeat." On April 6 and 7, 1945 in the spirit of the Kusunoki tradition, the *Kikusui* Special Attack Campaign was launched against US and Allied shipping, with a force of 355 navy and army aircraft. The campaign was doomed from the start, as US and Allied combat air patrols, directed by radar, circled around the carrier fleet and spotted the Japanese long before they got to the target. The result was high casualties on both sides.

A *kikusui* (flower on water) patch (top left) with an assortment of naval flight insignia (1934-45), and pairs of naval collar tabs and shoulder boards with light blue aviation piping (bottom right). (Shelton Yokomizo)



FLIGHT COMPUTERS

Pilots and flight navigation personnel used the flight computer to plot routes to and from their destinations.

The flight computer itself was basically a circular slide-rule and a wind direction tool that would aid in calculating any of the following (and more):

- Time, speed, and distance
- True airspeed
- Pressure altitude
- Density altitude
- Rate of fuel consumption and endurance
- True temperature

Japanese Navy pilots and navigators had to be proficient at using these flight computers because most of their sorties were flown over large expanses of water. While Japanese Army pilots were also trained in the use of these devices, they navigated primarily by using charts, and observing prominent landmarks (pilotage).

Navy flight personnel used the following types of navigational devices:

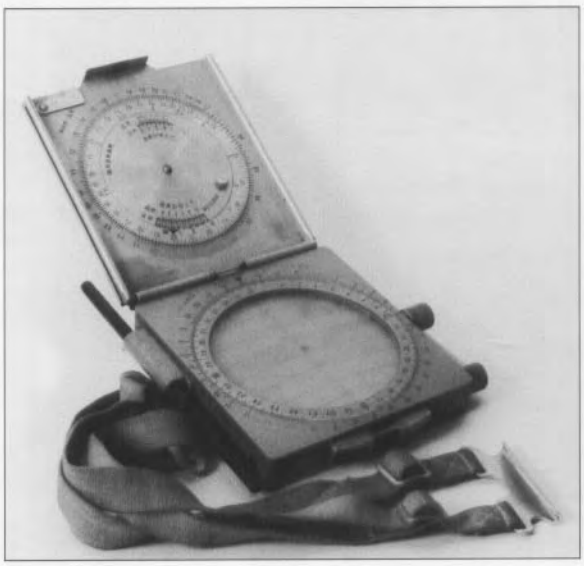
- Type 4 Model navigational computer (strapped to the thigh)
- Type 2 Model (hand-held "paddle" style)
- Dive-Bomber computer (also strapped to the thigh)
- Plotting board

Type 4 Model

The early Type 4 Model flight computers were made of high-quality lightweight aluminum alloy. The metal was either polished or finished in dull black paint. The user strapped the computer to his leg, just above the knee, using the attached elastic straps and their hook-and-eye fasteners. The computer had a frame brace that could be raised and used as a chart or document holder. A narrow, 3-inch slot on the left side served as a pencil holder. On the whole, the Type 4 was the most practical and useful flight computer used by the Japanese Navy during the war. The top/lid portion of the computer was hinged. Pushing the central button exposed the circular slide-rule. This top portion of the device was used to calculate the following:

- Time, speed, and distance
- True airspeed
- Pressure altitude
- Density altitude

The bottom portion of the flight computer had a slightly frosted, circular plastic window, beneath which was a cloth scroll. The scroll was marked with a series of numbered grids, which were used for solving wind problems. The grids were also used for solving interception and rendezvous problems. The frosted window allowed the user to write on the plastic in pencil, which could be easily removed afterwards.



This Type 4 Model was worn on the pilot's thigh and was the most practical flight computer used by the navy during the war. Note the pencil in the holder on the left side of the computer.

By turning a knob on the lower right corner either forward or backward, the scroll could be positioned as desired. Turning the center knob enabled the user to rotate the inner ring, upon which were marked the compass headings or wind directions. The outer azimuth ring was also marked in 10-degree increments, with the cardinal points (North, South, East, and West) denoted as "N," "S," "E," and "W." The ordinal directions were marked numerically (e.g. "26" = 260 degrees). The bottom portion of the computer was used to solve:

- Wind triangle problems (ground speed and drift)
- Search and rendezvous problems

The versatile Type 4 Model flight computer could also aid in calculating:

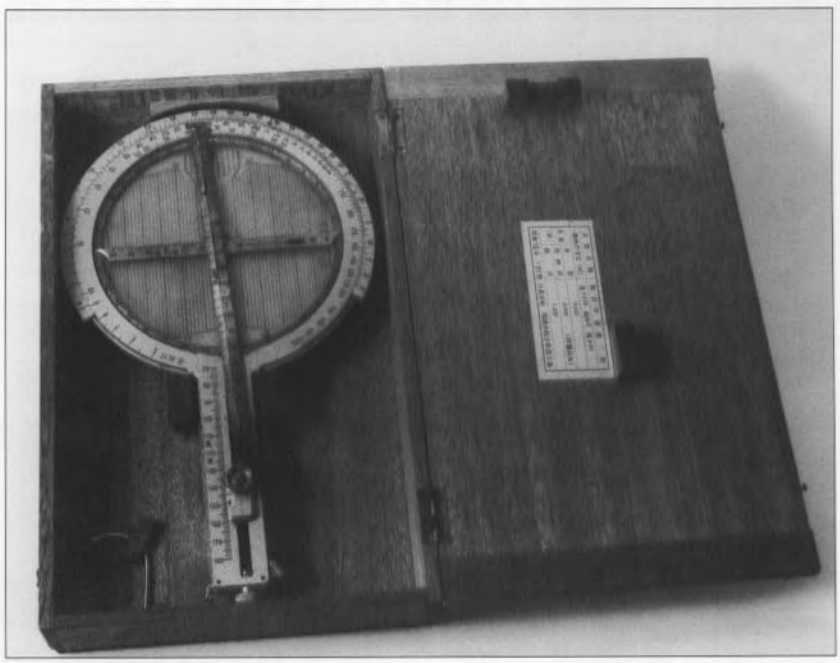
- Rate of fuel consumption
- Endurance

The early (1937–42) flight computer could be identified by an attached aluminum data plate bearing the model number (Type 4) and manufacturer's name (Shimazu or Sokukisha Company Limited). Additional information (such as manufacturing serial number, date of manufacture, and the naval inspection mark) was also included. The Type 4 computers manufactured between 1942 and 1944 had similar data plates, made of plastic. Computers made after late 1944 used a decal with the same information.

Type 2 Model

Early models (1937–40) of the Type 2 Model computer were quality-finished instruments, made of brass and steel components.

Resembling a hand-held fan, or ping-pong paddle, these early computers had an attached brass data plate. The plate was engraved with information identifying: the computer as a "Type 2 Model," the manufacturer (Shimazu or Sokukisha), date of manufacture, a serial number, and naval inspection markings. These computers were



A Type 2 Model hand-held "paddle" style flight computer in its original storage box.

somewhat heavy, considering they were designed for use in an aircraft, where weight is always a concern. When not in use, the computer could be suspended by an attached hook and chain.

As the war continued, and the supply of metal dwindled, the Type 2 Model computer evolved into what eventually became known as the Type 3. Type 3 computers (produced from 1941) weighed less than the Type 2 due to the use of handles made of aluminum or wood.

The data information plates were now made of aluminum, and by the end of the war, were made of plastic, and finally replaced by a decal.

Not having the circular slide-rule feature limited the Type 2 and 3 model computers to solving:

- Wind triangle problems (ground speed and drift)
- Search and rendezvous problems

The Type 2 and 3 Model computers used the same grid pattern and azimuth numbering system used in the bottom section of the Type 4 Model computer.

Former naval pilots Saburo Sakai, Sadamu Komachi, and Takeo Tanimizu all described using the Type 4 and 2 Models of flight computers, with no specific preference being mentioned. Sakai commented, in jest, that the Type 2 made a useful hand-fan in what could sometimes be an uncomfortably warm cockpit.

Dive-Bomber

The flight computer identified by its attached *kanji* data plate specifically as a "Dive-Bomber" computer was of a crude design, to be worn on the user's leg just above the knee during flight. It was secured to the leg by two cotton elastic straps and "hook-and-slot" type fasteners. The device consisted of a simple aluminum disc marked with grids, as described earlier. The cardinal points (N, S, E, and W) were marked in red, while the intermediate graduations were marked in black. The device also bore the outline (in red) of an airplane, which corresponded to the longitudinal (fore and aft) axis of the bomber (also known as the "lubber line").

Two Dive-Bomber flight computers. (Left) The top view of a Dive-Bomber computer with description data plate, in the original storage box (Dave Hooker) (Right) The rear view of a duplicate computer revealing thigh straps and data plate. (Gary Nila)

Model Type 2 plotting board. Like the flight computers used during the war, either the Shimazu or Sokukisha Company also manufactured the Model Type 2 plotting boards.

Again, the Dive-Bomber flight computer was limited to solving:

- Wind triangle problems (ground speed and drift)
- Search and intercept problems

The data plate was engraved with information, which included manufacturer (Shimazu or Sokukisha), date of manufacture, a serial number, and naval inspection markings.

Plotting board

The plotting board was basically a piece of wood approximately 18 inches x 16 inches (although sizes varied), framed by a combination of plastic and aluminum. A map or document could be easily secured between the metal/plastic frame and the wood. Attached to the bottom of the plotting board was an adjustable drafting arm with a fixed clear plastic protractor/straight edge. The cardinal directions (N, S, E, and W), as well as the intermediate compass directions, were marked in red on the protractor.

The plotting board was used solely to navigate from point to point. Used primarily by navigators in high-altitude bombers, plotting boards were also used by designated navigator/pilots on fighter missions.

Early plotting boards had aluminum data plates identifying them as "Aerial Computer Type 2," noting the manufacturer (Shimazu or Sokukisha), date of manufacture, a serial number, and naval inspection markings. Late-war plotting boards used a decal with the same information.

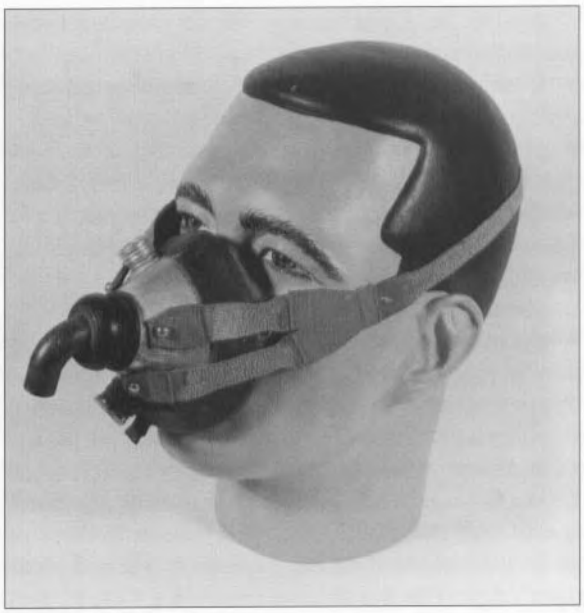
SPEAKING DEVICES, EARPHONES, THROAT MIKES, AND OXYGEN MASKS

After World War One, the Japanese military found themselves students of technology, and they were taught more and more, throughout the 1920s and 30s, by their allies.

By 1930, Japanese Navy and Army Air Forces had adopted the British form of a Gosport system that consisted of a flexible rubber hose with metal connector to the ear position on the user's flight helmet. The end of the rubber hose ran to the adjacent cockpit, where it was then connected to a funnel-shaped mouthpiece. The mouthpiece was either worn around the user's neck, suspended by straps, or fixed to a holder within the cockpit.

This form of crewmember-to-crewmember communication was initially used during training in the open cockpit aircraft. The operators usually had to shout their messages into the mouthpiece. The Gosport, and speaking devices, had been modified by the beginning of World War Two. Experimentation with different forms of aluminum or leather-covered mouthpieces that enhanced the vibration had improved the message quality.

Although the Japanese-model Gosport tubes were unmarked in most cases, some specimens of the leather-covered mouthpieces, embossed



ABOVE LEFT **A navy Type 2 metal oxygen mask. (Shelton Yokomizo)**

ABOVE **Petty Officer Second Class Kinpachi Yoshinari of the 302nd *Kokutai* wearing a Type 2 oxygen mask. (Yataka Morioka)**

with the Iida & Takashimaya maker's logo, have survived to recent times.

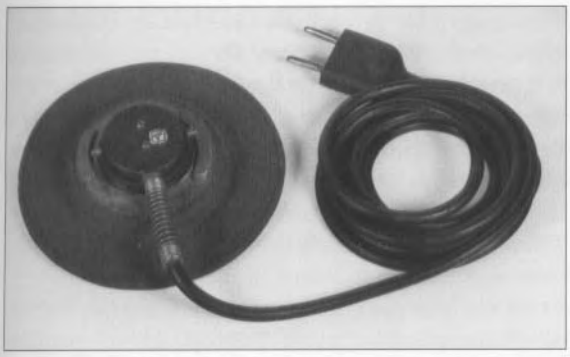
During World War Two, radio communications from base (land or carrier) to aircraft or between aircraft was weak and suffered from a lot of static interference. In most cases, the static interference was due to the distance between the transmitters, atmospheric or weather changes, and simply the radio technology of the period. Petty Officer First Class Saburo Sakai said that radio communication during the war was a waste of effort and, during the interview, he imitated removing the earphone from his flight helmet in frustration and throwing it away.

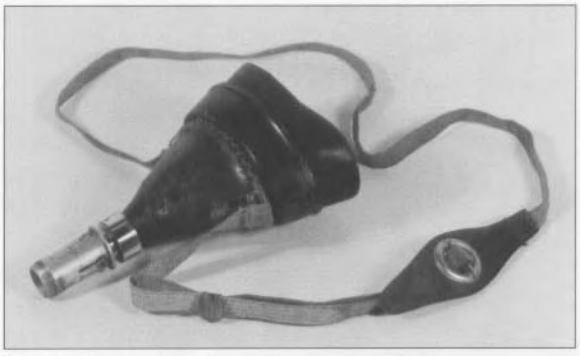
Early in the war, Japanese technicians had discovered that an unshielded aircraft spark plug created some distortions in radio communications, particularly in forward-mounted engine aircraft. Subsequent metal shielding of the aircraft spark plug eliminated some of the static interference.

While American pilots relied heavily on aircraft radios during combat, Japanese pilots did not. Instead, they used hand signals because of the poor state of their aircraft radios, and to avoid detection by the enemy. In most cases, the squadron leader could transmit, while the subordinates were prohibited from transmitting unless there was an emergency. Combat was not considered an emergency. They wanted to keep unnecessary chatter to a minimum. Therefore, they did not use the radio during combat.

On the other hand, reconnaissance aircraft used a Morse code type key communication because the voice radios were not reliable. Telegraphic code messages were more reliable than voice, and had a longer range. It should be noted that the Japanese Navy used telegraphic coded messages for the Pearl Harbor attack.

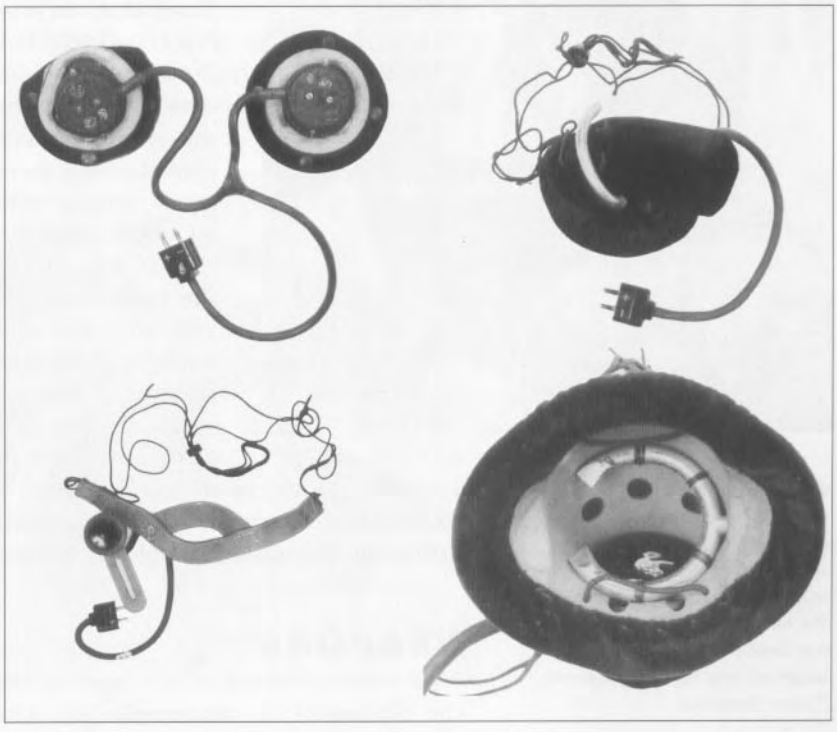
From 1939, Japanese Navy flight personnel communicated with hand-held Bakelite (handle and casing) microphone and earphone





ABOVE **TTK (Toyo Telecommunication Equipment Co.) developed this earphone that consisted of brown-colored felt surrounding a soft rubber, with an internal wiring loom and receiver.**

ABOVE RIGHT **A mouthpiece with the embossed Iida & Takashimaya Co. logo on the leather keeper. (Shelton Yokomizo)**



RIGHT **Naval air crewman's short wave wireless transmission equipment all manufactured by Tokyo Musen Denki Kabushiki Kaisha or Tokyo Wireless Electric Company. (Left, top to bottom): twin headset earphones; single throat mike on leather neck strap. (Right, top to bottom): exterior view of velveteen-covered oxygen mask with visible curled aluminum tube for air intake and electrical plug for internal microphone; close-up inside view of funnel-shaped oxygen mask with velveteen-padded edge; note internal microphone and "C" shaped aluminum tube for air intake (Gary A. Ormsbee Collection; Photographed by Gregory A. Babich)**

(placed in flight helmets) systems that had been created by the Toyo Telecommunication Equipment Company Ltd, (TTK).

By 1942, TTK had developed an earphone that consisted of light brown felt surrounding a soft rubber with internal wiring loom and receiver. This style of earphone lay flat against the user's ear within the flight helmet and only the rubber cord suspended visibly outward from the ear position.

By late 1942, TTK had developed, for the Japanese Naval Air Forces, the Model Type 3 flight helmet with built-in earphones. (See the section on Flight Helmets.) The Model Type 3 flight helmet also accommodated a dual leather-belted Bakelite throat mike system and had two nickel-plated "D" clips that were fitted under the electronic earphones for a proposed oxygen mask that was never developed.

The oxygen mask was normally reserved for, and used by, navy or army flight personnel in medium bombers that flew at high altitudes. The Japanese oxygen masks were based on obsolete European models.

Chief Petty Officer Takeo Tanimizu is shown with friends at Taiwan in June 1945. He is wearing a Type 2 oxygen mask with a TTK earphone. Much of the felt on the outer earphone has been removed for easier insertion into the flight helmet. (Takeo Tanimizu)

The early navy model consisted of an unpainted aluminum triangular frame with a combination of felt and padded leather on the outer edges, for the facial seal. It had riveted canvas straps on both sides of the mask, which was supported by canvas elastic straps (top and side head positions) so that the unit could be worn around the wearer's head. The oxygen mask used the Gosport style tube for communication.

As the war progressed, the navy modified their oxygen mask, which consisted of a black-painted aluminum body, with a more contoured triangular frame that was more in line with the wearer's face. A soft padded chamois leather was placed around the outer edges to give a better facial seal. The navy also had a rubber model oxygen mask that was similar to the army flight oxygen mask. It consisted of a greenish/gray rubber molded facial mask with a velveteen inner lining, with an attached accordion style hose composed of a rubberized canvas material. At the junction where the hose began was a circular pepper shaker lid style filter that allowed circulating air to enter the mask and dilute the oxygen. The mask was secured to the wearer's head by two canvas elastic straps on both side of the mask. Some variations of this rubber mask also accommodated the Gosport style communication tube. By late 1944, because rubber was not a natural resource in Japan, the Japanese Navy had to depend more on the aluminum style oxygen mask for any high-altitude missions.

WEAPONS

The discussion of weapons in this chapter is limited to handguns, swords, and daggers.

Handguns

Prior to World War One, the Japanese military had developed its own revolver, known as the Model Type 26 (1893), which was double-action, and held six rounds of 9mm ammunition. The Type 26 resembled a cross between the early US Smith and Wesson and the British MKI Webley revolvers.

In 1906, Japanese Army officer, Kijiro Nambu, developed an early model automatic pistol that was recoil-operated, magazine-fed, and held eight rounds of 8mm ammunition. Known as the Type Nambu or, in modern terms, as the Nambu "Grandpa", it resembled the German Luger. The Type Nambu was modified into the modern "Papa" Nambu and, by 1925, was replaced with the Type 14, which used the same 8mm ammunition.

In 1934, the Type 94 automatic pistol was developed. It held six rounds of 8mm ammunition. Somewhat crude in design, it was inferior to the Type 14 in workmanship, quality, and appearance.

By 1941, Bunji Hamada had developed the Type Hamada automatic pistol that accommodated nine rounds of 7.65mm ammunition. The Type Hamada was designed as an officer's side arm, and was to complement the existing Type 14 and 94 pistols. The Hamada operated on the blowback principle and resembled the Belgium Fabrique Nationale (F/N) Browning Model 1910 automatic pistol. The Hamada was manufactured in limited quantities and ended up being an expensive weapon to produce.

Prior to 1939, the Japanese military imported small quantities of the Browning automatic pistol, as well as other foreign handguns. Because of the cost of some of these weapons, only officers could afford the foreign-model handguns. Unlike most other nations during World War Two, not all Japanese Navy pilots or flight personnel were issued side arms. Japanese pilots often referred to their pistols as "suicide weapons." The pistol was never meant for self-protection like US or German fighter pilots' pistols, but was more of a means of not being captured alive.

Five models of Japanese handguns: (Top left) Type 14 with rope lanyard (Bottom left) Navy (anchored) "Papa" Nambu (Center) Type 26 revolver (Top Right) Type 94 (Bottom right) Fabrique Nationale Browning (Japanese import) (Steve Hayama)

Two models of Japanese handguns: (Left) A Nambu "Grandpa" (Right) A Hamada (John Ziobro)

Posed photograph of four navy pilots, taken c.1939. The pilot at left has a "Papa" Nambu handgun, with a rope lanyard, holstered in his float vest. The right-hand pilot holds a Browning automatic, also with lanyard. (Saburo Sakai)

Picture of Petty Officer Takeo Tanimizu taken aboard the aircraft carrier *Junyo* in May 1942. Tanimizu is wearing a Type 14 pistol that was issued from the *Junyo*'s on-board weapons' arsenal. He returned it when he was transferred to another assignment. (Takeo Tanimizu)

During their carrier duty, navy pilots on aircraft carriers were issued a side arm from the armory on board ship. The pilots would return these weapons to the armory when they were transferred from the ship.

Some navy pilots on island air bases acquired side arms on a more permanent basis or were able to acquire privately purchased foreign side arms. Unlike the Japanese Army pilots, navy pilots carried their side arms (non-holstered) in the semicircular chest pocket of their flight suits or, if the weapon was small enough, it could be placed in either knee pocket. In some cases, the pistol was attached to a rope lanyard, with two leather keepers, which was suspended around the user's neck, and again tucked into the flight suit chest pocket.

Petty Officer First Class (PO 1/c) Saburo Sakai advised that he carried an anchor-marked Navy Papa Nambu while he was serving in China. Sakai eventually acquired an F/N Browning automatic when he reached the Pacific Islands campaign. He carried it until the end of the war. PO 1/c Sadamu Komachi spoke about carrying an F/N Browning automatic as well.

Ensign Masajiro Kawato recalled carrying a Type 94 pistol that he wore with a lanyard, while PO 1/c Takeo Tanimizu carried a Type 14, also suspended by a lanyard. Tanimizu said that he often only loaded five rounds of 8mm ammunition into the eight-round clip in order to ensure operation if the need arose, and to prevent the spring-loaded clip from becoming weak.

In September 1942, PO 1/c Minoru Honda was forced to make an emergency landing on Kolombangara Island near Rabaul, when he was

approached by a group of curious natives. Honda held up a bag of candy in one hand and a Browning automatic in the other. The natives were friendly, and tended to Honda's needs for ten days until he was rescued.

Swords

All naval officers were required to have a military sword for ceremonies. These swords were not issued and the officers either bought their swords from the *Suikosha* (Naval Officers' Club) or used family blades which had been made through private sources. A machine made sword blade cost anything between 10 and 20 yen, whereas a hand-made blade would cost about 280 yen. Naval flight officer Takeshi Maeda carried a family blade that originally cost 1,200 yen.

Non-commissioned officers were issued their swords by the navy. If an officer had a sword that was of the family or ancestral order, the blade on this sword would be removed from its civilian mounts and placed into naval military mounts, which included a two-ring hanger sword scabbard. Army swords had one-ring hanger scabbards. Army officer pilots sometimes carried swords into their aircraft as a symbol of authority, similar to the British officer's swagger stick. They also carried the sword for good luck.

Navy fighter pilots, on the other hand, did not follow this tradition, and thus did not carry a sword in their aircraft for two specific reasons. The first, rather obvious, reason was that there was no room in the cockpit to accommodate this large awkward item.

The second, and most important, reason was that the steel from the sword blade interfered with the synchronization of the aircraft's flight compass, and as navy pilots flew over large expanses of water, it was imperative that all the flight instruments worked without compromise. However, navy pilots and flight personnel in medium bomber aircraft could carry and store a sword aboard their ship.

Because the Japanese Navy did not issue individual commendations or awards for valor and distinguished service to the living (all heroes were dead heroes), some admirals took matters into their own hands. Admiral Jinichi Kusaka, commanding officer of the 11th Air Fleet at Rabaul, presented swords to deserving pilots. They were large *katana* blades in wooden scabbards, with *kanji* inscriptions, accompanied by a large citation scroll. Two notable recipients were Warrant Officer Hiroyoshi Nishizawa and PO 1/c Shigetoshi Kudo. Naval flight officers normally used their swords in ground flight formations and ceremonies.

PO Kenji Yanagiya, who was the escort pilot on the Yamamoto mission, had an officer's sword that he had purchased during the war. Although he was allowed to purchase the sword, his problem was that he was not an officer, and as a

Two naval flight officers shown about to board an aircraft, c.1943. They wear green tropical service dress uniforms, flight boots, and swords. (Robert Rolfe)

result he was not allowed to carry the sword. Yanagiya later said that he used this sword to hack papayas and other fruit when he was stationed at Rabaul. Whether he said this in jest was never determined.

The only known exceptions to naval fighter pilots carrying a sword in their aircraft during flight would have been between late October 1944 and the end of the war, if a pilot were assigned to a *kamikaze* suicide attack mission.

Daggers

After a junior grade officer graduated from Naval Academy, he was presented with a dress dagger that consisted of a single-edged blade (with blade guards) mounted in a hilt consisting of a grip, that was made out of white ray or shark skins (*samē*) wrapped with brass wire, on a wooden base. The scabbards prior to 1939 were covered with brown or black polished ray or shark skins between two gilded brass mounts. The scabbards produced after 1940 used fewer skins and, more commonly, black or brown cowhide coverings. In either case, one loose brass ring was mounted on each side at the top of the scabbard so that the dagger could be worn with belt and hanger under the left side of the wearer's service dress uniform tunic. There are no known instances of this style of dagger accompanying a navy pilot during a flight operation.

After October 25, 1944 with the formation of the *Kamikaze* Special Attack Units under the command of Vice-Admiral Takejiro Onishi, it became an infrequent custom for a dagger, dirk or *tantō* to be presented to some volunteer suicide pilots. These daggers were also single-edged blades (without blade guards) mounted in plain wood handles with matching scabbards.

On many occasions, *kanji* characters would be written on the scabbard reflecting words of encouragement or a prayer intended for the honored pilot. These daggers were sometimes presented to the pilot in a samurai ceremony as a spiritual gift with hidden intentions that the recipient could use the blade to perform *seppuku* or *hari-kari* (ritual suicide by disembowelment) if the need arose. The dagger presentation was strictly ceremonial and the dagger really had no value as a weapon. There are no known documented cases to date that support a pilot using a dagger to commit *hari-kari* during a *kamikaze* mission.

MISCELLANEOUS FLIGHT ACCESSORIES

Naval pilots' badges

The section on flight insignia discussed the navy sailor's speciality and/or proficiency ranks, which since the early 1920s were identified by cloth patches sewn on to the sleeves of the service dress uniforms.

After a sailor completed basic training, he could volunteer, or was selected, for a particular specialty and/or proficiency. In time of war, a sailor's desired preference had to be put aside and, in many cases, he was assigned a speciality based on the needs of the service.

For many specialties, such as flight school, the sailor had to take an entrance exam and only the top scores were accepted. When the sailor completed a particular specialty (e.g. gunnery, ordnance, mechanics, etc.) he could continue with advanced courses in the same discipline.

(Left) Second-class advanced aviation pilot's badge with box (Gary Nila) (Right) First-class advanced aviation pilot's badge. (Alexander Mac Iver)

It was during this time that he could earn a specialty badge.

The early advanced training badges were made of brass and/or other less precious metals, and had a symbol depicting the proficiency acquired, such as submarine, construction, and demolition to mention a few. Unlike medals honoring distinguished service, such as the Order of the Rising Sun or Sacred Treasure, these badges were not considered medals, and did not have ribbons. The badges, along with a certificate, were contained in a small wooden box and were presented to the recipient in a simple ceremony.

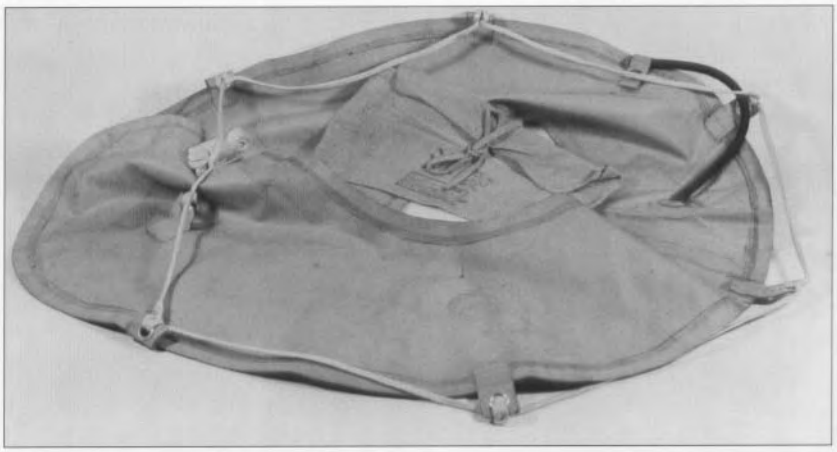
The badges were regarded more as a merit achievement. The recipients rarely wore these badges except on special occasions or for a ceremony. Among these advanced training badges were two relating to the naval pilots.

The badges came in the first- and second-class orders. The first-class advanced aviation or pilot's badge was 2¼ inch x 1½ inch, nickel-plated (hasp and hook back), with an enameled green wreath and four brown propeller blades. A silver-colored naval anchor with a pair of wings was positioned down the center of the badge. In the center of the badge was the Imperial chrysanthemum crest. The second-class advanced aviation or pilot's badge was a silver-colored anchor with brown metal wings (hasp and hook back). In the center of the badge was a gold-colored *sakura*. The early second-class badges were a good-quality brass. Later second-class badges were a lightweight metal and had brown-painted wings.

Pilots interviewed for this book were unfamiliar with these badges. To date, it is unknown how many of these first- or second-class badges were presented, and for what specific merit achievement.

Naval flight bag

Some naval pilots were issued with a tan-colored cotton canvas bag that had two cloth handles and was secured by a sewn-on leather belt strap. In the examples inspected to date, all had five black *kanji* characters that translated to "Reconnaissance equipment bag." PO 1/c Saburo Sakai had one of these flight bags. According to Sakai, he carried his maps, flight



A rare yellow "U" shaped naval survival floatation device with an oral inflation tube secured with silk parachute cord. (Center) Beige canvas storage bag with black *kanji* stamping. (Shelton Yokomizo)

computer, and gauntlets in the bag. Sakai continued, in jest, that he often carried his lunch in the same bag.

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GLOSSARY

Glossary of English Terms

Azimuth The arc of the horizon measured clockwise from the north point, in navigation to the point where a vertical circle through a given heavenly body intersects the horizon

Bakelite Trademark name for a series of thermosetting plastics prepared by heating phenol or cresol with formaldehyde and ammonia under pressure to make molded plastic ware

Dirk Dagger or *Tantō*

Diaper The sewn-on cloth that extends from the bottom rear of the navy float vest under the wearer's groin, and ties to the bottom front of the vest

Gosport A simple intercommunication system (between crewmembers on an aircraft) where a length of rubber hose extends from a single earpiece mounted on a flight helmet to a corresponding funnel-shaped mouthpiece. Created by members of the Royal Flying Corps in Gosport, Hampshire, England

Pilotage The process of directing the movement of an aircraft by optical observation

Zero An American term given to the Japanese A6M fighter aircraft

Glossary of Japanese Terms

Asahi Morning (rising) sun

Chutai Squadron

Daishō A matching set of *katana* and *wakizashi* swords

Hachimaki Traditionally, a cloth headband worn on the forehead of samurai warriors going into battle, to keep hair and sweat from obstructing their vision. Often used by pilots during World War Two as a symbol of determination

Hinomaru The circular red design symbol in the Japanese National flag, often referred to as a "meatball" or "sun"

Kaigun Navy

Kaiten The Imperial Japanese Navy one-man-operated suicide torpedo

Kamikaze During World War Two, a member of a special attack corps in the Japanese Air Force charged with the suicide mission of crashing his aircraft, laden with explosives, into an enemy target; translates to "Divine Wind," which was originally the typhoon that destroyed Mongol invasion forces in the 13th Century

Kanji Japanese writing

Katana A traditional style of long sword with a 24 to 30-inch blade, carried cutting-edge uppermost through the waist sash

Kikusui The Kusunoki family crest symbol from AD 1331. Translates to chrysanthemum "flower on water," symbol used during World War Two by Special Attack Forces to reflect "Loyalty in the face of defeat," and not *kamikaze*

Kokutai Japanese Naval Air Force group

Kugun Air Force

MAN An abbreviation for Manchuria, said to be the location used by a Japanese Navy flight goggle manufacturer during the war

Nihon Japan, also Nippon

Sakura Cherry blossom

Samē Ray or shark skin used on hilts and scabbards of swords

Sentai Japanese Army Air group

Suikosha Japanese Naval Officers' Club

Tantō A dirk or dagger fitted with a guard

Rikugun Army

Wakizashi A traditional short sword with a 16 to 20-inch blade, carried cutting-edge uppermost through the waist sash as a companion to the *katana*; a matching pair is called a "*Daishō*"

THE PLATES

A: SUMMER FLIGHT DRESS, 1937–42

A1: Chief petty officer in summer flight dress

This naval chief petty officer is wearing the full summer issue flight dress that would have been routine from 1937 to early 1942. His helmet is the early Model Type 30, with the standard clear lens goggles. He is wearing a muffler, made from parachute silk, in ascot fashion around his neck. His two-piece suit is wool gabardine with no inside lining. The early model float vest displays the 14 independently sewn chambers on the front (seven on each side), a series of ties, diaper, and a small pocket on the left side of the vest (suitable for a pencil or pocket watch). The gauntlets are standard summer issue (no fur) with exterior sewn-on green tags for the user's name. The rank insignia is a red on green round rating with *sakura* (cherry blossom), two crossed airplanes, and wreath that are unique to the petty officer.

A2: Rear view of summer flight dress

The rear view of the chief petty officer (from **A1**) wearing the early model float vest with eight independently sewn chambers on the rear. (When added to the front, these would total 22 chambers.) There is a central 3½-inch x 9-inch sewn-on green tag for the user's name and/or unit designation. The sewn-on diaper, which extends down between the wearer's buttocks and under the groin, ties at the front.

A3: Chief petty officer in summer flight dress with plotting board

The chief petty officer is wearing a pocket watch, suspended by a red parachute silk cord, around his neck, and is holding a Model Type 2 plotting board. The flight boots are of the early brown model with the reinforced toecap. They also have the sewn-on green tag for the user's name.

B: TYPE 97 FIGHTER PILOT PARACHUTE HARNESS

B1: Lieutenant-JG wearing Type 97 harness

The lieutenant-JG is wearing the summer Model Type 2 flight helmet with white privately purchased clear lens goggles. He is wearing the two-piece summer flight suit, float vest, gauntlets, silk muffler, and early flight boots. On the left arm (from top to bottom), is a gold bullion thread (loops and bars) flight insignia identifying the lieutenant-JG rank, a black and white colored cloth arm band identifying him as the "officer of the day," and a large pilot's wristwatch, which is worn on the outside of the flight suit.

B2: Lieutenant-JG wearing Type 97 harness

The lieutenant-JG (from **B1** & **B6**) is wearing the Type 97 parachute harness with one metal "D" ring visible for attaching the parachute seat pack at the level of the bottom rib. The black *kanji* character *Okami* translates as "Wolf," with "31" added, which may have been a naval squadron unit designation.

B3: Lieutenant-JG wearing Type 97 harness and parachute seat pack

The lieutenant-JG is wearing the Type 97 harness with the parachute seat pack attached to the rear. The parachute rip cord ring is attached to the upper left of his chest, and one seat pack attachment strap is visible at the "D" ring at the rib cage level. An aircraft clock is worn (upside down for the user to view), suspended by a white silk parachute cord, around the neck.

B4: Rear view of the Type 97 fighter pilot parachute harness

The rear view of the flight officer wearing the summer Model Type 2 flight helmet with a sewn-on green tag visible, below the goggle strap, for the user's name. The diamond pattern

This photograph taken in late 1944 shows an ensign wearing his pilot's watch in the typical fashion, outside and over his flight suit forearm; also note that he is wearing an electrically heated glove. (Yutaka Morioka)

quilted canvas back portion of the Type 97 parachute harness (with harness cross straps), without the parachute seat pack, is visible.

B5: Rear view of the Type 97 fighter pilot harness and parachute seat pack

Rear view of the Type 97 harness, diamond pattern padded quilted, brown velveteen seat cushion (positioned between the wearer's buttocks and the seat pack), and parachute seat pack. Four red elastic bungee cords were normally hooked diagonally along the orange piping, which were not attached for this photograph. Two of the four sewn-on black metal loops remain on the horizontal orange piping where the bungee cords hook on to the parachute canvas.

B6: Lieutenant-JG wearing the Type 97 fighter pilot parachute harness

The lieutenant-JG is wearing the Type 97 parachute harness (early fighter pilot model) without the parachute seat pack. On the left of the harness strap is a square nickel-plated rip cord bracket. There are two visible metal "D" rings for the parachute seat pack to be attached at the wearer's lower rib cage.

B7: Side view of the Type 97 fighter pilot harness and parachute seat pack

A side view of the Type 97 harness with attached rip cord, brown seat cushion and parachute seat pack.

C: WINTER FLIGHT DRESS, TYPE 89 HARNESS AND TYPE 0 (MODEL 1) HARNESS

C1: Lieutenant-JG in winter flight dress, 1940–45

This lieutenant-JG is wearing the full winter flight dress that includes the Model Type 2 fur-lined flight helmet with *MAN* clear lens goggles (fur), which would have been issued from 1940 to 1945. The right side of the helmet is turned up under the goggle strap, which was fashionable among veteran pilots. He is wearing a knitted wool muffler around his neck in a turtleneck fashion. His suit is a one-piece winter wool gabardine model with fur collar. He is wearing a float vest, winter fur-lined gauntlets, and a later model black flight boot without the toecaps. He also wears the Type 89 parachute harness (for air crew or flight observer), as his gauntlet is touching the static line, which is secured in a leather/canvas holster (not shown). A Type 14 pistol is tucked into the harness strap that also has an attached rope lanyard suspended around the user's neck. He is carrying the separate Type 89 parachute pack, which has all the appropriate elastic bungee cords, hooked and secured properly. (*Type 89 harness and parachute pack courtesy of Alexander Mac Iver*)

C2: Fighter pilot, 1942–45

This pilot is wearing the Model Type 3 (Hard Earphone) flight helmet with the standard clear lens goggles. He wears a muffler made from parachute silk, summer gauntlets, and the later style of black flight boots. His flight suit is a one-piece intermediate model made of a late war cotton-silk-satin material. The parachute harness is the Type 0 (Model 1) that was worn by fighter pilots from 1942 to 1945. This pilot is carrying the green canvas flight bag that was used to store the Type 0 harness and parachute when not in use. (*Model Type 3 flight helmet courtesy of Robert Reichelderfer; Flight suit, Type 0 (Model 1) harness, and parachute courtesy of Alexander Mac Iver*)

C3: Chief petty officer

A close-up view of a chief petty officer wearing the Model Type 3 (Hard Earphone) flight helmet with the standard clear lens goggles. Attached to the belted portions of the flight helmet is a black double throat mike that is fitted to the Type 3 helmet with a plug and socket. This pilot also wears a metal navy Type 2 oxygen mask, supported around the neck by an olive drab canvas strap. In addition, he wears a late war yellow on black (three bars, anchor, wreath, and light blue aviation *sakura*) rank insignia for a chief petty officer. (*Model Type 3 flight helmet, throat mike, and Type 2 oxygen mask courtesy of Robert Reichelderfer; Flight suit courtesy of Alexander Mac Iver*)

C4: Side view of the Type 0 (Model 1) parachute harness, 1942–45

Side view of a pilot wearing the Type 0 (Model 1) with the visible parachute rip cord ring located on the upper left shoulder. There are no additional "D" rings or brackets on the front of this harness. (*Model Type 3 flight helmet courtesy of Robert Reichelderfer; Flight suit, Type 0 (Model 1) harness, and parachute courtesy of Alexander Mac Iver*)

C5: Rear view of the Type 0 (Model 1) harness, parachute, and equipment bag, 1942–45

The rear view of the Type 0 (Model 1) parachute pack, which has all the appropriate elastic bungee cords, hooked and secured properly. Unlike the Type 97 parachute seat pack, the Type 0 was fitted more to the lower back. This example has a dark brown quilted back pad, while other styles are fitted with a dark green back pad. (*Model Type 3 flight helmet courtesy of Robert Reichelderfer; Flight suit, Type 0 (Model 1) harness, and parachute courtesy of Alexander Mac Iver*)

C6: Rear view of the Type 89 air crew/flight observer harness with parachute seat pack

A rear view of a flight crewman in winter gear, wearing the crossed straps of the Type 89 harness with a triangular ring where the parachute static line is permanently attached. A 1-inch x 4-inch white cloth label on the lower left side of the harness is the parachute's issue label. This view of the Type 89 parachute pack shows the rip cord ring secured by a combination of leather and canvas snaps. The crewman is also wearing the later style of float vest, still with 22 independently sewn chambers but without the front pen/watch pocket. This vest also had a smaller green tag (3 inch x 3½ inch) for the user's name and/or unit designation. On this green tag, written in black *kanji*, is the original user's last name of *Mamiya* and additional *kanji* to the right that reads *Kanjo Kogekki* or "Torpedo Attack Squadron." (*Type 89 harness and parachute pack courtesy of Alexander Mac Iver*)

D: NAVAL AVIATION BRANCH INSIGNIA, 1930–41

D1: Special Pilot and Navigator
D2: Co-Pilot or Observer
D3: Flying Co-Pilot
D4: Petty Officer 1st Class
D5: Petty Officer 2nd Class
D6: Petty Officer 3rd Class
D7: Aviation Seaman 1st Class/Leading
D8: Aviation Seaman 2nd Class

Aviation Seaman 2nd Class Kiyoe Hosokawa (left) poses with a classmate during flight training in February 1939. They wear winter service dress with Type 30 (red on blue) round rating insignia. On October 11, 1943, Hosokawa assisted in the sinking of the US submarine *Wahoo* in his Jake (E13A) floatplane. (Gary Nila)

D9: Aviation Seaman 3rd Class
D10: Air Maintenance/Ground Crew Petty Officer 1st Class
D11: Air Maintenance/Ground Crew Petty Officer 2nd Class
D12: Air Maintenance/Ground Crew Petty Officer 3rd Class
D13: Air Maintenance/Ground Crew Seaman 1st Class
D14: Air Maintenance/Ground Crew Seaman 2nd Class
D15: Air Maintenance/Ground Crew Seaman 3rd Class
D16: Advanced Aviation Engineering
D17: Regular Aviation Engineering
D18: Advanced Aviation Ordnance
D19: Regular Aviation Ordnance

E: NAVAL FLIGHT INSIGNIA, 1934–45

See plate

F: NAVAL INSIGNIA, 1942–45 AND PROFICIENCY/SPECIALTY SERVICE COLORS

See plate

G: SUMMER AND TROPICAL DRESS

G1: Naval ensign, Flight Medical Corp, in tropical service dress

This naval ensign wears the red piping of the Flight Medical Corp on his collar insignia. He wears the olive drab tropical service dress tunic and pants, leather sword belt with shoulder strap, and early flight boots. The soft cap (with wreath and anchor insignia) has two black stripes, which also identify him as an officer. He is carrying his privately purchased naval officer's sword and a flight bag that has black *kanji* that reads "Reconnaissance equipment bag" (*Naval tropical service dress uniform, soft cap, and leather sword belt courtesy of Robert Rolfe*)

G2: Flight lieutenant in summer tropical shirt and shorts dress

This lieutenant is wearing a uniform of summer white

Flight group being briefed. The flight leader (far right) is holding (in his left hand) a closed Type 4 Model flight computer. On April 1, 1945, these members of the 701st *Kokutai*, 102nd *Chutai* of the *Chusei* unit based in Kyushu, Japan, participated in *kamikaze* attacks in the Okinawa area. (Kazuhiko Osuo)

OPPOSITE **The author and naval pilot ace, Saburo Sakai, October 11, 1990, at Whittier, California.**

tropical shirt and shorts uniform with canvas belt (metal anchor buckle), flight boots, and a white two-stripe officer's soft cap. His shoulder boards show full lieutenant rank, with the aviation light blue piping. He is wearing a pilot's wristwatch and a stopwatch suspended by a red parachute cord around his neck. The white canvas armband has an anchor, wings, and *sakura* logo with written *kanji* that reads "Torpedo Attack Squadron."

G3: Lieutenant in a variation of the summer uniform with flight equipment

This variation of the summer uniform of white tropical shirt and shorts with flight boots was worn by many pilots in the Pacific Islands campaign. Many pilots wore the winter style helmet with their summer dress flight gear, as a statement of toughness.

H: *KAMIKAZE* PILOTS, 1945

H1: *Kamikaze* pilot preparing for a mission

This naval pilot, wearing the *Kikusui* (flower on water) patch on his shoulder, is preparing for one of the ten *Kamikaze* special attack missions that occurred from April 6 to June 22, 1945. He has a ceremonial presentation dagger tucked into his float vest, a red naval rising sun cloth flag, and an aircraft clock, suspended by a white parachute cord, around his neck. He is holding in his hand a cloth *hachimaki* headband that bears the red *hinomaru* (sun) and *kanji* that reads, "Divine Wind."

H2: *Kamikaze* pilot

A naval *kamikaze* pilot stands wearing a cloth *hachimaki* headband. He is wearing the *Kikusui* (flower on water) patch on his shoulder. The *Kikusui* is the family crest of the ancient Japanese samurai warrior Kusunoki and signifies "Loyalty in the face of defeat."

H3: Young *kamikaze* pilot

A young naval *kamikaze* pilot stands holding his winter flight helmet, goggles, and naval sword.

H4: Officer assisting a young *kamikaze* pilot

A naval officer places a *hachimaki* on the flight helmet of a young *kamikaze* pilot.

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References to illustrations are shown in **bold.**

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ISBN 1-84176-465-5

9 781841 764658