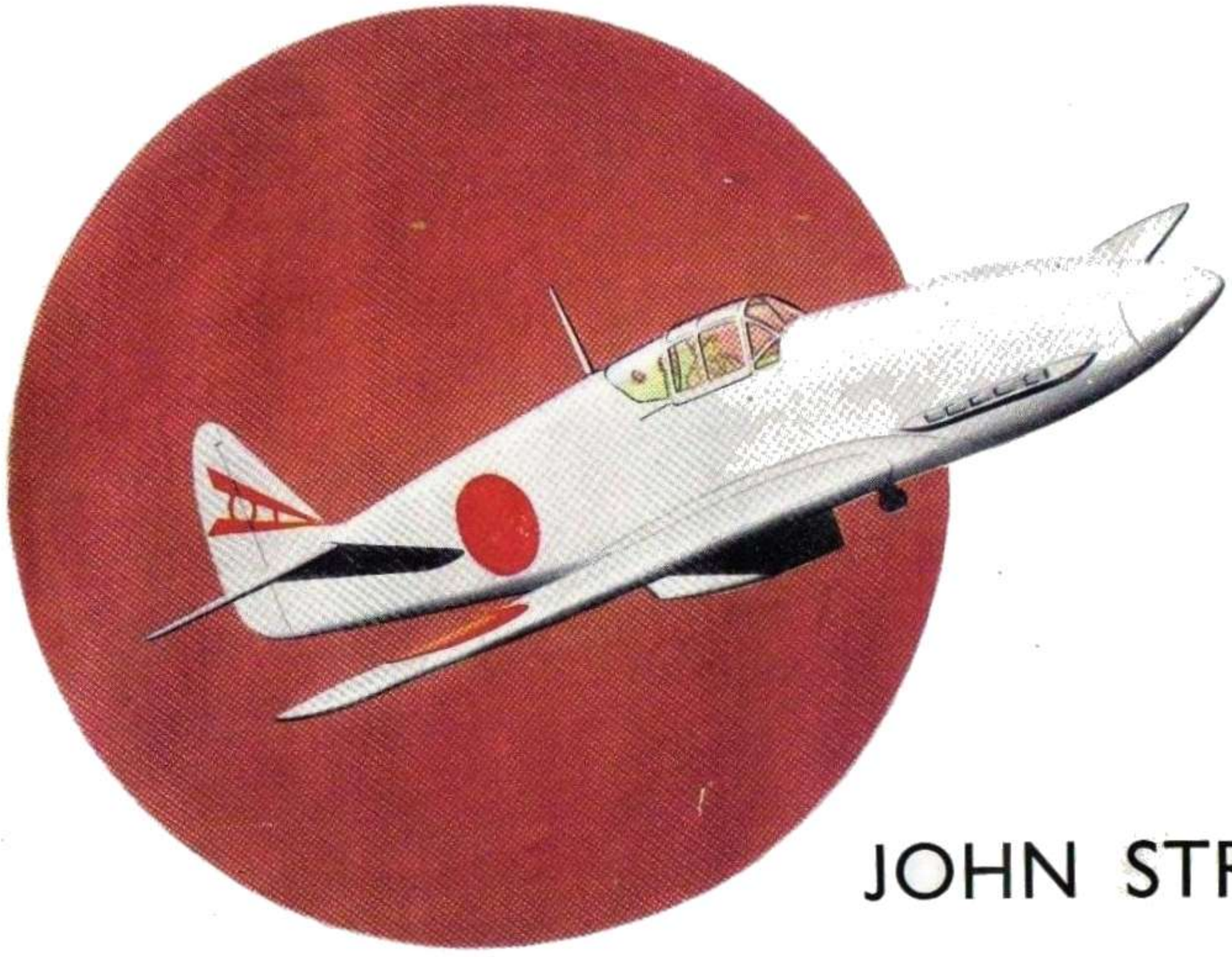
JAPANESE AIRCRAFT



JOHN STROUD

INTRODUCTION

ALTHOUGH the Allied Nations have been at war with Japan in the Pacific and the Far East since 1941, and a state of war has existed between China and Japan since the Japanese attack in Manchuria in 1931, little genuine interest has been taken in this theatre of war, and for the most part only utterances of ill-founded statements have been made to the effect that the Japanese are a race of copyists and that "... we will soon knock hell out of them."

With this lack of general interest it is perhaps not surprising that attempts to teach recognition of Japanese aircraft have proved extremely difficult.

When Japan attacked Pearl Harbour and British, United States, and Dutch territory in the Far East and Pacific, little was known of the enemy aircraft put into service later than 1938, and opinion differs as to whether or not the Allies had heard of the so-called "Zero" fighter, destined to become the best known of Japan's aeroplanes, and for a number of years the mainstay of Japanese Naval Air Fighter strength.

The purpose of this book is threefold.

(1) To present as complete and accurate a record of Japanese service aircraft as possible, with the hope that all the Allied forces, both in service and under training, will learn to recognize them positively and rapidly ;

(2) To create an interest in the war against Japan, especially in the air ;

(3) Having aroused this interest, to supply the necessary information about the equipment of the Japanese Army and Navy Air Services, and the theatre in which they operate.

There are no Japanese aeroplanes which we cannot destroy, or have not already destroyed in large numbers, but at the same time we must recognize Japanese air power as formidable. Its equipment to date is on the whole well designed and built, and Japanese aircrews use their aeroplanes with skill and determination. They do not as regular practice perform suicide missions, in spite of Tokyo radio, but they do press home their attacks with great bravery, and they are to be respected. Given good British, Dominions, Empire, and United States aeroplanes and crews in sufficient quantity, we shall continue to beat the Japanese as we have already done in no small measure. To underestimate, however, the quality of the enemy's aeroplanes and crews, not only gives a wrong impression, leading so easily to disastrous results, but also does a grave injustice to the Allied forces engaged in battle against the Japanese.

CODE NAMES

In order to eliminate the difficulty of learning Japanese names and type numbers, the Allies have agreed to use code names for all the Army and Navy aeroplanes of Japan. The first code names were given by General MacArthur to aircraft operating in the South West Pacific, but this system has now been extended to apply to all Japanese aeroplanes in any theatre.

The method used has been to give boys' names to all Japanese fighters and floatplanes, and girls' names to most other aircraft, the code names of transport aeroplanes beginning with the letter "T."

The aeroplanes dealt with in this work are classified according to their type and duty, and subdivided alphabetically, according to their code names, in the order : single-motor fighters, single-motor bombers, two-motor fighters, two-motor reconnaissance and bomber aeroplanes, floatplanes and flying-boats.

JAPANESE AIRCRAFT MANUFACTURERS

Japanese aeroplanes are designed by a comparatively small number of companies and Naval Establishments, and to give some background to the types in service to-day short histories of the main companies, with details of the development of their aeroplanes, have been included. *Pages* 52–59.

JAPANESE NAVY AEROPLANE NAMES

Navy aeroplane designs are given experimental numbers based on the year 1925 (Japanese 2585), *i.e.*, Experimental 20 will appear in 1945 (2605). On going into production an official designation is given, this includes the official name, function and model number. The names are descriptive, such as *Moonlight*, the name of a night fighter. The model number consists of two figures, the first refers to the airframe and the second to the motor. The original airframe and motor are known as the Model 1–1 ; modifications to either are shown by the appropriate figure. Up to 1943 a number showing the year in which production started, was given in place of the name. This number up to and including 1939 consisted of the last two figures for the year in the Japanese calendar, *i.e.*, 2599 (1939). After 1939 the last figure only was used ; this system gave us the Type 0 in 1940 (Japanese 2600) and accounted for the famous "Zero." In addition, Navy aeroplanes carry a Model/Type symbol made up from code letters and numbers. The letters show the function of the aeroplane and the identity of the designer, while the figures indicate the number of the aeroplane in its class and the model number.

Example.—D3A2 is the third Navy Carrier-Borne Bomber ; it is an Aichi design and it is the second model of the type.

A full list of the code letters appears on *Page* 63.

JAPANESE ARMY AEROPLANE NAMES

Army aeroplanes in experimental form are given a number with the prefix Ki. The numbers are chronological irrespective of duty or designer. On going into production the type is given a designation comprising the designer's name, type number according to the year, function and model number. The year number is on the same plan as for Navy aeroplanes except that 1940 types are numbered 100 in place of the Navy 0, also the year numbers are still used.

Model numbers consist of only one figure. Changes in model number are also added to the Ki number, by the addition of a third figure. Certain inconsistencies have been noted in both the Army and Navy systems.

PRESENTATION OF AEROPLANES IN THIS BOOK

Each of the main operational Japanese aeroplanes, excluding transports and the aeroplanes to be found under New Aeroplanes on *Pages* 60-61 has been given a double page spread in this book. On the two pages devoted to each type will be found a technical specification, a general description and history, a photograph, three-view drawings, and four drawings in colour. The large colour drawing incorporates all known details of the type at the time of preparation.

Transport and training aeroplanes appear on *Pages* 48–49, second line types are on *Pages* 50–51.

THE PACIFIC

A map of the Pacific War Zone together with a number of topographical details of the area has been included.

KANA

Kana is a simple form of Japanese ideography used for the lesser educated ; it is used in the cheaper journals as well as for the names on the hulls of warships. Kana comes into this work through its appearance on some of the aeroplanes shown and also because its use sometimes alters words, giving us, for instance, the word Mitubisi in place of the more usual Mitsubishi which cannot be translated into Kana. A table for translating Kana appears on *Page* 63.

AERONAUTICAL TERMS IN JAPANESE

Japanese aeronautical terms appear on *Page* 62.

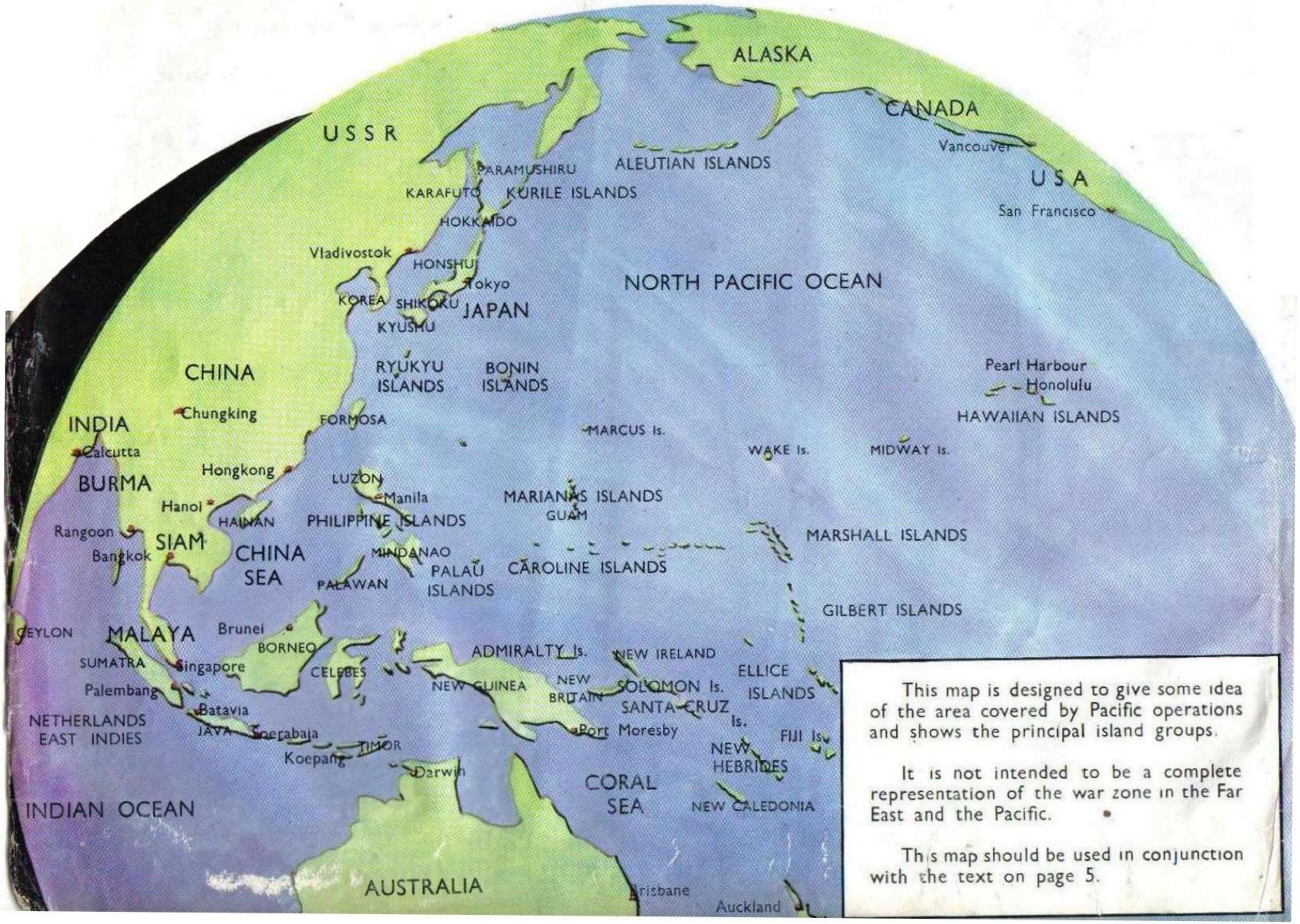
THANKS

For helping so willingly with the preparation of this work, my thanks go to: Air Ministry, Chinese Air Attaché in London, Chinese Naval Attaché in London, Ministry of Aircraft Production (Aircraft Recognition Branch, the producers of the official three-view drawings used throughout this volume), Mr. C. G. Grey for making available very early copies of *All the World's Aircraft*, Mr. Leonard Bridgman for lending many of the photographs of old Japanese aeroplanes which are the copyright of *All the World's Aircraft*, Royal Australian Air Force, United States Army Eighth Air Force, and the United States Navy.

JOHN STROUD.

London, 1945

THE PACIFIC WAR ZONE



This map is designed to give some idea of the area covered by Pacific operations and shows the principal island groups.

It is not intended to be a complete representation of the war zone in the Far East and the Pacific.

This map should be used in conjunction with the text on page 5.

THE PACIFIC WAR ZONE

The map of the Pacific has been included in this volume to assist all those who considered the Japanese war so far away that they had difficulty in following its progress and its geography, and also to help in giving an appreciation of the situation to all those who have been so busily engaged in the European war that they simply have not had the time or the facilities to study the Pacific theatre of operations.

Quite naturally it is impossible to list all the islands or even show them on the map, but principal island groups are shown on the map and the main islands within each group are listed on this page.

Where possible the important towns or villages on these islands within each group are given here.

ADMIRALTY ISLANDS
- Los Negros Is.
- Manus Is.

ALEUTIAN ISLANDS
- Andreanof Islands
  - Adak Is.
  - Atka Is.
  - Kanaga Is.
  - Tanaga Is.
- Fox Islands.
  - Umnak Is.
  - Unalaska Is.
    - (Dutch Harbour)
  - Unimak Is.
- Near Islands.
  - Agattu Is.
  - Attu Is.
- Rat Islands.
  - Amchitka Is.
  - Kiska Is.
  - Rat Is.

BISMARCK ARCHIPELAGO
- New Britain
  - Cape Gloucester
  - Gasmata
  - Rabaul
    - (Vunakanau)
- New Ireland
  - Kavieng
- New Hanover

BONIN ISLANDS
- Chichi Is.
- Iwo Is.
- Muko Is.

NORTH BORNEO
- Brunei

CAROLINE ISLANDS
- Kusaie Is.
- Nomoi Is.
- Pikelot Is.
- Ponape Is.
- Truk Islands
  - (Dublon Is.)
  - (Eten Is.)
  - (Umam Is.)
- Yap Islands

ELLICE ISLANDS
- Funafuti Is.
- Nanumea Is.
- Niutao Is.
- Nukufetau Is.
- Nukulaelae Is.
- Nui Is.
- Vaitupu Is.

GILBERT ISLANDS
- Abaiang Is.
- Abemama Is.
- Betio Is.
  - (Tarawa)
- Kingsmill Group
- Makin Islands

HAWAIIAN ISLANDS
- Hawaii Is.
- Lanai Is.
- Midway Is.
- Molokai Is.
- Oahu Is.
  - (Honolulu)
  - (Pearl Harbour)

KURILE ISLANDS
- Etorofu Is.
- Harimukotan Is.
- Ketoi Is.
- Matsuwa Is.
- Onnekotan Is.
- Paramushiru Is.
- Rashowa Is.
- Shasukotan Is.
- Shimushiru Is.
- Shumushu Is.
- Uruppu Is.
- Ushichi Islands

MARIANAS ISLANDS
- Agrihan Is.
- Alamagan Is.
- Anatahan Is.
- Asuncion Is.
- Guam
- Guguan Is.
- Maug Is.
- Pagan Is.
- Rota Is.
- Saipan Is.
  - (Aslito)
  - (Flores Point)
  - (Garapan)
  - (Tanapag)
- Sarigan Is.
- Tinian Is.

MARSHALL ISLANDS
- Eniwetok
  - (Engebi)
- Jaluit
- Kwajalein
  - (Namur)
  - (Roi)
- Maloelap
- Mili
- Namu
- Wotje

NETHERLANDS EAST INDIES
- Amboina
- Bali
  - (Crogak)
  - (Den Pasar)
- Bangka Is.
  - (Klabat Bay)
  - (Muntok)
- Boeroe
- Borneo
  - (Balikpapan)
  - (Bandjermasin)
  - (Tandjoengselor)
- Celebes
  - (Makassar)
- Ceram
- Flores
  - (Reo)
- Java
  - (Bandoeng)
  - (Batavia)
  - (Cheribon)
  - (Semarang)
  - (Soerabaja)
  - (Tegal)
- Lombok
  - (Rambang)
- Moluccas
- Soemba
  - (Waingapoe)
- Soembawa
  - (Bima)
- Sumatra
  - (Medan)
  - (Palembang)
  - (Sabang)
- Timor
  - (Dili)
  - (Koepang)

NEW GUINEA
- Buna
- Hansa Bay
- Lae
- Madang
- Milne Bay
- Port Moresby
- Salamaua
- Wau
- Wewak
  - (Boram)
  - (But)
  - (Dagua)

PALAU ISLANDS
- Koror Is.
- Peleliu Is.

PHILIPPINE ISLANDS
- Bohol Is.
- Cebu Is.
  - (Cebu)
- Leyte Is.
  - (Tacloban)
- Luzon Is.
  - (Bataan)
  - (Corregidor)
  - (Manila)
- Mindanao Is.
  - (Davao)
- Negros Is.
  - (Dumaguete)
- Palawan Is.
- Panay Is.
  - (Iloilo)

RYUKYU ISLANDS
- Amami Islands
- Okinawa Islands
- Osumi Islands
- Sakishima Islands

SANTA CRUZ ISLANDS
- Santa Cruz Is.
- Swallow Islands
- Utupua
- Vanikoro

SOLOMON ISLANDS
- Bougainville Is.
  - (Buka)
  - (Kieta)
- Choiseul Is.
- Guadalcanal Is.
  - (Henderson Field)
- Kolombangara
  - (Vila)
- Malaita Is.
- New Georgia Is.
  - (Munda)
- Rendova Is.
- Russell Islands
- San Cristobal Is.
- Santa Isabel Is.
  - (Rekata Bay)
- Tulagi
- Vella Lavella Is.

JAPAN—Includes the main islands of Hokkaido, Honshu, Karafuto, Kyushu, Shikoku and Formosa. The Kurile and Ryukyu Islands and Korea on the Asia mainland.

Prefecture	*Capital*
HONSHU ISLAND	
Aichi	Nagoya
Akita	Akita
Aomori	Aomori
Chiba	Chiba
Fukui	Fukui
Fukushima	Fukushima
Gifu	Gifu
Gumma	Maebashi
Hiroshima	Hiroshima
Hyogo	Kobe
Ibaraki	Mito
Ishikawa	Kanazawa
Iwate	Morioka
Kanagawa	Yokohama
Kyoto	Kyoto
Mie	Tsu
Miyagi	Sendai
Nagano	Nagano
Nara	Nara
Niigata	Niigata
Okayama	Okayama
Osaka	Osaka
Saitama	Urawa
Shimane	Matsue
Shizuoka	Shizuoka
Tochigi	Utsunomiya
Tokyo	Tokyo
Tottori	Tottori
Toyama	Toyama
Wakayama	Wakayama
Yamagata	Yamagata
Yamaguchi	Yamaguchi
Yamanashi	Kofu

Prefecture	*Capital*
HOKKAIDO ISLAND	
Hokkaido	Sapporo
Shiga	Otsu

Prefecture	*Capital*
KYUSHU ISLAND	
Fukuoka	Fukuoka
Kagoshima	Kagoshima
Kumamoto	Kumamoto
Miyazaki	Miyazaki
Oita	Oita
Saga	Saga

Prefecture	*Capital*
OKINAWA ISLAND	
Okinawa	Naha

SHIKOKU ISLAND	
Ehime	Matsuyama
Kagawa	Takamatsu
Kochi	Kochi
Tokushima	Tokushima

Sasebo and Yawata are both on Kyushu Island.

OSCAR
ARMY I FIGHTER
NAKAJIMA

Japanese designations—Ki 43 and 432. Hayabusa
Models—1 and 2.
Duty—Fighter.
Designing company—Nakajima Aircraft Company, Ltd.
Layout—Low-wing cantilever monoplane.
Construction—Metal with fabric-covered control surfaces.
Crew—One.
Motor—Model 1. One 14-cylinder Nakajima Type 99 or 1 air-cooled radial. 955 h.p. at 14,500 ft. Model 2. One 14-cylinder Nakajima Type 2 air-cooled radial. 1,020 h.p. at 15,600 ft. Two-speed supercharger.
Span—Model 1, 37 ft. 9 ins. Model 2, same as Model 1, others 35 ft. 7 ins.
Length—Model 1, 29 ft. 2 ins. Model 2, 29 ft. 3 ins.
Empty weight—Model 1, 4,300 lb.
Loaded weight—Model 1, 5,300 lb. Model 2, 5,500 lb.
Maximum speed—Model 1, 317 m.p.h. at 16,000 ft. Model 2, 342 m.p.h. at 17,500 ft.
Cruising speed—Model 1, 265 m.p.h.
Normal range—Model 1, 395-575 miles.
Maximum range—Model 1, with maximum fuel, 1,670 miles. Model 2, with maximum fuel and no bomb load, 1,590 miles.
Service ceiling—Model 1, 37,500 ft. Model 2, 38,400 ft.
Climb—Model 1, 2,690 ft./min. at 14,500 ft. Model 2, 3,000 ft./min. at 15,600 ft.
Fuel—Model 1, maximum 207 Imperial gallons (250 U.S. gallons). Model 2, maximum 198 Imperial gallons (239 U.S. gallons).
Armament—One 7·7 mm. and one 12·7 mm. M.G. Fixed forward firing.
Bomb load—Model 2, two 220 lb. bombs

OSCAR was the first Japanese Army fighter aeroplane to go into service after 1937, the year in which the Nakajima Army 97 Nate first appeared.

Oscar is now in service in three forms: the Model 1 with 955 h.p. Nakajima Type 99 or 1 motor and 37 ft. 9 ins. span; the Model 2 with 1,020 h.p. Nakajima Type 2 motor and 37 ft. 9 ins. span; and the Model 2 with 1,020 h.p. Nakajima Type 2 motor and 35 ft. 7 ins. span.

British Official

OSCAR is a long-range low-wing monoplane, and was first seen in service in Burma, where the earlier Nate was also in service, and an Oscar Model 1 was shot down almost intact, soon after its introduction, near Chittagong in Bengal. It has been used to escort bomber formations on raids on Assam and Bengal, and a number of Oscar fighters have been destroyed, and some of the wrecked aeroplanes have been exhibited in India to show the success of the defences. This type of aeroplane has also been in action in China, and many were seen on Vunakanau aerodrome near Rabaul, in New Britain, where the Oscars shared the aerodrome with Kawasaki Army 3 Tony single-motor fighters, Kawasaki Army 2 Nick two-motor fighters, and Mitsubishi Army 100 Dinah two-motor reconnaissance monoplanes. Oscar has also shared Dagua aerodrome in New Guinea with Tony fighters and Nakajima Army 100 Helen two-motor bombers. One example of the Oscar Model 1 is now flying with U.S.A.A.F. markings, and appears in the photograph on page 55.

Oscar has also been used in the defence of Paramushiru, and Oscar Model 2s have been seen on Hollandia aerodrome bearing on their rudders the marking shown on the Kawasaki Tony on page 11.

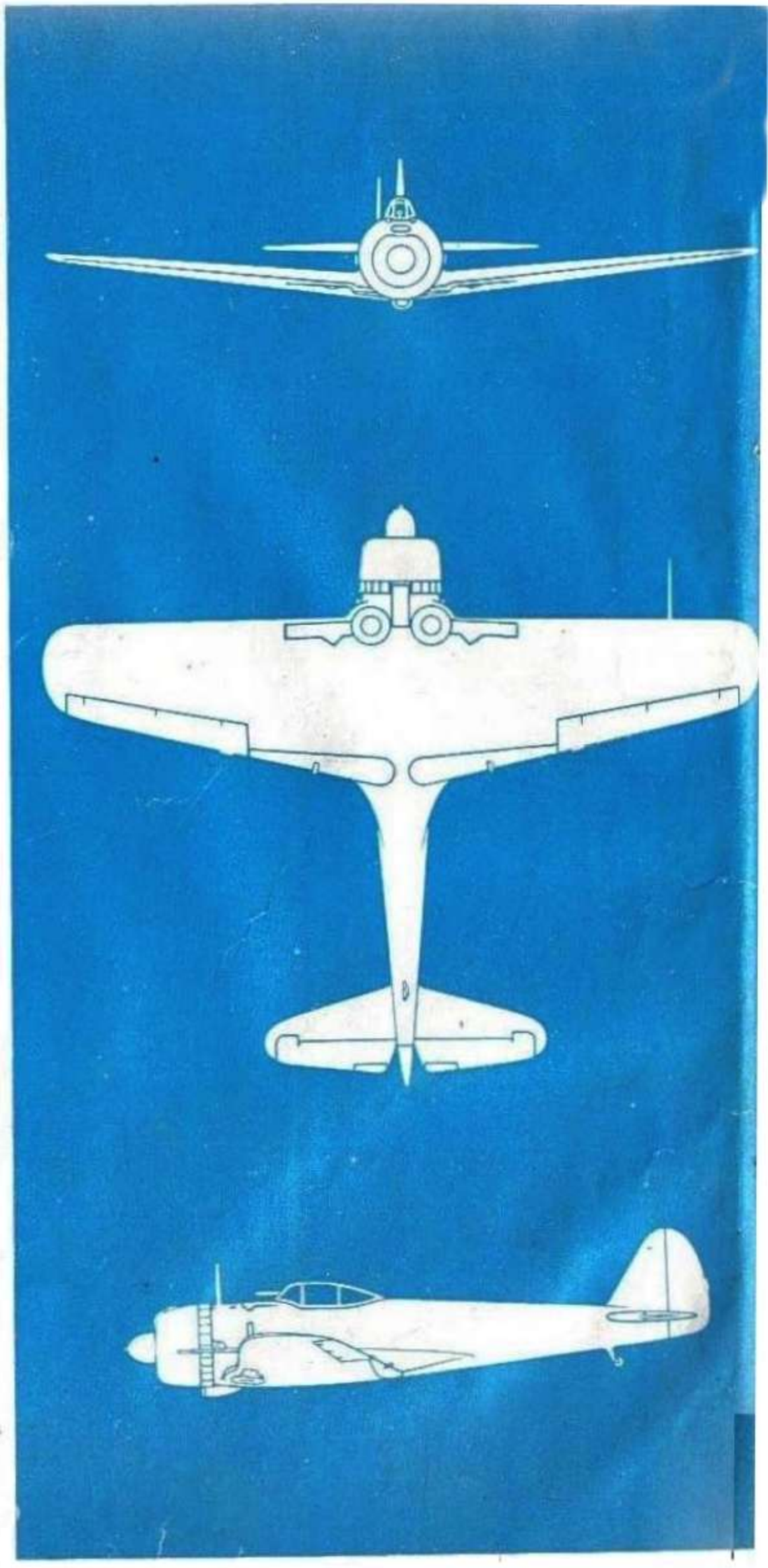
Oscar appears to be the link between the old and new types of Japanese Army fighter. Retaining the lines of Nate, but with retractable undercarriage, greater power, and improved performance, Oscar has not attained the look of the modern fighter apparent in the 1942 Tojo. Japanese single-motor aeroplanes, and in some cases two-motor types, normally have a rather delicate appearance, a beauty of line not always shared by the aeroplanes of other Powers, except in isolated cases like the Spitfire and Mosquito. This delicacy can be seen in Oscar from many views, and detected in the general feeling of the aeroplane.

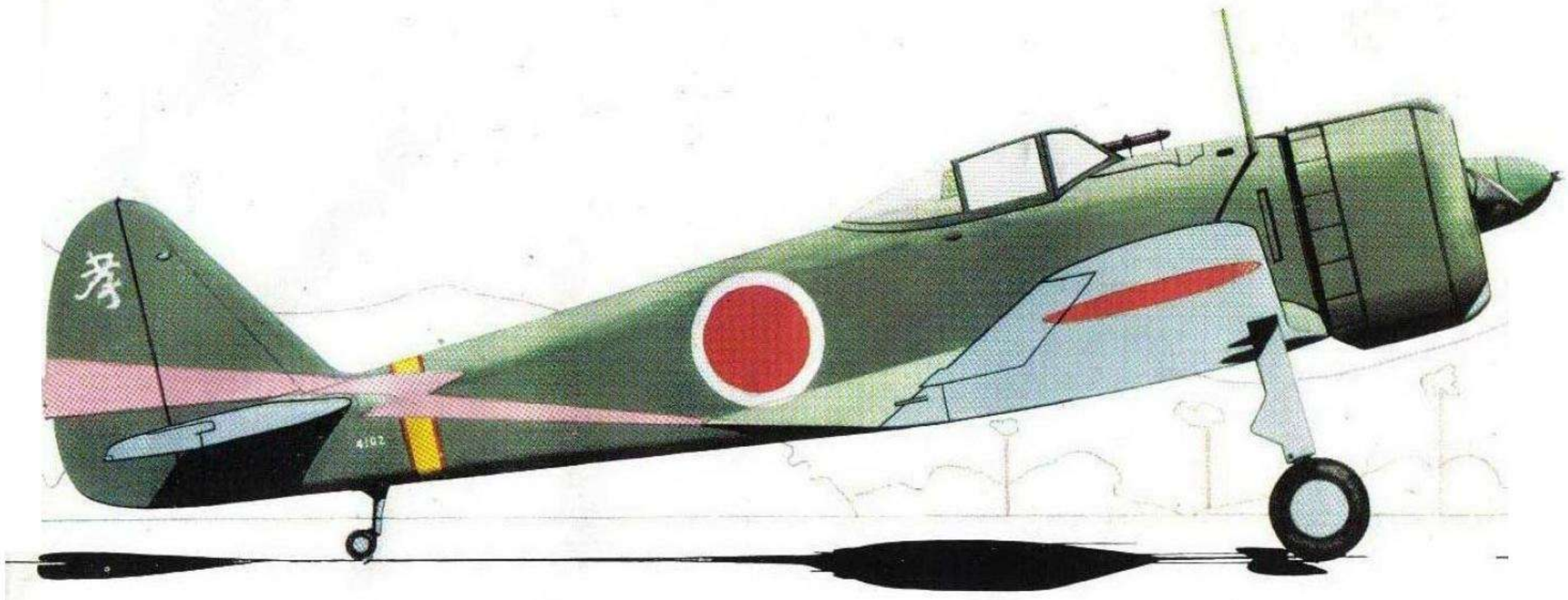
The cockpit cover used on Oscar is of interest, in that it conforms with the modern "tear drop" type, but in reality dates back to the type fitted to Nate in 1937.

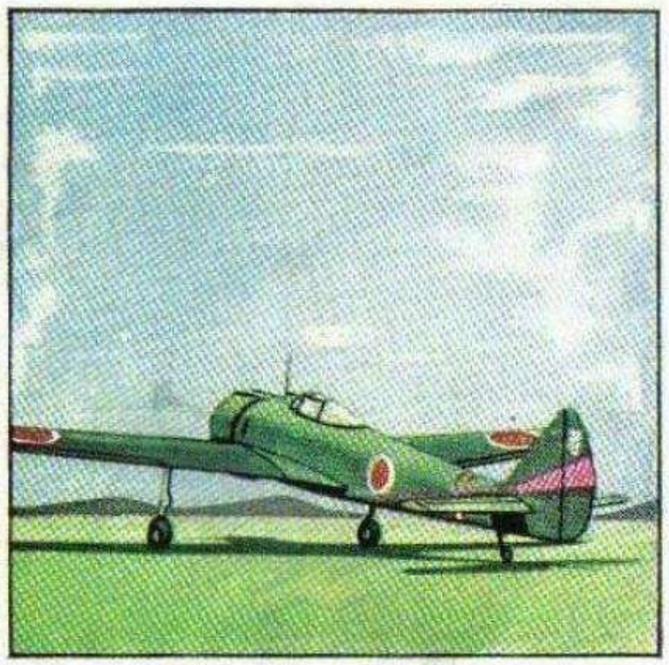
Although normally seen in the green camouflage shown in the main drawing, Oscar has appeared in the light scheme shown in the drawing of one of these aeroplanes flying over the Shwe Dagon Pagoda, near Rangoon. The aeroplane featured in the main drawing and in the photograph is the one shot down near Chittagong. The "lightning" marking along the fuselage is probably a form of squadron marking, and was also painted on the Nate fighters used in Burma.

This aeroplane may be fitted with two- or three-bladed airscrew, and can carry two long-range drop fuel tanks side by side under the centre section.

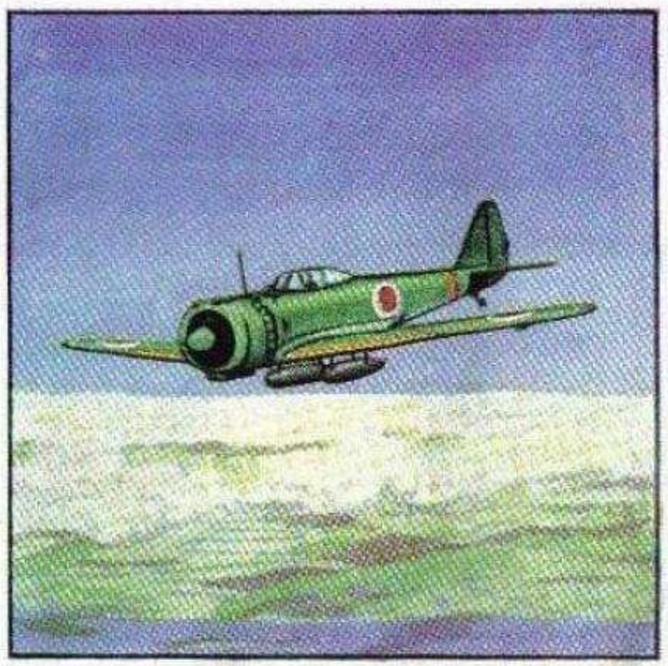
The red and white measuring pole on the right of the main drawing on the opposite page, and against all the other main drawings of land aeroplanes in this volume, is calibrated in feet, and is placed on a projection of the centre line of the aeroplane in plan view.



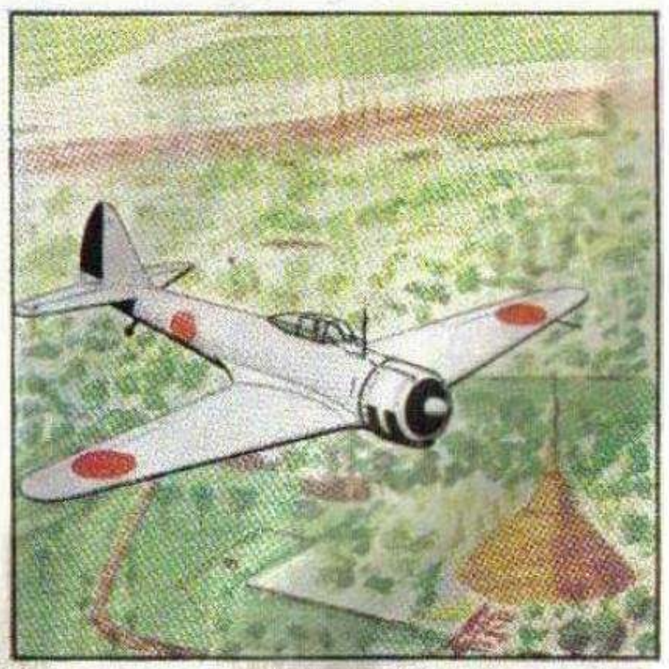




Oscar Model 1 . . .



with long-range fuel tanks . . .
(Off the mouth of the Kaleindaung, Burma)



and in light colour scheme.
(Over the Shwe Dagon Pagoda, Rangoon)

TOJO
ARMY 2 FIGHTER
NAKAJIMA

Japanese designations—Ki 44 and 442. Shoki

Models—1 and 2.

Duty—Fighter.

Designing company—Nakajima Aircraft Company, Ltd.

Layout—Low-wing cantilever monoplane.

Construction—Metal. May have fabric-covered control surfaces.

Crew—One.

Motor—Model 1. One 14-cylinder Nakajima air-cooled radial. 1,250 h.p. Model 2. One 14-cylinder Nakajima Type 2 air-cooled radial. 1,450 h.p.

Span—31 ft. 0 in.

Length—29 ft. 3 ins.

Maximum speed—Model 2, 380 m.p.h. at 17,000 ft.

Cruising speed—Model 2, 310–325 m.p.h. at 17,000 ft.

Estimated range—Model 2, 575–775 miles.

Service ceiling—Model 2, 39,000 ft.

Fuel—Model 2, Normal 89 Imperial gallons (107 U.S. gallons). Maximum 135 Imperial gallons (164 U.S. gallons).

Armament—Two 7·7 mm. and two 12·7 mm. M.G. Fixed forward firing.

British Official

TOJO, the smallest, and at one time, the most powerful Japanese fighter, was designed by the Nakajima Company, and is obviously a member of the same family as the Nakajima Army 97 fighter Nate. The resemblance is particularly noticeable in the similar characteristics both types possess on the ground, most easily seen in the three-quarter front view. On close examination Tojo shares quite a number of design features with the other Nakajima Army fighter, the 1941 Oscar.

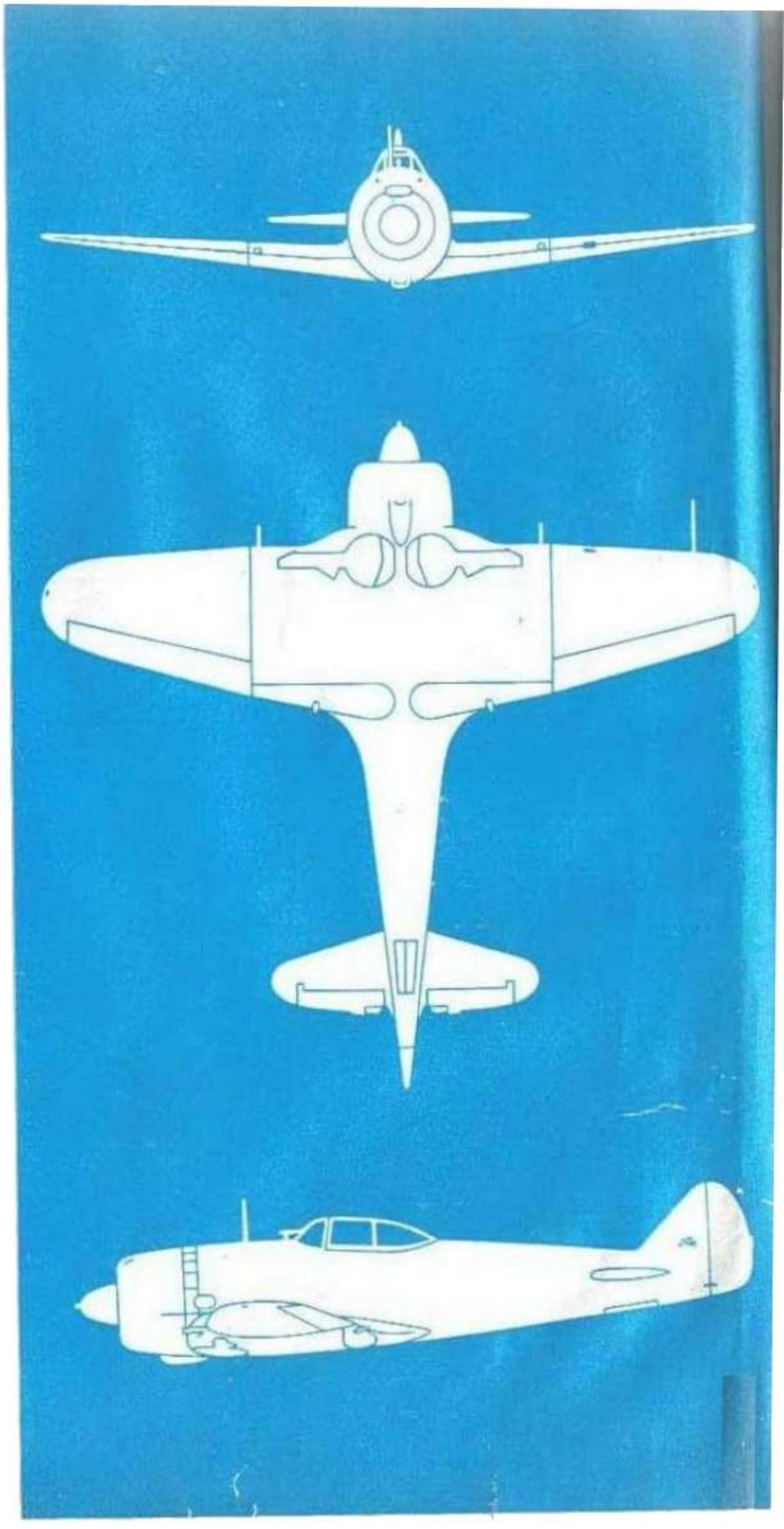
The Japanese are reported to have named this aeroplane *Shoki* (Heatwave) and two main versions are in service with the Army, although a number of variations of this type are known to exist. The most common type, the Model 1, has a short transparent cockpit cover, all of which slides aft to give access to the cockpit, and a similar cockpit enclosure is fitted to Oscar and Nate. The other main type, the Model 2, has a longer cockpit cover with the only movable panel directly above the pilot.

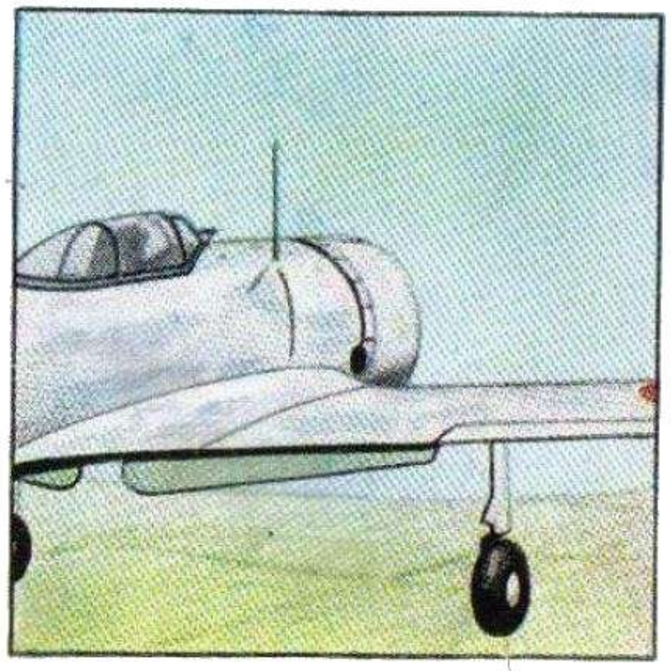
The first type has the radio mast mounted on the starboard side of the cowling, in front of the cockpit, while the mast of the later type is mounted on the actual cockpit cover.

The undercarriage covering varies appreciably. In the early Tojo the covering is attached to the undercarriage leg, with the lower section of the wheel-cover turning out at an angle of 90 degrees when the leg is in the down position ; while the later design, fitted to both Models 1 and 2, has half the wheel-cover attached to the underside of the fuselage, close to the centre line. In some instances the wheel-covering has been completely removed, leaving the only covering on the leg itself.

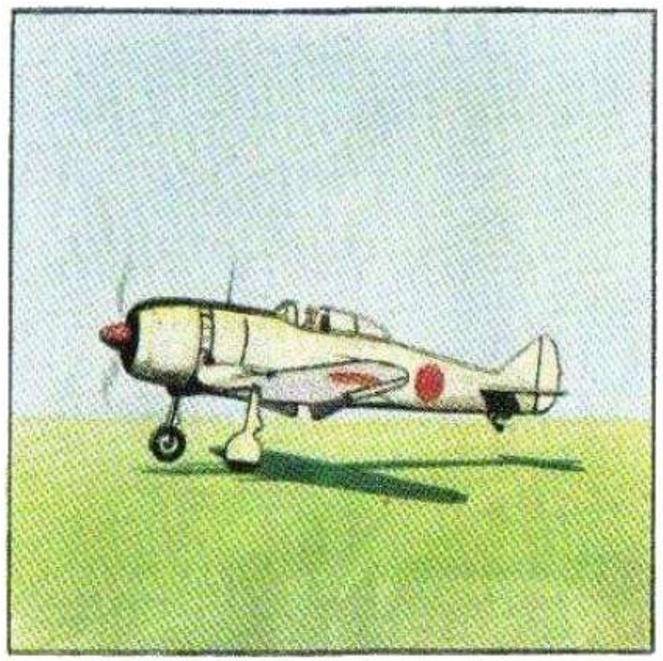
Tojos have been reported as being used in the Rabaul area, and have been in action against United States Navy Corsair fighters. The only other reports, so far, of this aeroplane have been from the Japanese home islands, where this type is one of the main home defence fighters. During January 1944, a number of Tojo fighters took part in a fly-past over Tokyo, along with other Army aeroplanes, making a total of 750. Many Tojos bear the mottled camouflage shown here on the Model 2 aeroplane in the main drawing, but some have been seen with dark green upper surfaces, and light blue undersides.

Tojo can carry two long-range drop fuel tanks under the centre section, and may be seen with long or short cockpit cover, with radio mast on the cowling or cockpit, and with or without the long-range fuel tanks.

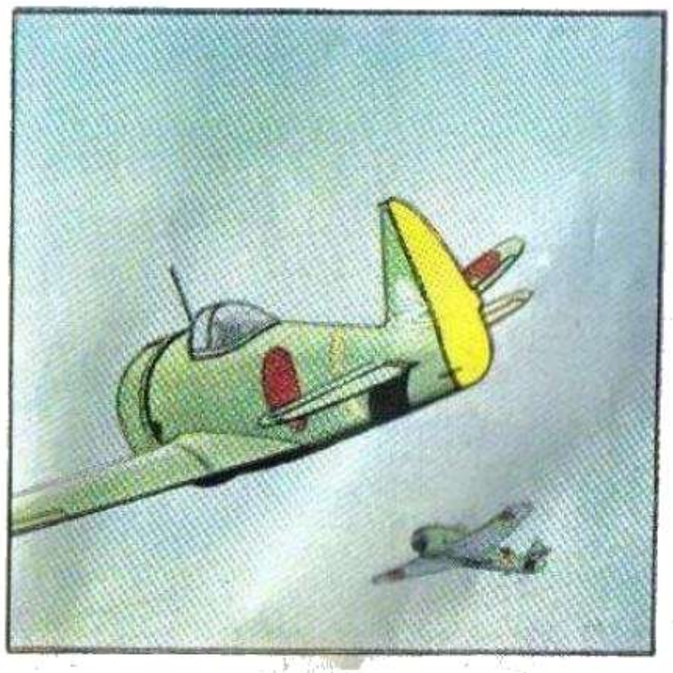




Tojo Model 1 without wheel covers . . .



and with complete cover fixed to undercarriage.



Tojo Model 1

TONY
ARMY 3 FIGHTER
KAWASAKI

Japanese designation—Ki 61. Hien

Model—1.

Duty—Fighter.

Designing company—Kawasaki Aircraft Engineering Company, Ltd.

Layout—Low-wing cantilever monoplane.

Construction—All-metal.

Crew—One.

Motor—One 12-cylinder Kawasaki Type 3 liquid-cooled inverted V. 1,100 h.p.
Two-speed supercharger.
Originally fitted with 1,060 h.p. Kawasaki Type 2.

Span—39 ft. 4 ins.

Length—28 ft. 9 ins.

Loaded weight—6,982 lb.

Maximum speed—356 m.p.h. at 17,000 ft.

Range—With maximum fuel 1,795 miles.

Service ceiling—35,100 ft.

Climb—2,340 ft./min. at 15,000 ft.

Fuel—248 Imperial gallons (299 U.S. gallons).

Armament—Four M.G. Fixed forward firing or,
Two 20 mm. cannon and two M.G. Fixed forward firing.

Bomb load—Up to two 500 lb. bombs.

British Official

TONY is a unique Japanese fighter, because, at the time of writing, it is the only fighter aeroplane in either the Japanese Army or Navy fitted with an in-line motor, and one of the only two Japanese operational aeroplanes to have this type of motor.

Although the Mitsubishi and Nakajima companies have, for a long time, favoured the use of radial motors, the Kawasaki Company have concentrated on producing aeroplanes with in-line motors, and these are shown in detail in the Kawasaki history on pages 56 and 57. The last Japanese aeroplane to go into service with an in-line motor was the now obsolete Kawasaki Army 98 bomber Mary. A break in the series of Kawasaki aeroplanes equipped with in-line motors came with the introduction of the Army 99 Lily two-motor bomber, and continued with the Army 2 Nick two-motor fighter.

At the present time Tony is easily recognized because of its motor installation, but it must be borne in mind that further Japanese types may appear with the liquid-cooled in-line type of motor.

This in-line motor fitted to Tony is a 1,100 h.p. 12-cylinder Kawasaki Type 3 inverted V, with two-speed supercharger, presumably developed from the German DB-601 motor, for which the Kawasaki Company hold a building licence. The earlier Kawasaki motors were B.M.W. upright V types, built under licence.

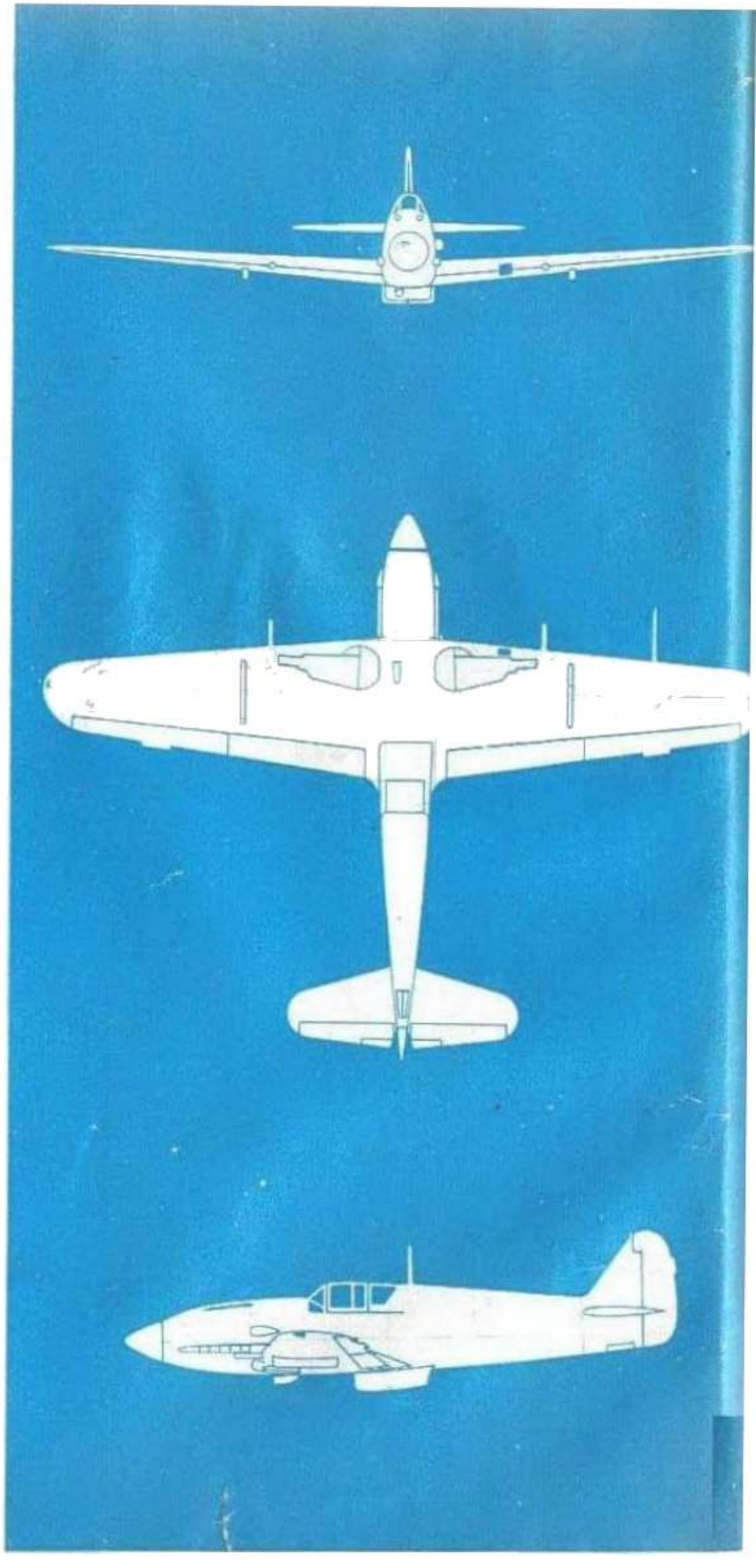
Tony more closely resembles the British type of fighter, in particular the Hurricane, in layout and size, than do the other Japanese aeroplanes.

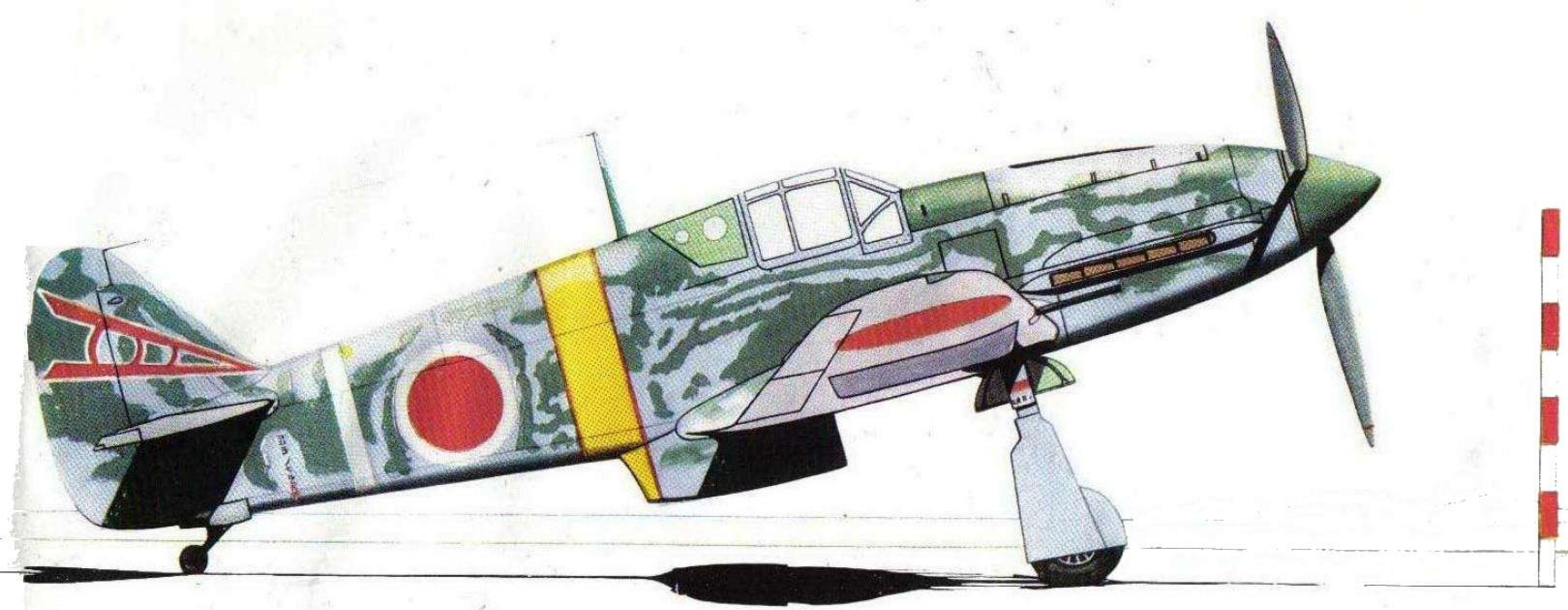
The first Tony to be captured intact by the Allies was the one shown in the main drawing. It was found on the aerodrome at Cape Gloucester in New Britain. In addition, another in good condition was captured at Lae. Tony has also operated from Vunakanau aerodrome near Rabaul (also in New Britain), from Dagua aerodrome in New Guinea, and in the Admiralty Islands.

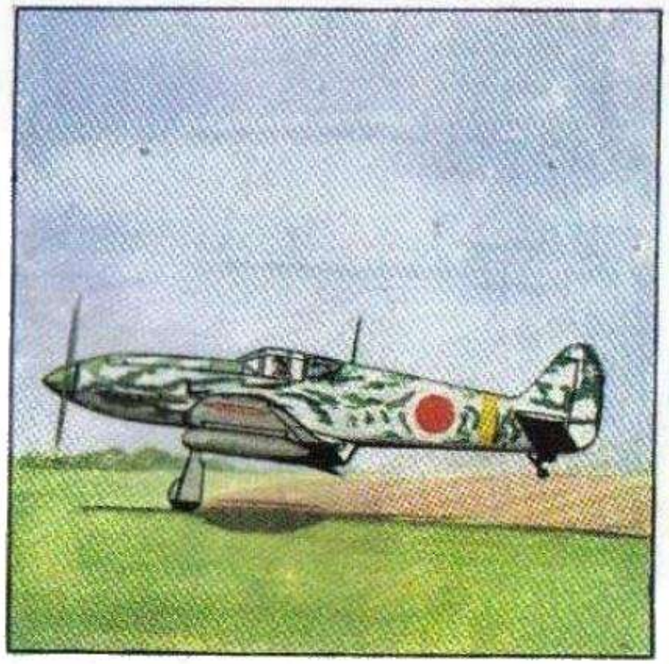
Tony appears to be of more robust construction than earlier Japanese fighters, it has armour plate behind the pilot, and a wide track undercarriage to facilitate operations from rough aerodromes and landing strips. An interesting structural detail is the fact that the whole rear of the aeroplane can be removed just forward of the tailplane. The racks attached to the underside of both wings outboard of the undercarriage can carry either a long-range drop fuel tank, or a 500 lb. bomb.

The yellow and white stripes running round the fuselage of the aeroplane in the main drawing are used for identification, while the Kana instructions painted on the rear of the fuselage read Kokora Noseru, which means "rest here," or "place on trestle at this point."

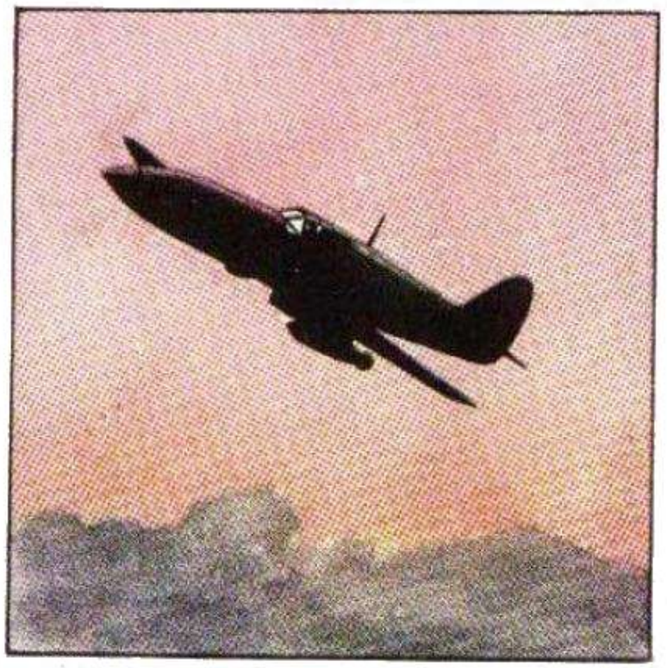
This aeroplane may be seen with or without cannon, and with or without bombs or long-range fuel tanks.



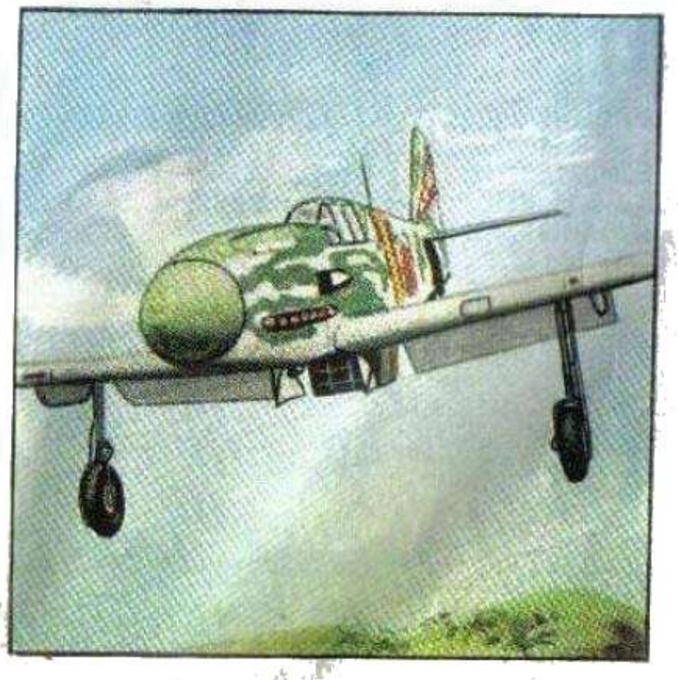




Tony can carry long-range fuel tanks . . .



or bombs . . .



and has an in-line motor.

ZEKE (MODELS 1-1, 2-1, 2-2, and 5-2)
NAVY 0 FIGHTER
MITSUBISHI

Japanese designations—A6M1, 2, 3 and 5. Reisen
Models—1–1, 2–1, 2–2 and 5–2.
Duty—Carrier-borne and shore-based fighter.
Designing company—Mitsubishi Heavy Industries, Ltd.
Layout—Low-wing cantilever monoplane.
Construction—Metal with stressed skin. Fabric-covered control surfaces.
Crew—One.
Motor—Models 1–1 and 2–1. One 14-cylinder Nakajima *Sakae* (Prosperity) Model 12 air-cooled radial. 955 h.p. at 14,500 ft.
Model 2–2. One 14-cylinder Nakajima *Sakae* Model 21 air-cooled radial. 930 h.p. at 18,600 ft. Two-speed supercharger.
Model 5–2. One 14-cylinder Nakajima *Sakae* Model 31 air-cooled radial.
Span—Models 1–1, 2–1 and 2–2, 39 ft. 5 ins. Model 5–2, 36 ft. 2 ins.
Length—Models 1–1 and 2–1, 29 ft. 8 ins. Models 2–2 and 5–2, 29 ft. 9 ins.
Wing area—Models 1–1, 2–1 and 2–2, 256 sq. ft.
Empty weight—Models 1–1 and 2–1, 4,500 lb.
Loaded weight—Models 1–1 and 2–1, 5,555 lb. Model 2–2, 5,650 lb.
Wing loading—Models 1–1 and 2–1, 21·7 lb./sq. ft.
Maximum speed—Models 1–1 and 2–1, 328 m.p.h. at 16,000 ft. Model 2–2, 341 m.p.h. at 20,500 ft. Model 5–2, 370 m.p.h.
Cruising speed—Models 1–1 and 2–1, 280 m.p.h.
Normal range—Models 1–1 and 2–1. With normal fuel and bomb load, 1,108 miles.
Maximum range—Models 1–1 and 2–1, 1,580 miles.
Model 2–2. With maximum fuel and no bomb load, 1,595 miles.
Service ceiling—Models 1–1 and 2–1, 38,600 ft. Model 2–2, 39,900 ft.
Climb—Models 1–1 and 2–1, 2,560 ft./min. at 14,500 ft. Model 2–2, 2,560 ft./min. at 18,600 ft.
Fuel—All models 189 Imperial gallons (228 U.S. gallons).
Armament—All models. Two 20 mm. cannon and two 7·7 mm. M.G. Fixed forward firing.
Bomb load—Two 132 lb. bombs believed standard for all models.

U.S.A.A.F.

ZEKE, popularly known as the Zero because of its type number 0, was the first of the new Japanese aircraft to become generally known. A Mitsubishi design, Zeke was used as an escort fighter and ground attack aeroplane during the Japanese attack on units of the United States Navy at Pearl Harbour and other military targets in the area on 7 December, 1941. Zekes were flown from aircraft carriers for this operation, as they have been on many occasions since, including the big carrier engagements during the attempted Japanese invasion of Midway.

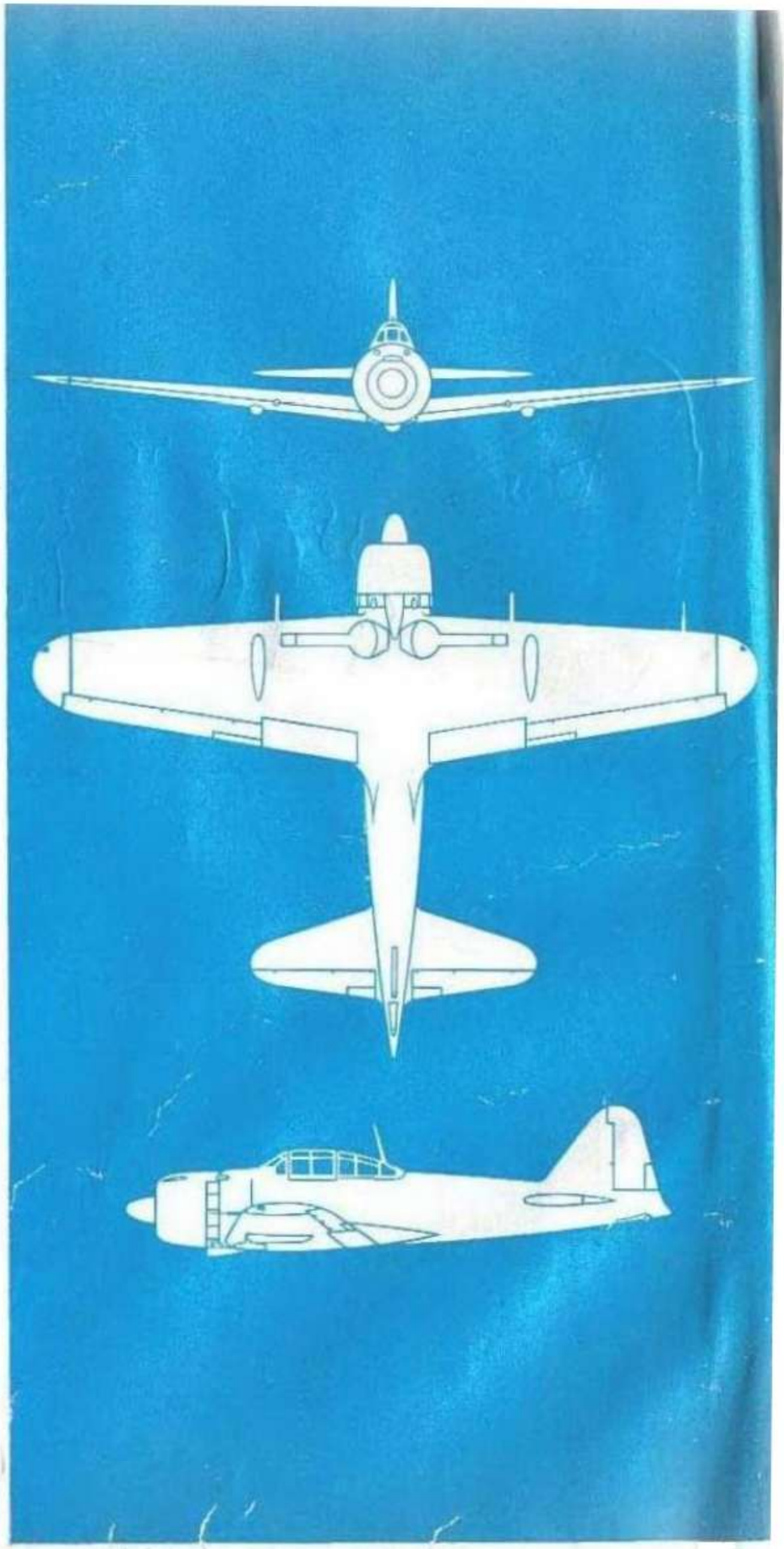
The wings of the Zeke are hinged to fold upwards about 2 ft. in from the tips to facilitate stowage aboard aircraft carriers. The first version to incorporate this feature was the Model 2–1. The wing tips on the original Zeke, the Model 1–1 did not fold. An interesting feature of the Zeke is the fact that the wing is built integral with the fuselage, and cannot be folded or detached. This method of construction reduces weight and increases the strength of the structure, but has certain obvious disadvantages.

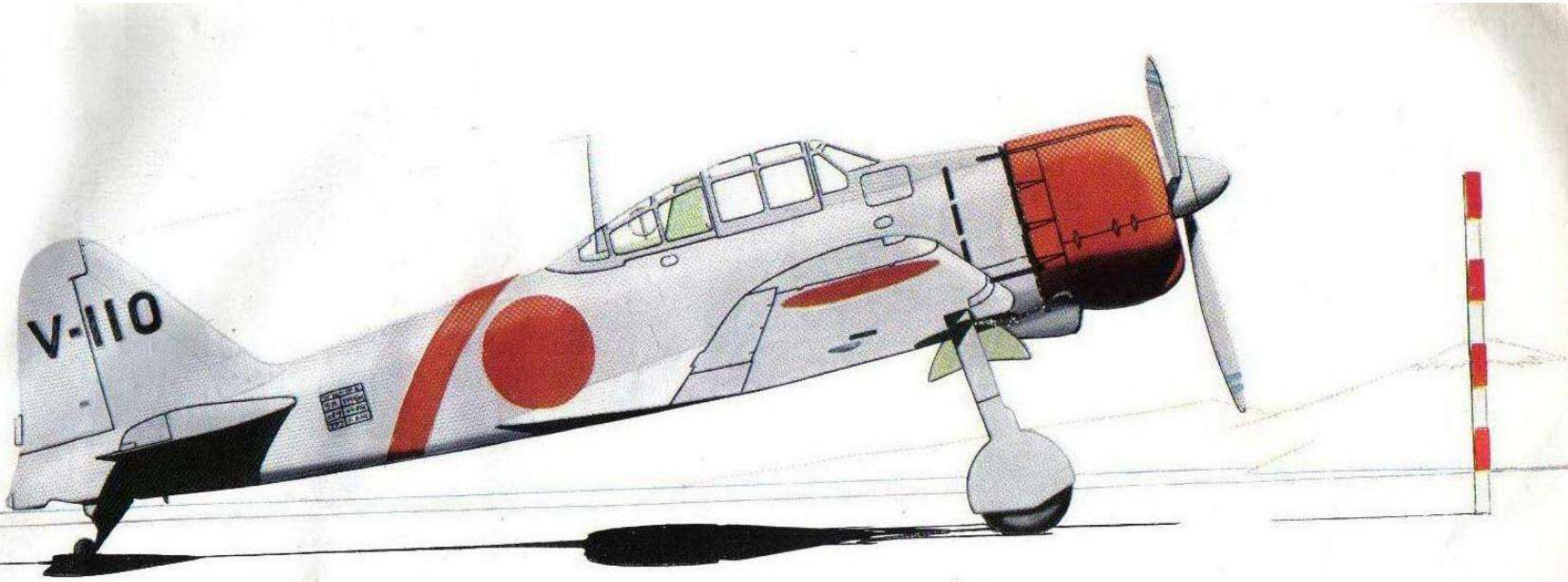
The first Zeke to be captured reasonably intact was shot down in New Guinea, and appears in the main drawing on the opposite page. In June 1942 a four-month-old Zeke built in the Mitsubishi factory was among those escorting bombers making a raid on Dutch Harbour—this particular Zeke did not return. The pilot made a forced landing on the marshy Aleutian Islands, and the Zeke turned upside down, its pilot being killed. The aeroplane was only slightly damaged, and has been salvaged and test flown in the United States, and it is this aeroplane which appears in the photograph on page 52. When this Zeke was discovered it was found to be finished with a film of rust-resisting lacquer, and after painting in standard U.S. Navy colours the weight was increased by 8 lb., and the speed decreased by about 15 m.p.h.

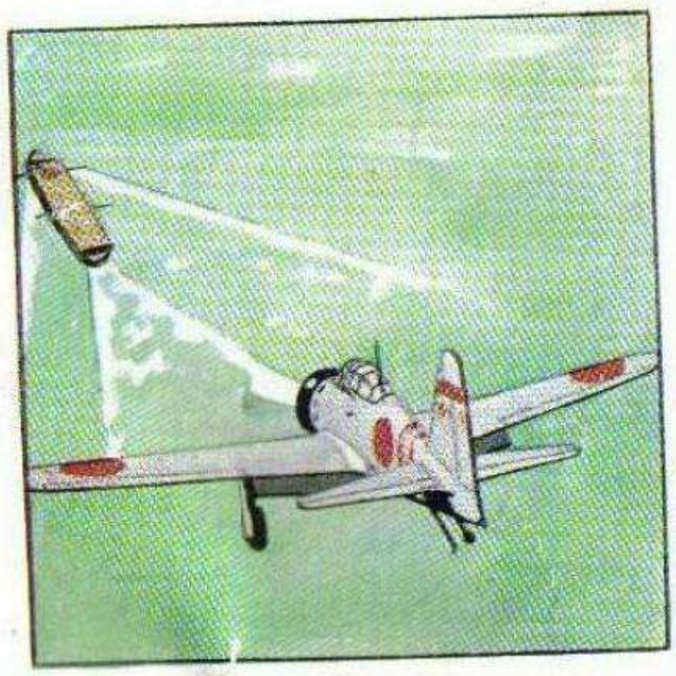
Zeke has been encountered throughout the Pacific area in the Aleutians, the Gilbert Islands, the Solomons, in New Guinea, and at Paramushiru. Zeke has also been used in China, and at least one has been captured and bears Chinese markings, as shown in the photograph on this page. Acting as escorts to bombers, Zekes operated against Australia from Timor, using long-range drop fuel tanks carried one under the fuselage of each aeroplane. Numbers of these tanks fell on shore, and they were found to be of two types, some constructed of metal and others of wood.

In September 1943 a new development of Zeke was found on the Munda aerodrome. This new version, the Model 2–2, has the Nakajima *Sakae* Model 21 motor, bomb or long-range fuel tank racks, one under each wing outboard of the undercarriage, and a new inset rudder trim tab. A still later version, the Model 5–2, has a shorter wing span and a *Sakae* Model 31 motor. This model is now the most used.

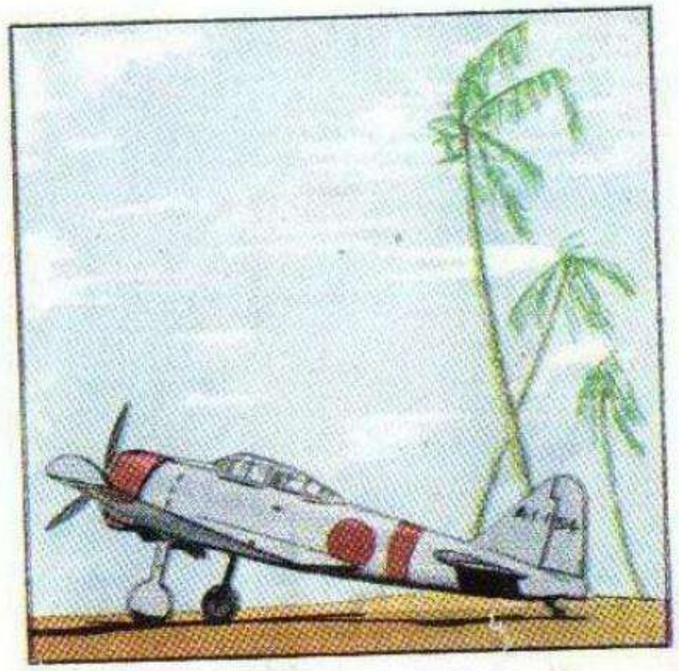
Although a Mitsubishi design, Zeke is thought to be built also by the Nakajima Company.







Zeke is carrier-borne . . .
(Approaching the carrier *Ryuzyo*)



and shore-based. Has folding wing-tips . . .
(At Tarawa)

and night flying equipment.
(With long-range fuel tank)

ZEKE (MODEL 3-2)
NAVY 0 FIGHTER
MITSUBISHI

Japanese designation—A6M3 modified.

Model—3–2.

Duty—Carrier-borne and shore-based fighter.

Designing company—Mitsubishi Heavy Industries, Ltd.

Layout—Low-wing cantilever monoplane.

Construction—Metal with stressed skin. Fabric-covered control surfaces.

Crew—One.

Motor—One 14-cylinder Nakajima *Sakae* (Prosperity) Model, 21 air-cooled radial. 930 h.p. at 18,600 ft. Two-speed supercharger.

Span—36 ft. 2 ins.

Length—29 ft. 9 ins.

Empty weight—4,700 lb.

Loaded weight—5,650 lb.

Maximum speed—348 m.p.h. at 20,600 ft.

Cruising speed—235 m.p.h. at 16,000 ft.

Normal range—With normal fuel and bomb load, 1,100 miles.

Maximum range—With maximum fuel and no bomb load, 1,585 miles.

Service ceiling—35,900 ft.

Climb—2,940 ft./min. at 18,600 ft.

Fuel—Normal 89 Imperial gallons (107 U.S. gallons). Maximum 189 Imperial gallons (228 U.S. gallons).

Armament—Two 20 mm. cannon and two 7·7 mm. M.G. Fixed forward firing.

Bomb load—Two 132 lb. bombs.

British Official

ZEKE Model 3–2, originally known as Hap and until recently as Hamp, is the third modification of the Zeke Model 1 airframe, the main modification being the fitting of square-tipped wings. Although it was not seen in service until encountered by a U.S.A.A.F. Boeing Fortress over New Guinea, in September 1942, it bears the same type number as the earlier Zeke, being essentially the same design.

Zeke Model 3–2, like the other Zeke Models, is a conventional low-wing, single-motor monoplane fighter, having the light weight construction and extreme manœuvrability which is a common feature in so many Japanese aeroplanes, both past and present.

The motor fitted to this model is the 930 h.p. Nakajima *Sakae* Model 21, being the same type of motor as that supplying the power for the Zeke Model 2–2 fighter. This motor has an output of 25 h.p. less than the *Sakae* Model 12 in the Zeke Models 1–1 and 2–1, but maintains its power at over 4,000 feet greater height.

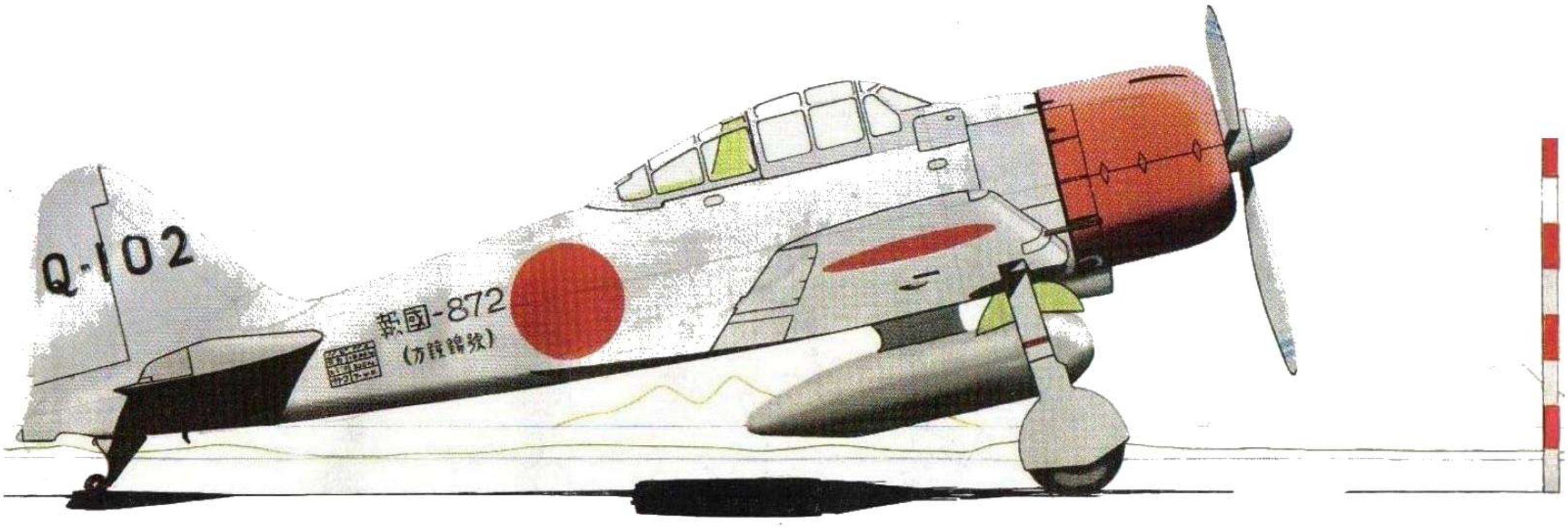
Designed as a carrier-borne fighter, and fitted with a deck arrester hook under the rear of the fuselage, this Zeke has been used mostly from shore bases throughout the Pacific, and has definitely been seen at Munda (New Georgia), Lae (New Guinea), Rabaul (New Britain), Vila on Kolombangara (Solomons), Roi in the Kwajalein Atoll (Marshall Islands), and at Paramushiru. It has been encountered at night over Bougainville Island, has full night flying equipment, and can also carry a long-range drop fuel tank under the fuselage.

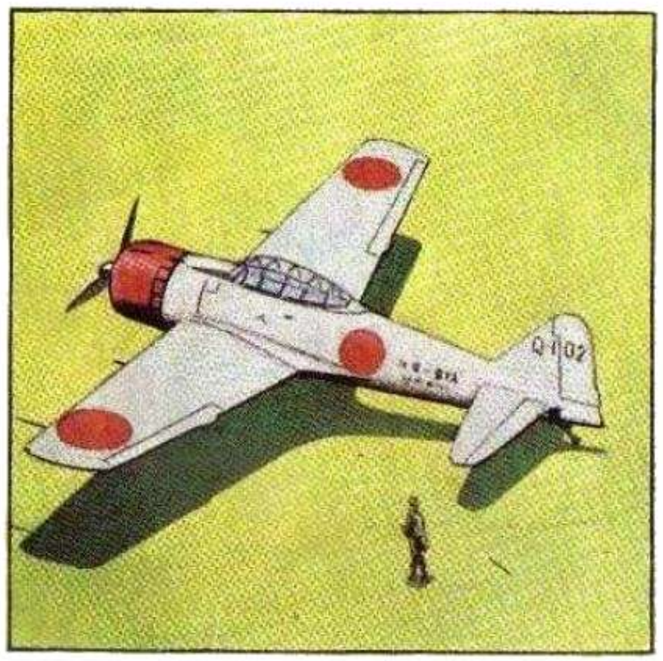
Parts of five crashed Zeke Model 3–2 fighters, shot down over the Buna airstrip in New Guinea, were shipped to Australia early in 1943, and one complete aeroplane was rebuilt from them and test flown at Brisbane in June of that year. This aeroplane was given United States identification markings, and a U.S. Army serial number, and a photograph of it appears on page 52.

A number of these aeroplanes, normally painted a light blue-grey on all surfaces, have been seen with the Japanese word *Hokokugo*, followed by a number, on the side of the fuselage. *Hokokugo* means Patriotism, and indicates that this particular aeroplane was presented to the service by public subscription, and the Zeke, *Hokokugo*–872, shown in the main drawing and photograph, was the 872nd of these publicly subscribed aeroplanes ; it was captured almost intact by the Allies.

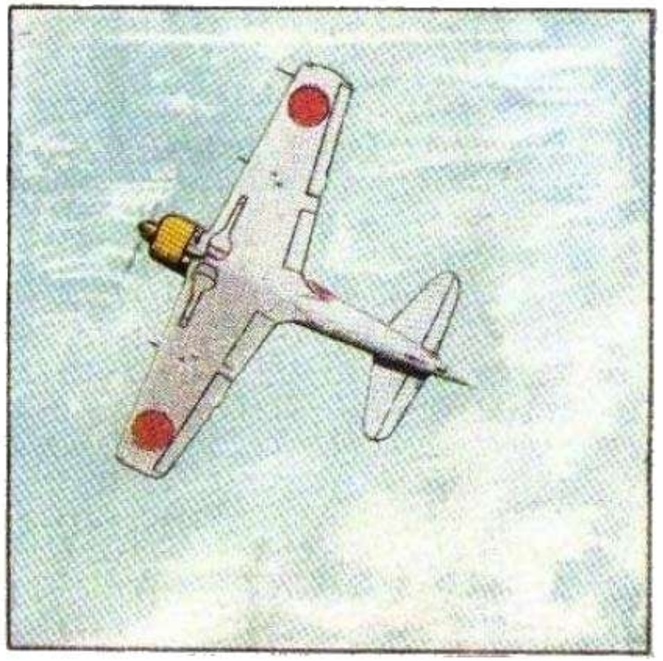
Reports suggest that the Zeke type of fighter is not only built by the designing company, Mitsubishi, but also by Nakajima. The panel bearing Japanese ideographs on the rear of the fuselage gives details of the empty and laden weights, together with the date of manufacture.

This aeroplane may be seen with or without main radio mast, and with or without a long-range fuel tank.

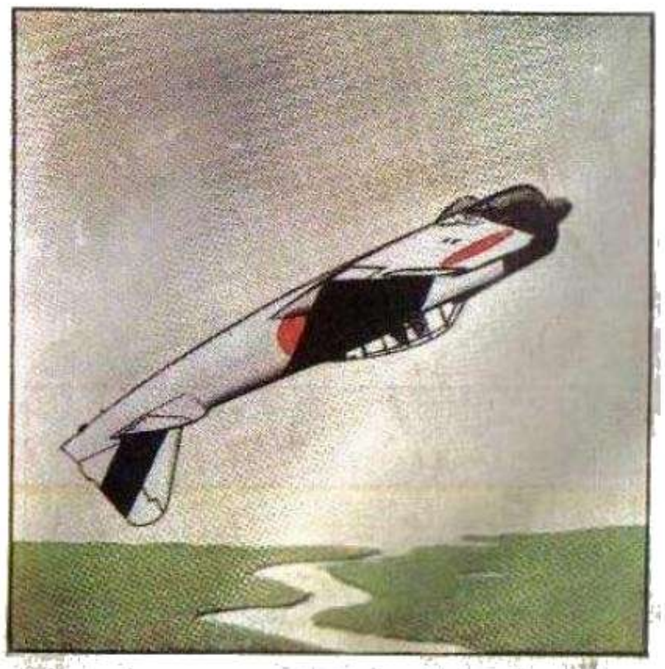




Zeke Model 3-2 . . .



has square cut wing tips . . .



and is very manœuvrable.
(Over Sumatra jungle)

JILL
NAVY TENZAN TORPEDO-BOMBER
NAKAJIMA

Japanese designation—B6N2 *Tenzan* (Heavenly Mountain).

Model—1-2.

Duty—Carrier-borne and shore-based torpedo-bomber.

Designing company—Nakajima Aircraft Company, Ltd.

Layout—Low-wing cantilever monoplane.

Construction—Metal. May have fabric-covered control surfaces.

Crew—Three.

Motor—One 14-cylinder Mitsubishi *Kasei* (Mars) Model 25 air-cooled radial. About 1,500 h.p.

Span—48 ft. 6 ins.

Length—35 ft. 0 in.

Maximum speed—310 m.p.h. at 19,500 ft.

Range—1,600 miles.

Armament—One 7·7 mm. M.G. firing from rear cockpit, and one under fuselage.

Bomb load—One 1,764 lb. torpedo (offset to starboard) or six 220 lb. bombs carried externally.

Jill may be fitted with either two or four-bladed metal airscrew.

No other details available for publication.

U.S. Office of War Information

JILL is the new Nakajima Navy torpedo-bomber now superseding Kate, which was a Nakajima design introduced in 1937, and which, although outdated, is still in service.

This new type is essentially similar to Kate in layout, but has a new motor of greater power, and the design has been generally cleaned up with a consequent improvement in performance.

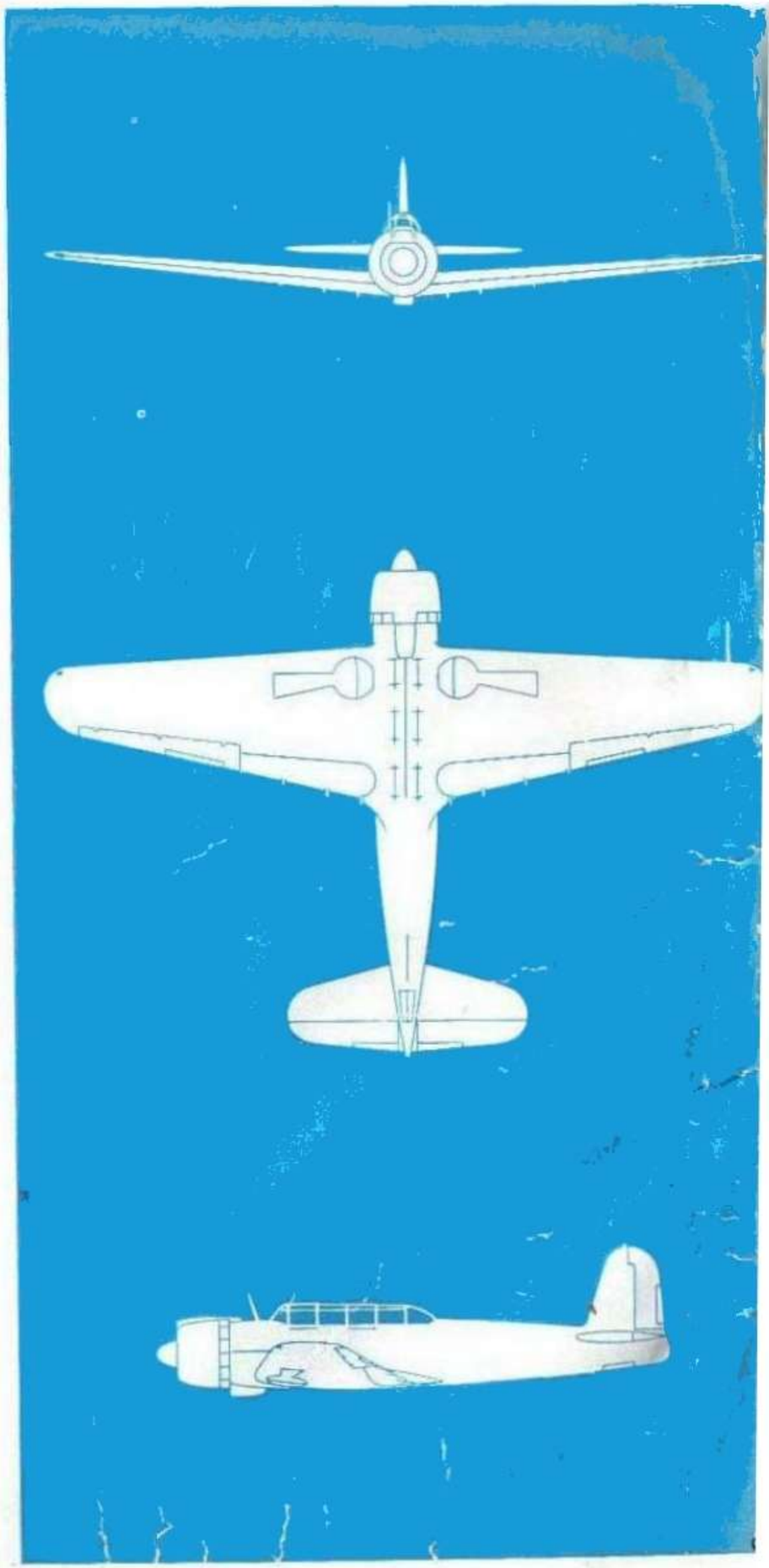
Jill was first seen in action when six of these aeroplanes made close range torpedo attacks on a United States carrier force, themselves engaged in attacking the Marshall Islands on 4 December, 1943. This attack by the Jill torpedo-bombers was pressed home with determination. Some extremely good action film was taken from one of the United States carriers showing Jills flying in to the attack, releasing their torpedoes, and flying close alongside the carrier. Two of the bombers were seen to be hit by the carrier's guns, and in each case the aeroplane caught fire, and shed a wing, while the undercarriage dropped into the down position before the bomber dived into the sea. The photographs on this page, and on page 55, are " stills " from this film, and they were the first photographic evidence of this type. Another attack by Jill torpedo-bombers was made against United States aircraft carriers off Truk, in the Caroline Islands.

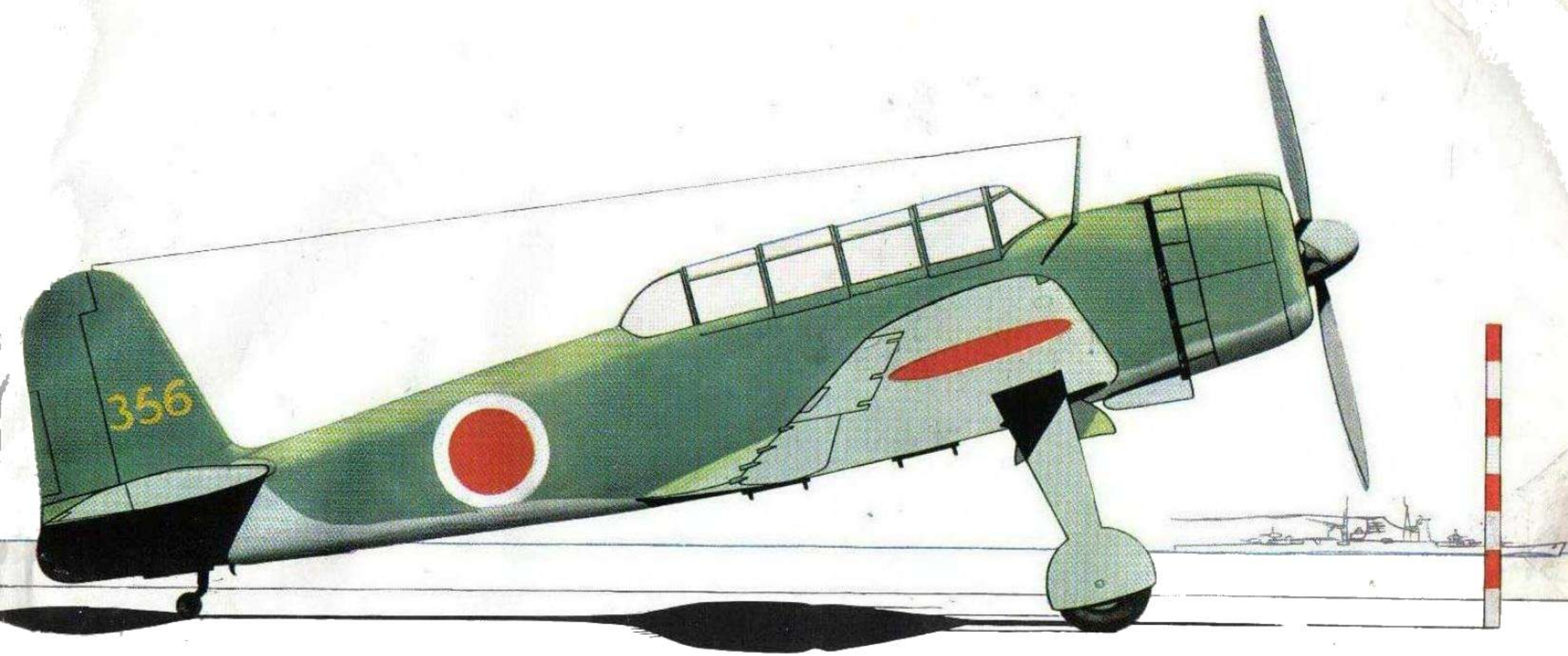
Although primarily a torpedo-bomber, Jill can be used as a light bomber. The bomb load is carried externally.

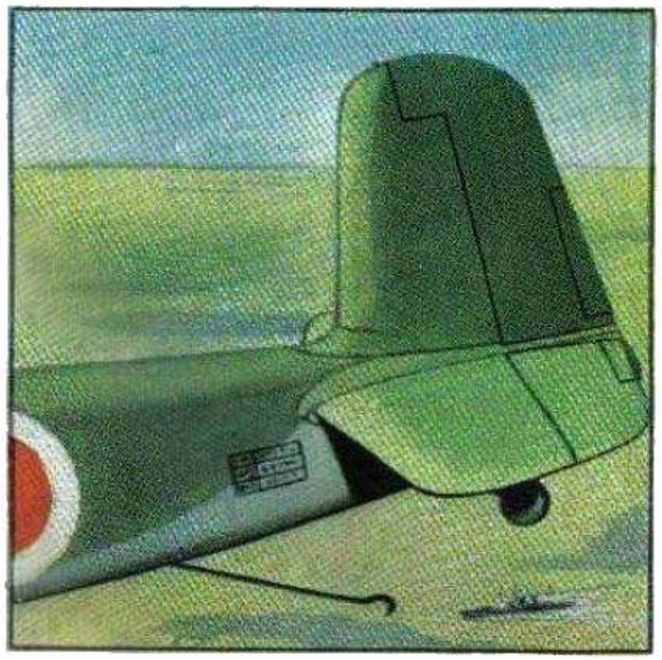
Jill is both carrier-borne and shore-based, and there are two or three versions in service; some have two-blade metal airscrews, while others are known to have the four-blade type.

Most Jill type aeroplanes have been seen with the fin shown in the main drawing, but there is now photographic evidence showing a modification of this aeroplane with the leading edge root of the fin extending to a point in front of the now narrower chord tailplane. This later type has a modified rudder and a vertical radio mast in place of the swept-forward mast on the earlier type. The four flap guides protruding from the trailing edge of the wing are a Nakajima design feature, there being one guide on each wing of the Oscar and Tojo fighters, and three on each wing of the Helen bomber.

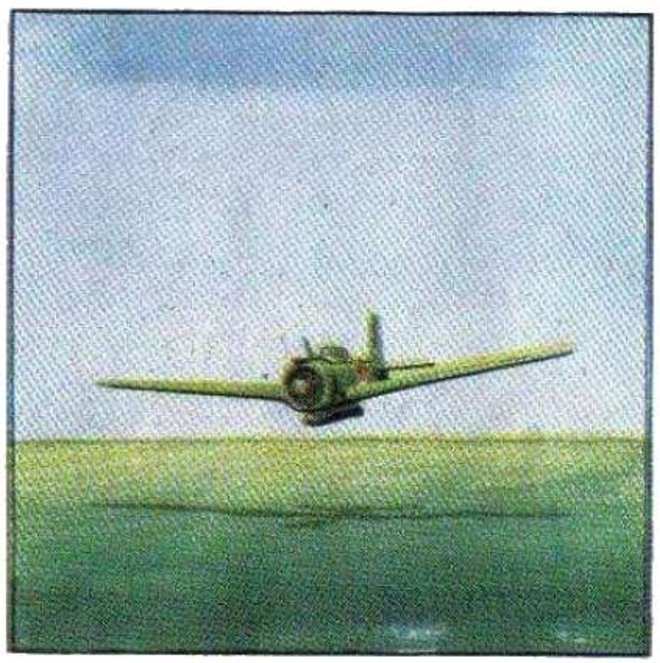
The ship in the background of the main drawing is the 8,500-ton Japanese Cruiser *Mogami* (named after one of the swiftest-flowing rivers in Japan); it was completed in 1935.



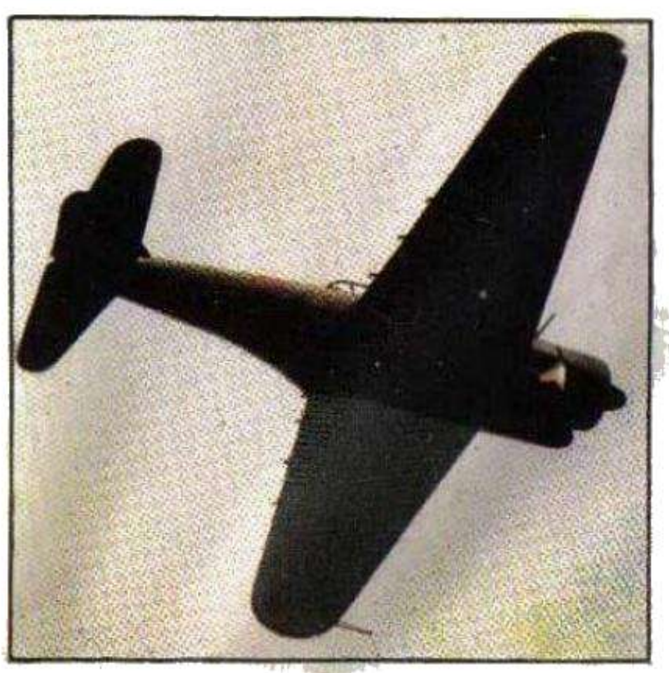




Jill is a carrier-borne . . .



torpedo-bomber monoplane.



One version has narrow chord tailplane.

JUDY

NAVY SUISEI DIVE-BOMBER YOKOSUKA

Japanese designations—D4Y1 and D4Y1-C *SUISEI* (Comet).

Model—1–1.

Duty—Carrier-borne and shore-based reconnaissance dive-bomber.

Designed by—Yokosuka Naval Air Arsenal.

Assembled by—Yokosuka and Aichi (mostly by the latter).

Layout—Mid-wing cantilever monoplane.

Construction—Metal. May have fabric-covered control surfaces.

Crew—Two.

Motor—One 12-cylinder Aichi *Atsuta* (name of shrine in Prefecture of Aichi) Model 21 liquid-cooled inverted V. 1,160 h.p. at 14,800 ft. Two-speed supercharger.

Span—37 ft. 10 ins.

Length—33 ft. 7 ins.

Loaded weight—8,060 lb.

Maximum speed—326 m.p.h. at 16,500 ft.

Maximum range—With maximum fuel 2,500 miles.

Service ceiling—31,700 ft.

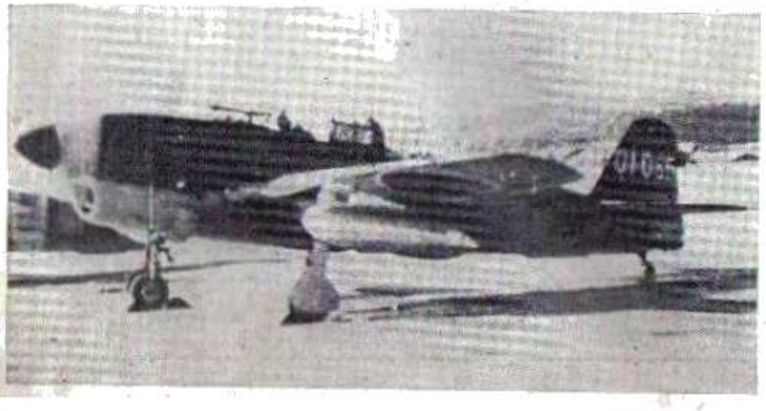
Climb—2,050 ft./min. at 14,800 ft.

Fuel—372 Imperial gallons (449 U.S. gallons).

Armament—Two M.G. Fixed forward firing.

Bomb load—One 550 lb. bomb internally stowed and one 132 lb. bomb or a long-range fuel tank under each wing.

*The Model 3–3, with a radial motor, appears on page 61.



British Official

JUDY is the new Navy dive-bomber designed to replace the 1939 Aichi Navy dive-bomber Val.

Judy, at the time of writing, holds the same unique position in the Japanese Navy as that occupied by Tony in the Army, Judy being the only in-line motored type in the Navy's service. The last single-motor Navy aeroplane with an in-line motor was the 1932 Aichi 92 reconnaissance biplane with an Aichi built Lorraine liquid-cooled motor.

The power plant fitted to Judy is a 1,160 h.p. 12-cylinder Aichi *Atsuta* Model 21 inverted V, with two-speed supercharger. Like the Kawasaki Type 3 motor in Tony, the *Atsuta* is also probably based on the German DB-601, as the Aichi Company also holds a licence for building this type of motor.

Very little information is available on this aeroplane, and it is not yet possible to mention any actions in which this aeroplane has played a part.

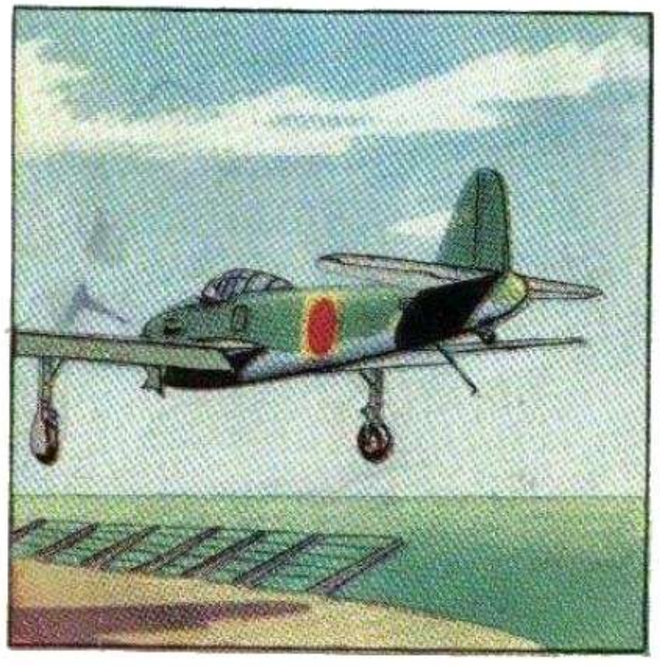
Although Judy was designed as a carrier-based aeroplane, and has a deck arrester hook under the rear of the fuselage, this type is known to operate also from shore bases. The bomb load is carried in a bomb compartment in the fuselage beneath the forward cockpit, and the bomb bay is enclosed by two doors.

Long span flaps extending from the short ailerons to the fuselage are probably used as dive-brakes for attacks involving prolonged dives.

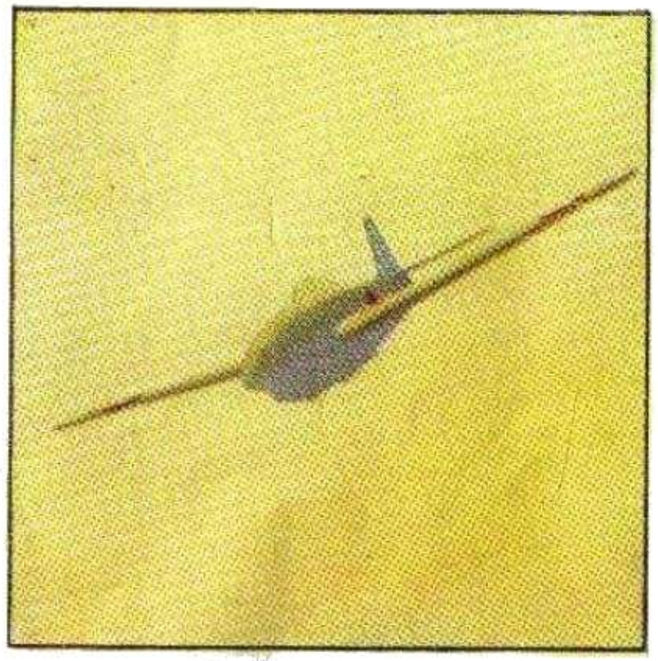
The wide track undercarriage retracts inwards, and is completely housed in the wing, while the tail wheel retracts backwards and is completely covered by a hinged door.

Judy is the first of the new operational types to be produced by the Yokosuka Naval Air Arsenal. The Imperial Naval Dockyard at Yokosuka was building floatplanes as long ago as 1919. The new two-motor Frances is also a Yokosuka design.

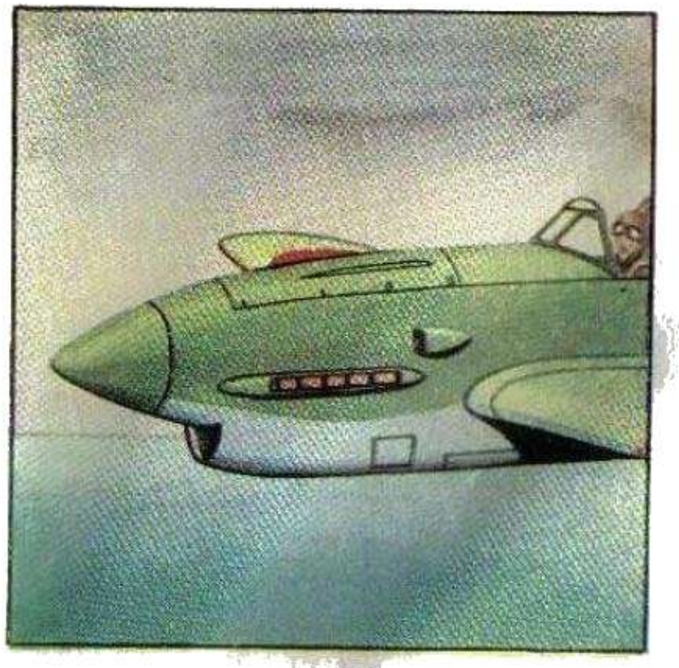
The ship in the background of the main drawing is a Japanese *Hubuki* class destroyer. The *Hubuki* was formally known as the *Fubuki* (Blizzard).



Judy is a carrier-borne . . .



dive-bomber monoplane . .



with an in-line motor.

KATE

NAVY 97 TORPEDO-BOMBER

NAKAJIMA

Japanese designation—B5N2.

Model—1–2.

Duty—Carrier-borne and shore-based torpedo-bomber.

Designing company—Nakajima Aircraft Company, Ltd.

Assembled by—Nakajima, Aichi and Hiro Naval Yard.

Layout—Low-wing cantilever monoplane.

Construction—Metal with stressed skin. Believed to have fabric-covered control surfaces.

Crew—Three.

Motor—One 14-cylinder Nakajima *Sakae* (Prosperity) Model 11 air-cooled radial. 985 h.p. at 7,500 ft.

Span—50 ft. 11 ins.

Length—33 ft. 11 ins.

Maximum speed—222 m.p.h. at 8,500 ft.

Range—Normal fuel and maximum bomb load 1,220 miles.

Service ceiling—23,800 ft.

Climb—1,190 ft./min. at 7,500 ft.

Fuel—Maximum 322 Imperial gallons (388 U.S. gallons).

Armament—Two 7·7 mm. fixed forward firing M.G. and one or two movable rear 7·7 mm. M.G.

Bomb load—One externally carried 1,764 lb. torpedo or up to three 250 lb. bombs.

British Official

KATE has been the standard Japanese Navy torpedo-bomber since 1937, although it is now being replaced by the Nakajima Navy *Tenzan* Jill.

The accepted Kate is the Nakajima Navy 97 Model 1–2 three-seat monoplane, with a 14-cylinder 985 h.p. Nakajima *Sakae* Model 11 motor, but the code name also applied to two earlier versions, both of which were equipped with a 9-cylinder 700 h.p. Nakajima *Hikari* (Splendour) motor. In addition to the Nakajima design, the Mitsubishi Company built an aeroplane to the same specification which went into service in smaller numbers also under the type number 97. The Mitsubishi design is also generally known by the code name Kate.

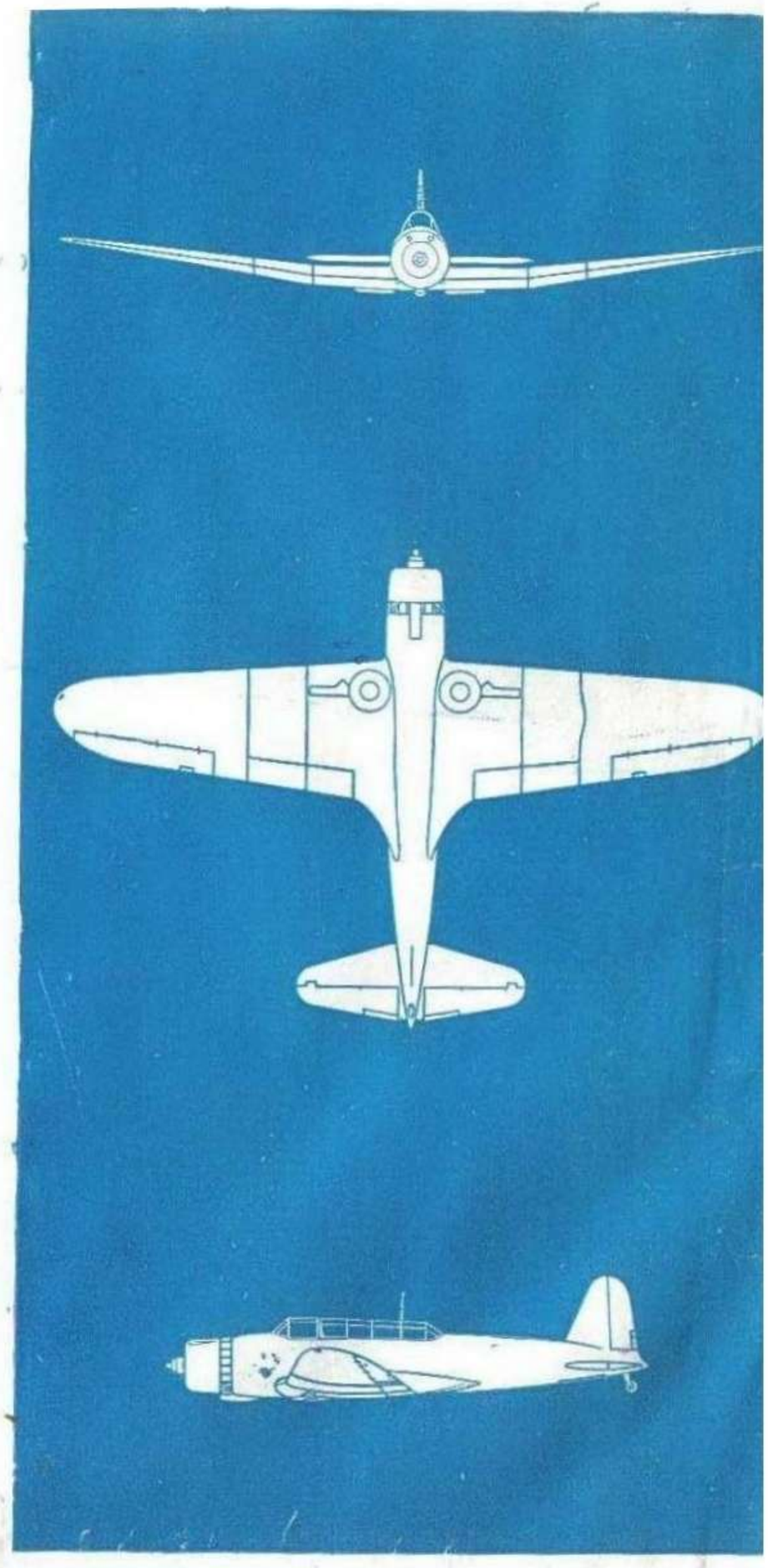
The Nakajima Kate was used by the Japanese Navy in the attack on Pearl Harbour, and a number were shot down. The Kate bombers employed on this raid were painted yellow and red, presumably for bravado, as this colour scheme has not been seen since the first "surprise" attack. From films taken by the Japanese of the "take-off" for Pearl Harbour, the carrier from which the Kate aircraft operated appears to have been the 20,000-ton *Syokaku* (Crane), formerly known as the *Shokaku*, and only completed in 1941. The photograph on this page is a "still" from the Japanese film of the Pearl Harbour raid, and shows a Kate "taking-off," while the aircraft carrier shown in the background of the main drawing is the *Syokaku*.

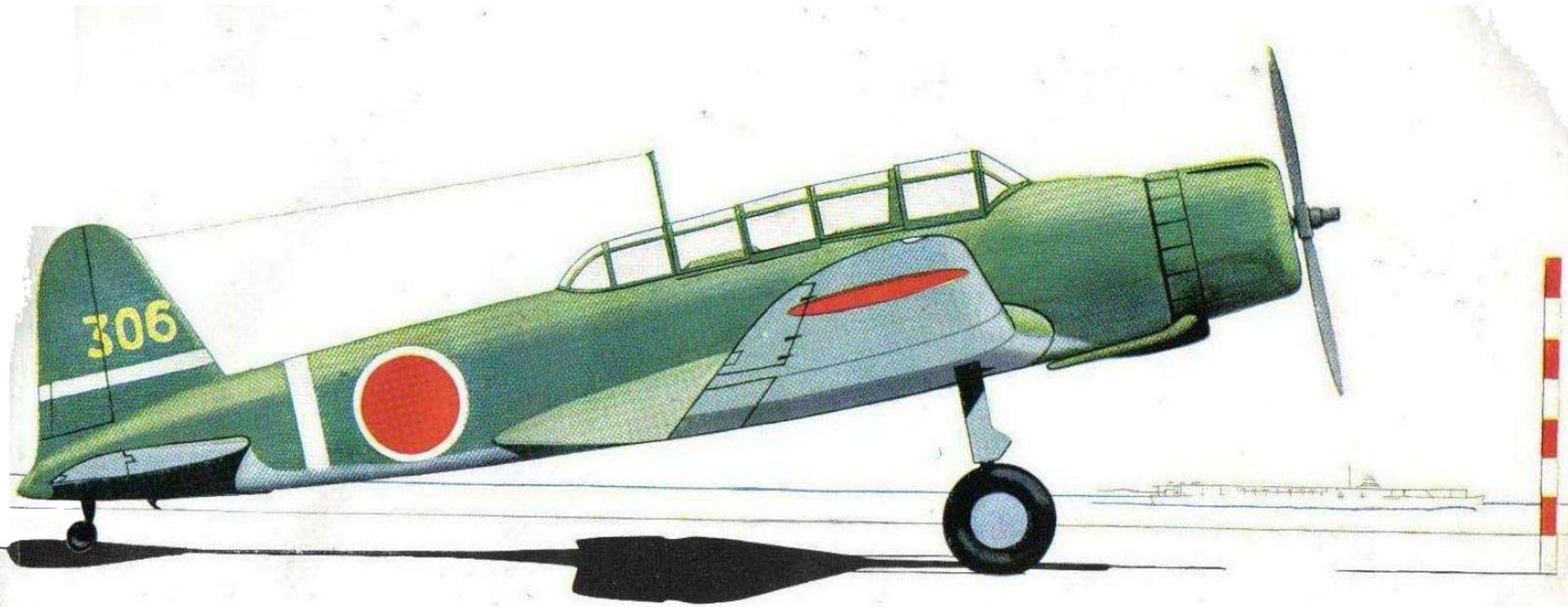
Kate was used throughout the Pacific, and was probably in on the sinking of the British capital ships *Prince of Wales* (35,000 tons) and *Repulse* (32,000 tons) in the South China Sea on 10 December, 1941, although credit for the sinkings has normally been given to the obsolete Nakajima Navy 96 torpedo-bomber biplane.

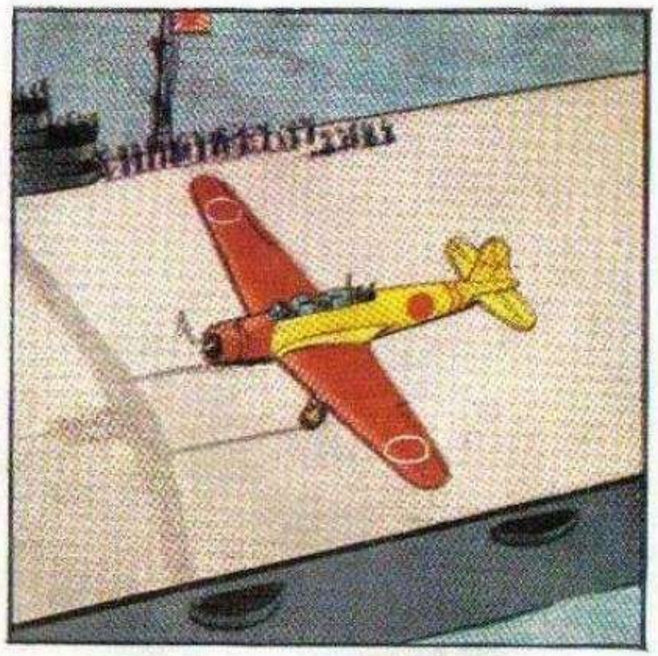
Kate was also responsible for torpedoing the United States Battleships *Arizona* (32,600 tons), and *Oklahoma* (29,000 tons) at Pearl Harbour on 7 December, 1941.

Taking part in the Battles of Coral Sea, Midway, and Santa Cruz, Kate contributed largely to the sinking of the United States Aircraft Carrier *Yorktown* (19,900 tons) at the Midway Battle on 7 June, 1942, and the sinking of another United States Carrier, the *Hornet* (20,000 tons) in the Battle of Santa Cruz Islands on 26 October, 1942.

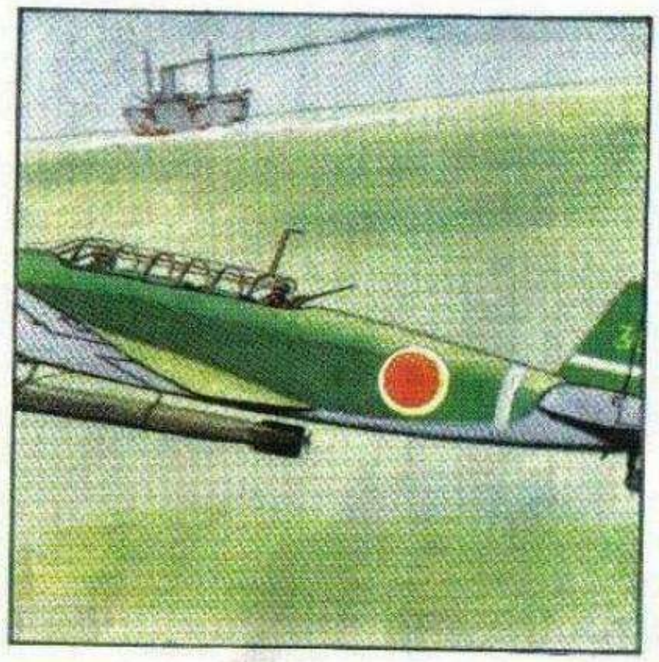
The Kate squadrons have been a thorough nuisance throughout the entire Pacific, inflicting, from time to time, heavy losses on the Allies, although they and their successors are getting less opportunities for operating now.







Kate is a carrier-borne . . .
(Taking-off for Pearl Harbour)



torpedo-bomber . . .

also used with ordinary bombs.

VAL
NAVY 99 DIVE-BOMBER
AICHI

Japanese designations—D3A1 and 2.

Models—1–1 and 2–2.

Duty—Carrier-borne and shore-based dive-bomber.

Designing company—Aichi Watch and Electric Machinery Company, Ltd.

Layout—Low-wing cantilever monoplane. Fixed undercarriage.

Construction—Metal with stressed skin. Believed to have fabric-covered control surfaces.

Crew—Two.

Motor—Model 1–1. One 14-cylinder Mitsubishi *Kinsei* (Golden Star) Model 44 air-cooled radial. 1,060 h.p. at 6,500 ft. Model 2–2. One 14-cylinder Mitsubishi *Kinsei* Model 54 air-cooled radial.

Span—Both models, 47 ft. 7 ins.

Length—Both models, 35 ft. 5 ins.

Loaded weight—Model 1–1, 8,828 lb.

Maximum speed—Model 1–1, 241 m.p.h. at 7,700 ft.

Cruising speed—Model 1–1, 195 m.p.h.

Range—Model 1–1, Maximum fuel and bomb load 1,250 miles,

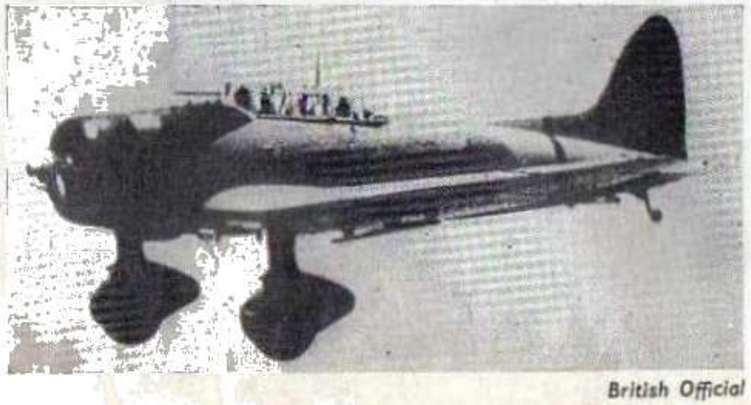
Service ceiling—Model 1–1, 27,200 ft.

Climb—Model 1–1, 1,740 ft./min. at 6,500 ft.

Fuel—Model 1–1, Maximum 220 Imperial gallons (265 U.S. gallons).

Armament—Both models : Two 7·7 mm. fixed forward firing M.G. and one or two movable 7·7 mm. rear M.G.

Bomb load—Model 1–1, 1,050 lb.



British Official

VAL was the standard Japanese Navy dive-bomber at the start of the Japanese war against Britain and the United States of America. Val is an Aichi design introduced in 1939, and has seen service in three forms, two known as the Model 1–1, and another the Model 2–2, all essentially the same aeroplane, but differing in such details as the model of the Mitsubishi *Kinsei* motors employed, and the type of cockpit-cover fitted.

Val Models 1–1 and 2–2 were used in the attack on Pearl Harbour along with the Kate torpedo-bombers and the Zeke fighters. Like the Kate aeroplanes taking part in that raid, some at least of the number of Vals used were painted yellow and red, and again like Kate a number were shot down.

Val was designed as a carrier-borne dive-bomber, and has been in action all over the Pacific, operating both from Japanese aircraft carriers, and from shore bases. These dive-bombers, probably the Model 2–2, took part in the Battle of Santa Cruz Islands, and attacked the U.S. Aircraft Carrier *Hornet*. Two of these dive-bombers crashed on the aircraft carrier causing extensive damage, the first one caused a petrol fire and was carrying a bomb at the time of impact, which exploded in the crash.

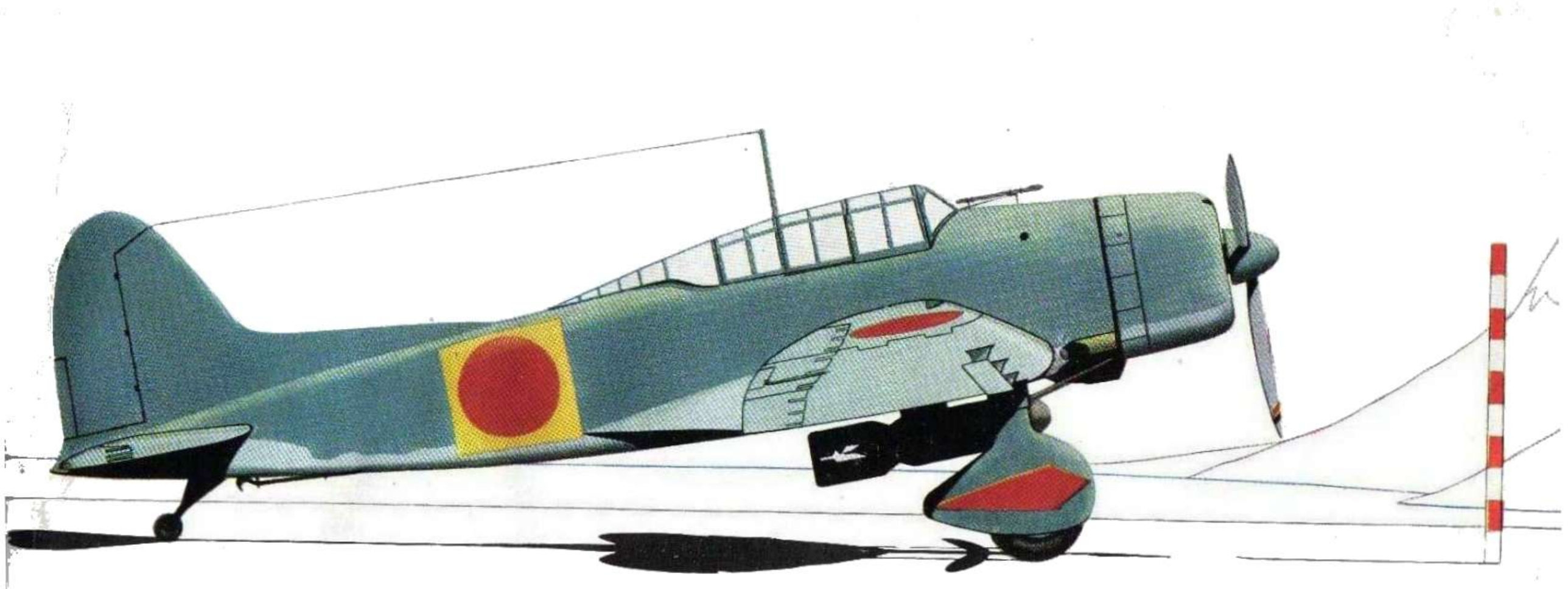
For stowage aboard carriers the wing tips of Val fold upwards, and are hinged at a point about six feet from the actual tips, the position of the hinge means that the ailerons are broken into two sections, the outer section folding with the wing tip. A deck arrester hook is fitted under the rear of the fuselage.

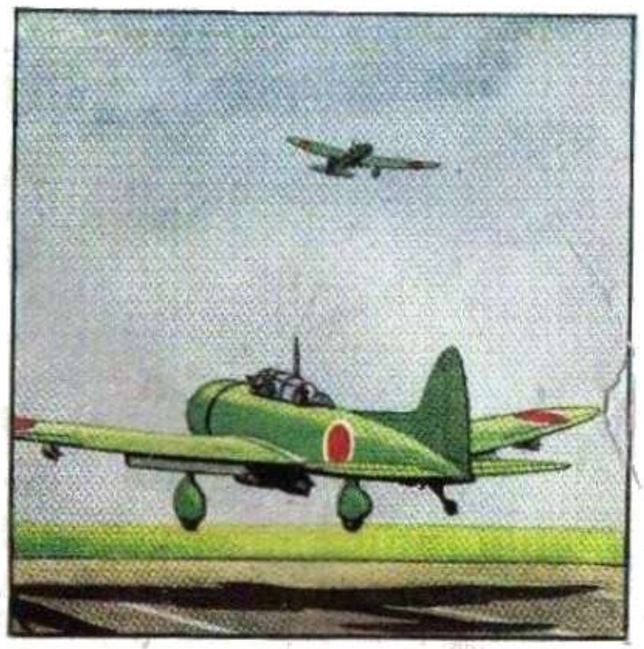
The main bomb is carried under the centre section, and before its release it is swung forward and down on two arms to ensure that the missile clears the airscrew. This method is similar to that used on the United States Navy Douglas Dauntless, and the German Junkers Ju 87. Small bombs are carried on racks under each wing just inboard of the wing hinge point. Hinged dive brakes are attached to the underside of the main spar.

The original Val, Model 1-1, is shown in the photograph on this page.

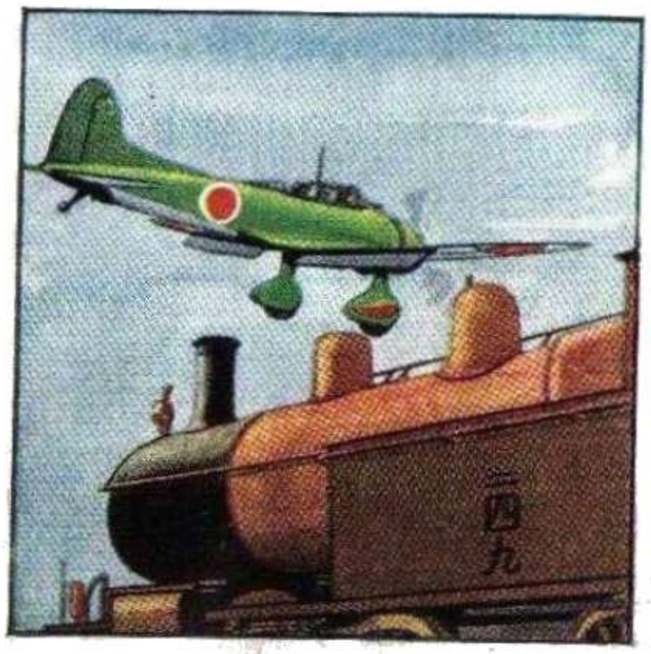
The second type of Val, Model 1–1, was discovered on Munda aerodrome in September 1943, and it is the model shown in the accompanying three-view drawing. The more common Model 2–2 appears in the main drawing.

A new dive-bomber designed by the Yokosuka Naval Air Arsenal is now replacing the Val type. The new design is the in-line motored Navy Suisei Judy.

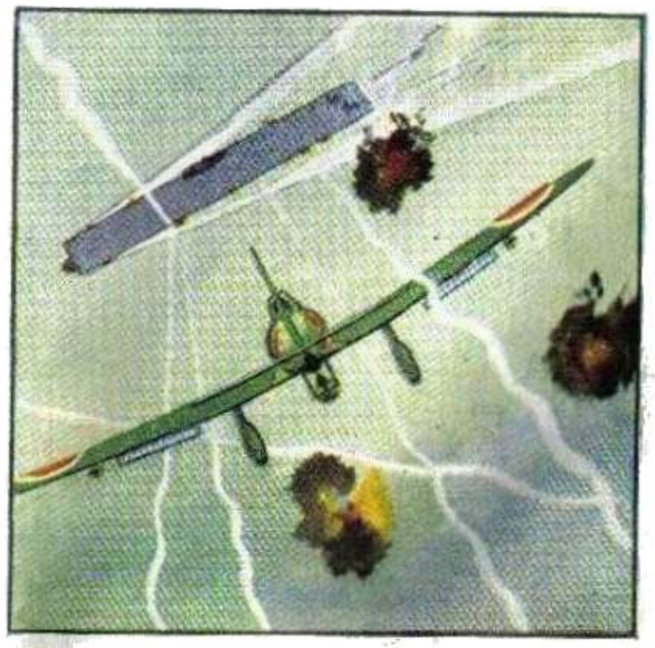




Val is a carrier-borne . . .



and shore-based . . .



dive-bomber.
(Attacking U.S.S. Yorktown off Midway,
4 June, 1942)

NICK
ARMY 2 FIGHTER
KAWASAKI

Japanese designation—Ki 45. Toryu

Duty—Day and night fighter.

Designing company—Kawasaki Aircraft Engineering Company Ltd.

Layout—Low-wing cantilever monoplane.

Construction—Metal with stressed skin. May have fabric-covered control surfaces.

Crew—Two.

Motors—Two 14-cylinder Nakajima Type 2 air-cooled radials, 1,020 h.p. each at 15,600 ft. Some versions of Model 1 may have two 14-cylinder Mitsubishi Type 1 air-cooled radials. 1,050 h.p. each at 18,200 ft. Both types of motor have two-speed superchargers.

Span—49 ft. 6 ins.

Length—34 ft. 5 ins.

Loaded weight—With Nakajima motors, 12,305 lb.

Maximum speed—With Nakajima motors, 351 m.p.h. at 17,600 ft.

Range—With Nakajima motors, 1,284 miles at 259 m.p.h.

Service ceiling—With Nakajima motors, 35,400 ft.

Climb—With Nakajima motors, 2,510 ft./min. at 15,600 ft.

Fuel—With Nakajima motors. Maximum 311 Imperial gallons (375 U.S. gallons).

Armament—Two forward firing M.G. and one forward firing cannon, possibly of 37 mm. calibre, and one or two movable rear M.G.

U.S. Office of War Information

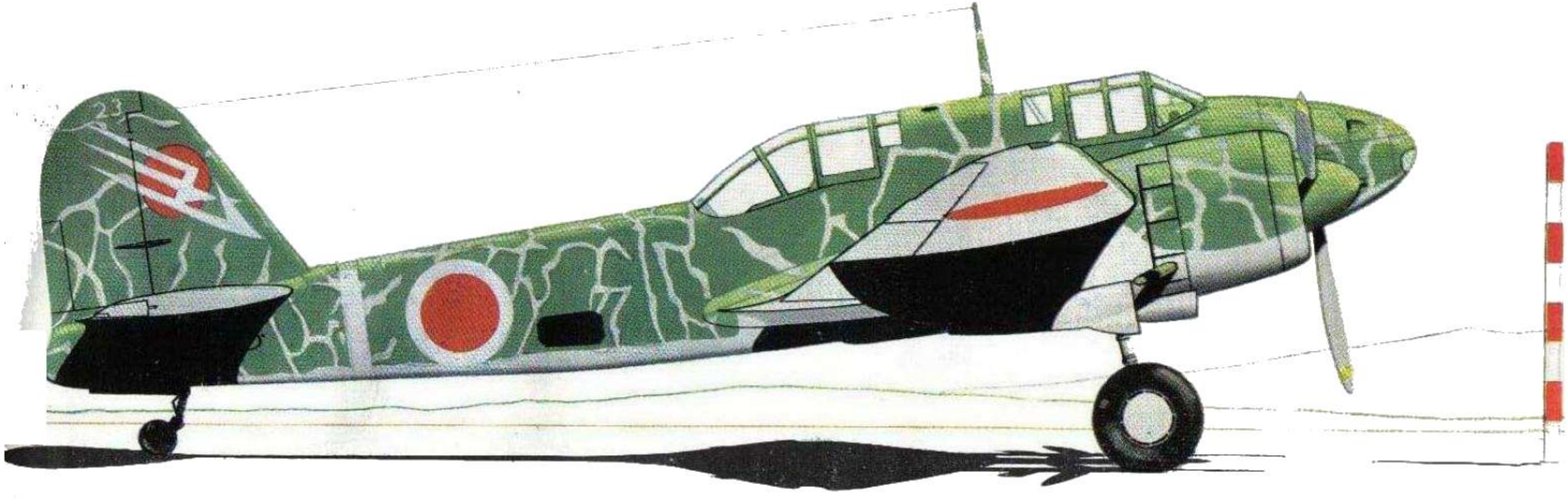
NICK is the standard Japanese Army Air Service two-motor day and night fighter. It is a fairly clean low-wing cantilever metal monoplane, and is in service in two main versions, one having Mitsubishi air-cooled radial motors, while the other has Nakajima air-cooled radial motors.

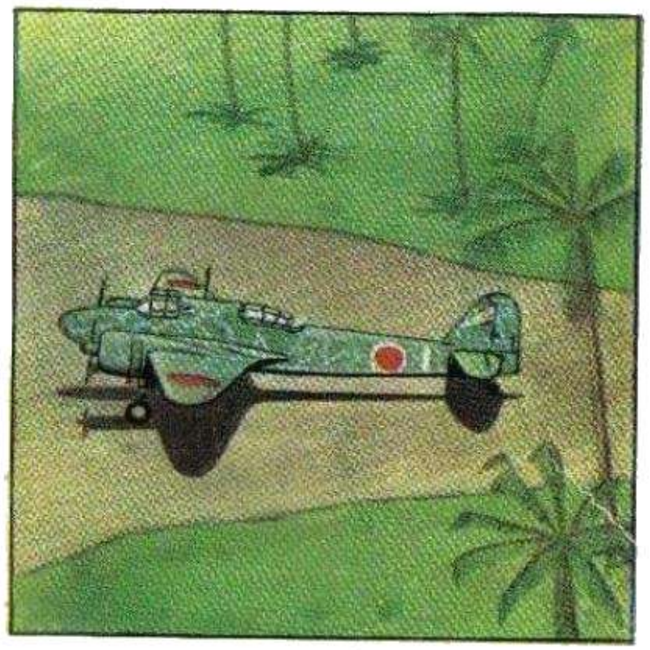
Nick is the first known two-motor fighter ever to go into service in either of the Japanese Air Services, and was first discovered on Boram aerodrome near Wewak in New Guinea. A number of these Kawasaki designed Army 2 Nick monoplanes, some being refuelled, were dispersed just off the perimeter track on the already bombed aerodrome with its water-filled craters and broken palm trees when North American Mitchell medium bombers of the United States Army Air Forces made a low-level attack on the aerodrome using parachute bombs, in the autumn of 1943. The photograph on this page and that on page 56 show two of these two-motor fighters, partially covered with camouflage netting, during this attack. Both aeroplanes were probably badly damaged, if not destroyed, as the complete photograph from which the part shown on this page was taken shows bombs about to hit within twenty yards of each. A Japanese petrol bowser can be seen in the close-up photograph.

Nick is possibly the type of fighter used for the night defence of the Japanese home islands mentioned in the reports of the crews of United States Army Air Force 20th Bomber Command Boeing B-29 Superfortresses on returning from a raid during darkness on Yawata, at the north of Kyushu, one of the Japanese islands, towards the middle of 1944.

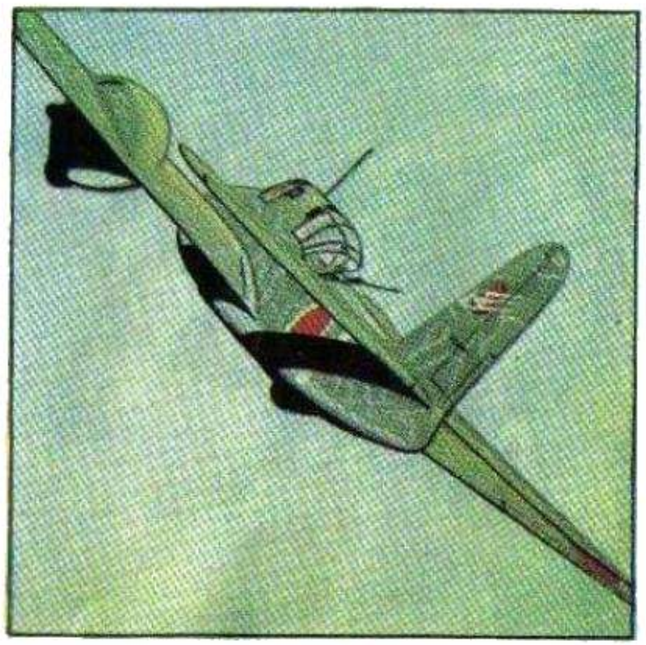
To assist in picking out the B-29's in the dark the Japanese fighters were said to have used their own searchlights, and a headlight can be seen in the nose of Nick in the accompanying illustrations.

Nick fighters operating in New Guinea bear a scheme of camouflage so far not seen in quite the same form on any other Japanese type of aeroplane. This camouflage is shown in detail on the main drawing on the opposite page. The insignia on the fin and rudder is probably squadron marking, while the scratchy Japanese characters visible on the national marking on the fuselage would appear to indicate that the Japanese are no more restrained than the more cultured Western peoples in the serious business of writing one's name on other peoples' property and trees.

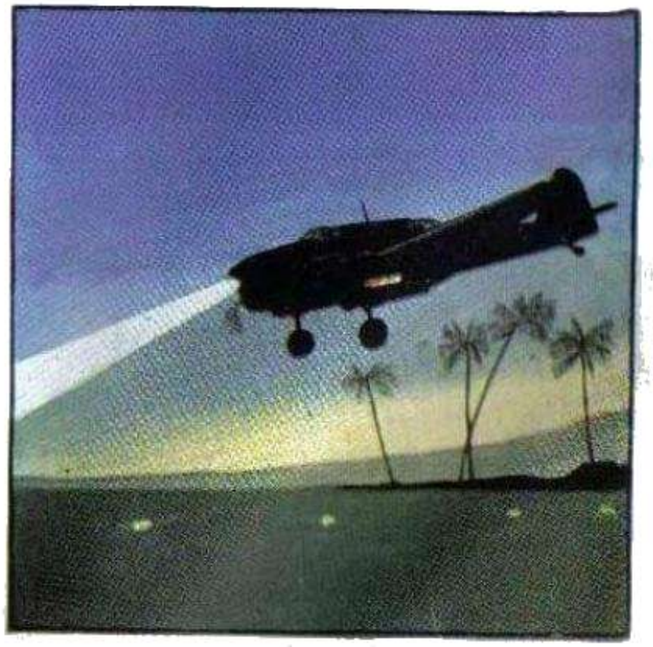




Nick, discovered in these surroundings near Wewak . . .



is a two-motor day . . .



and night fighter.

BETTY
NAVY 1 BOMBER
MITSUBISHI

Japanese designation—G4M1.

Model—1–1.

Duty—Reconnaissance and torpedo-bomber. Normally shore-based but known to have operated from carriers.

Designing company—Mitsubishi Heavy Industries, Ltd.

Layout—Mid-wing cantilever monoplane.

Construction—Metal with stressed skin. Fabric-covered control surfaces.

Crew—Five to seven.

Motors—Two 14-cylinder Mitsubishi *Kasei* (Mars) Model 15 air-cooled radials. 1,300 h.p. each at 13,200 ft. Two-speed superchargers.

Span—82 ft. 4 ins.

Length—65 ft. 0 in. With streamlined tail gun position on early models 66 ft. 4 ins.

Wing area—780 sq. ft.

Loaded weight—26,975 lb.

Wing loading—34·6 lb./sq. ft.

Maximum speed—276 m.p.h. at 15,000 ft.

Cruising speed—235 m.p.h.

Normal range—With normal fuel and bomb load 910–1,370 miles.

Range—With 1,079 Imperial gallons of fuel and 1,584 lb. bomb load, 2,630 miles.

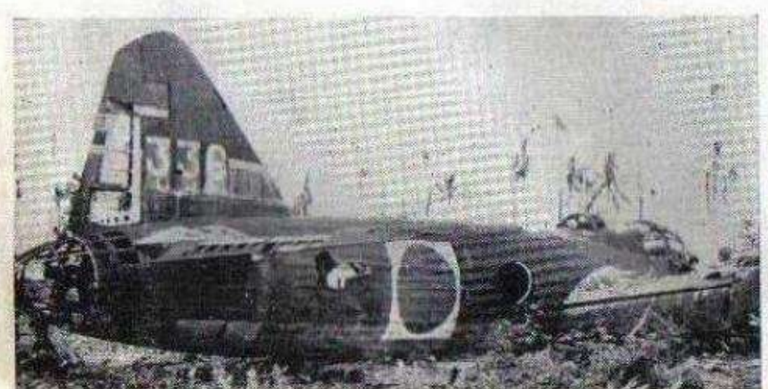
Service ceiling—28,800 ft.

Climb—1,210 ft./min. at 13,200 ft.

Fuel—Maximum 1,290 Imperial gallons (1,554 U.S. gallons).

Armament—One forward 7·7 mm., one dorsal 7·7 mm., two lateral 7·7 mm., one or two ventral 7·7 mm. M.G. and one tail 20 mm. cannon.

Bomb load—Normal 1,765 lb. Maximum 3,300 lb., or two 880 lb., or one 1,764 lb. torpedo.



U.S. Office of War Information

BETTY is the standard two-motor Navy bomber, designed to carry a load of bombs, one large torpedo, or two small torpedoes internally. Betty is used in quantity throughout the Pacific, and was first seen during an attack on a United States task force west of the Gilbert Islands, early in 1942, and again during the attempted Japanese invasion of Midway. On 4 June, 1942, Betty aircraft took part in a raid on United States Naval units defending Midway, the bombers having presumably taken-off from aircraft carriers in the Japanese invading force. This carrier-borne operation by two-motored bombers followed closely on the first recorded raid made by two-motored bombers from an aircraft carrier, when 16 North American Mitchell bombers of the United States Army Air Forces, led by Brigadier-General Doolittle, took off from the U.S. Aircraft Carrier *Hornet*, some 800 miles from Japan, and bombed Tokyo, Kobe, Nagoya, and Yokohama on 18 April, 1942. The defeat of the Japanese force at Midway was the first defeat suffered by the Japanese Navy since 1592. In addition to these actions, Mitsubishi Navy 1 Betty bombers have seen service in the Gilbert Islands, the Marianas Islands, the Marshall Islands, New Britain, New Georgia, New Guinea, at Peleliu and in the Solomons. At least one Betty was shot down near Munda at night.

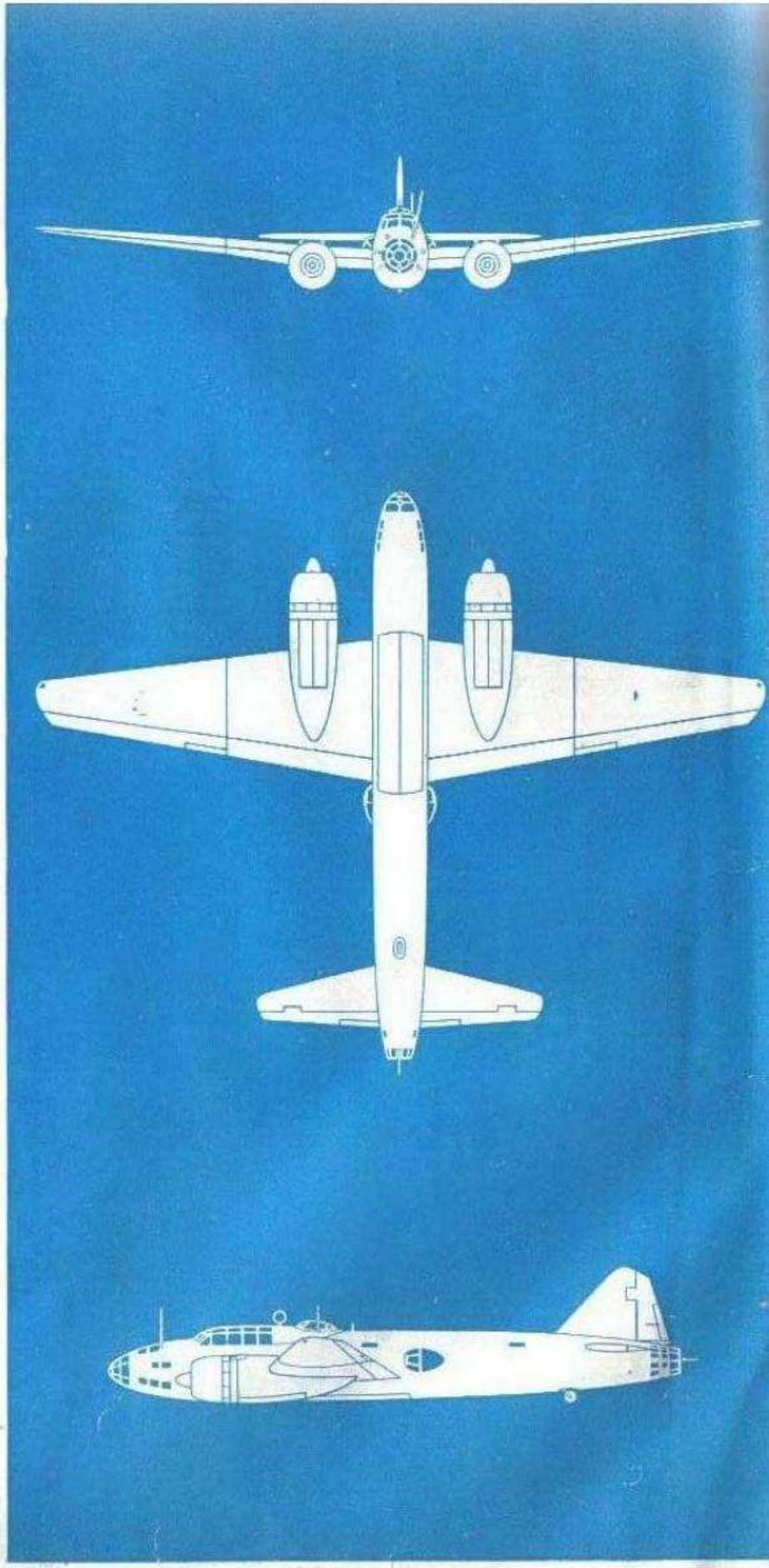
A number of detail variations have been found on Betty bombers, but the only one affecting recognition is the modified tail gun turret. The rear turret on the early Betty was extended as shown in the small drawing on the opposite page, while the rear turret on the later and more common Betty is the same as shown in the main drawing.

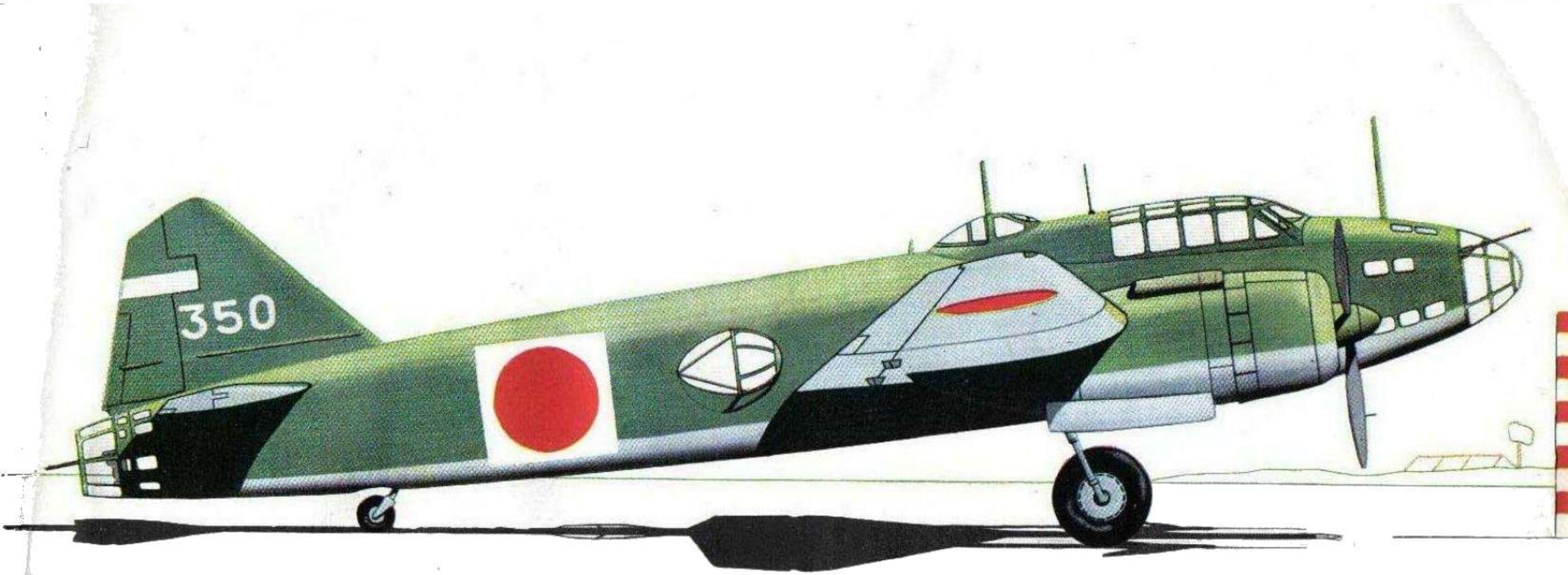
The Japanese have adopted a small version of the lateral blister gun turret now familiar on the Consolidated Catalina, and this type of turret is used on the Mitsubishi Betty, as well as on other Japanese aeroplanes, including the Mitsubishi Navy 96 Model 2–2 Nell bomber, the Kawanishi Navy 2 Emily flying-boat, and the new four-motor bomber Liz.

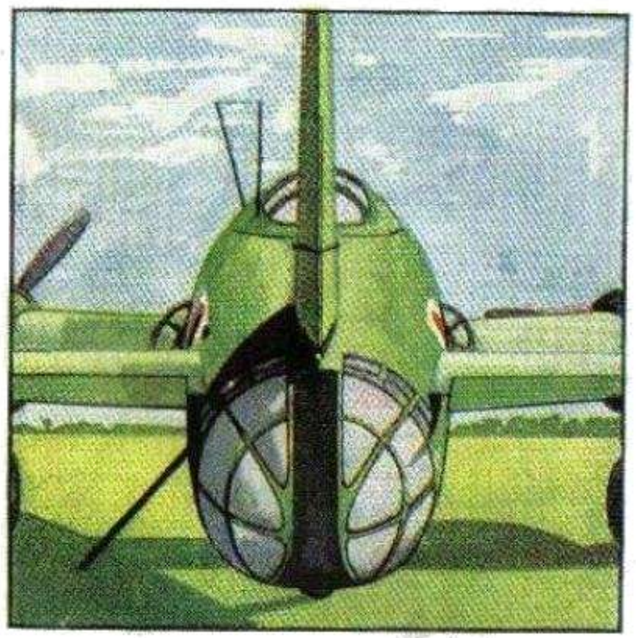
Betty has long range, and is capable of operating at heights of about 30,000 ft., and has also made frequent torpedo attacks flying only a few feet above the surface of the sea.

Numbers of Bettys have been shot down by Allied fighters and by the guns of warships, but it is probable that a much larger number have been destroyed by Allied air raids on their aerodromes, using, in many instances, small parachute bombs, and also incendiary phosphorus bombs which burst in the air scattering burning particles over the dispersed aircraft. Many grounded aeroplanes, including the Betty type, were destroyed in both types of raids carried out in the Rabaul area alone during 1943 and 1944.

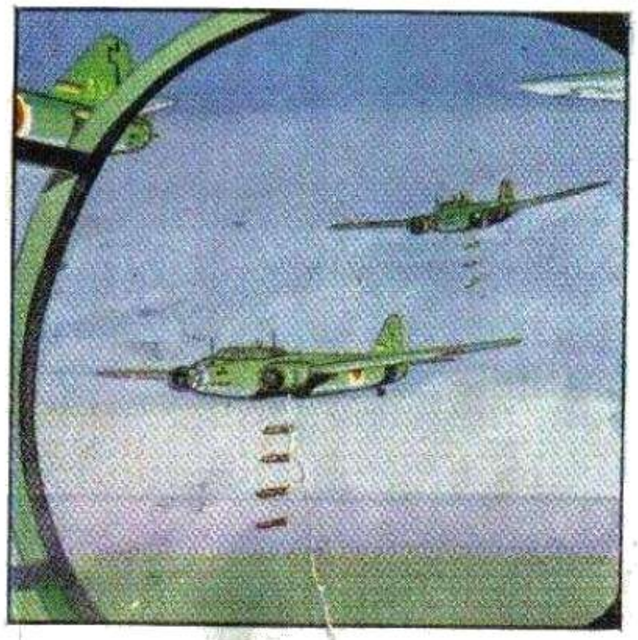
A new version of Betty has modified tips to the wings and tailplane, new motors and a dorsal turret in place of the lateral blister turrets. This type is the Model 2–2, G4M2, powered by two *Kasei* Model 21 motors.



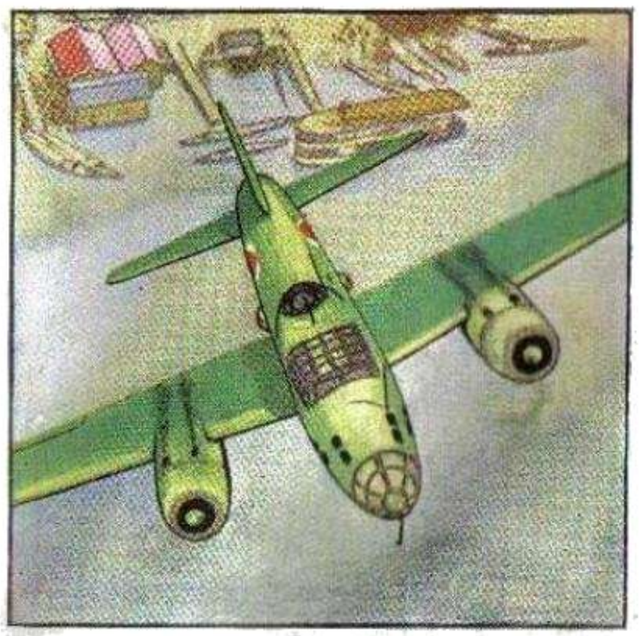




Betty's old type tail turret.



Betty raid seen from lateral blister turret of another.



Betty Model 1-1 over Palembang, Sumatra.

DINAH
ARMY 100 RECONNAISSANCE
MITSUBISHI

Japanese designations—Ki 46, 462 and 463.

Models—1, 2 and 3.

Duty—Reconnaissance.

Designing company—Mitsubishi Heavy Industries, Ltd.

Layout—Low-wing cantilever monoplane.

Construction—Metal with stressed skin. Fabric-covered control surfaces.

Crew—Two.

Motors—Model 1. Two 14-cylinder Mitsubishi Type 1 air-cooled radials. 935 h.p. each at 18,200 ft. Model 2. Two 14-cylinder Nakajima Type 2 air-cooled radials. 1,020 h.p. at 15,600 ft. Model 3. Two 14-cylinder Mitsubishi Type 2 air-cooled radials. All motors have two-speed superchargers.

Span—48 ft. 3 ins.

Length—36 ft. 1 in.

Loaded weight—Models 1 and 2, 12,225 lb.

Maximum speed—Model 1, 347 m.p.h. at 20,000 ft. Model 2, 348 m.p.h. at 17,600 ft. Model 3, 370 m.p.h. at 23,000 ft.

Normal range—Model 1, 1,435 miles. Model 2, 1,370 miles.

Service ceiling—Model 1, 36,800 ft. Model 2, 36,300 ft.

Climb—Model 1, 2,260 ft./min. at 18,200 ft. Model 2, 2,530 ft./min. at 15,600 ft.

Fuel—Model 1, 332 Imperial gallons (400 U.S. gallons). Model 2, Estimated as for Model 1.

Armament—Some versions have one or two 7·7 mm. M.G. in rear cockpit.

British Official

DINAH is a Mitsubishi designed high-speed reconnaissance monoplane, operating with the Japanese Army Air Service. Dinah was first reported in China and Burma, and is now operating in the Pacific, many having appeared in New Guinea, some being based on Dagua aerodrome near Wewak. Many Dinah monoplanes were destroyed in the total of 215 aeroplanes wrecked on the aerodromes in the Wewak area by Allied aircraft on 17 and 18 August, 1943.

The Mitsubishi Dinah has pleasant lines and a good performance, and is in service in at least three forms. The type of motors fitted differ in each case with a consequent variation in performance. Other variations are not of particular consequence, apart from the armament installed in the later models. Dinah was reported in the first place as an unarmed aeroplane, but in later models the rear section of the aft cabin has been found to roll inwards, making an open gun position, with either one or two machine guns for aft protection.

The first Dinah aeroplanes did not have a radio direction-finding loop-aerial, but had their main radio mast mounted on top of the fuselage, about halfway between the pilot's cockpit and the rear cabin ; later aeroplanes now have a direction-finding loop in the position formerly occupied by the radio mast, while the radio mast itself has been moved forward to a point immediately behind the cockpit.

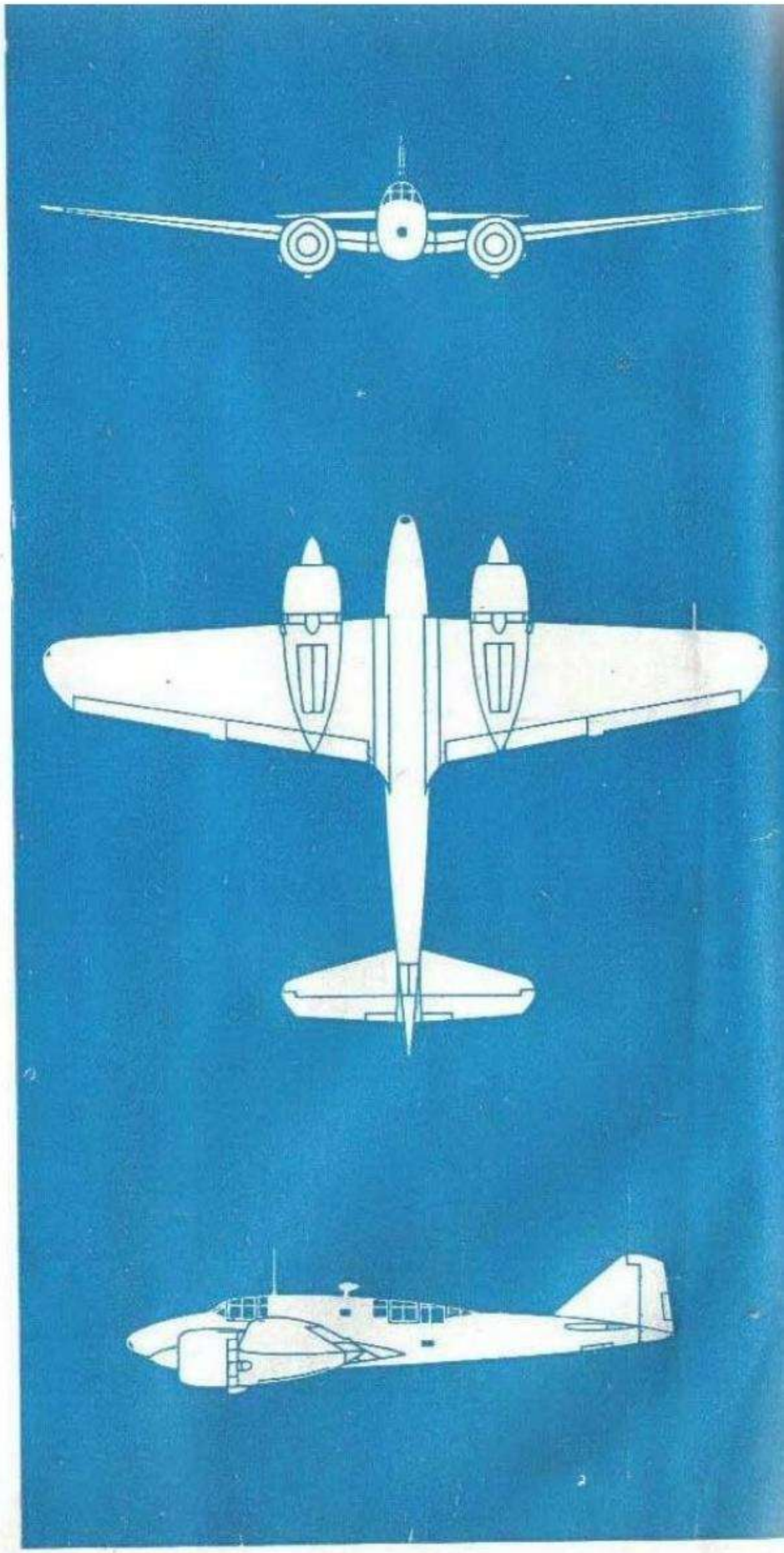
No information is available on the camera installation in these aeroplanes, but a window low down on either side of the fuselage, beneath the rear cabin windows, suggests the position for oblique cameras, while a transparent panel on the underside of the nose may indicate that the vertical cameras are mounted in the nose aft of the headlight.

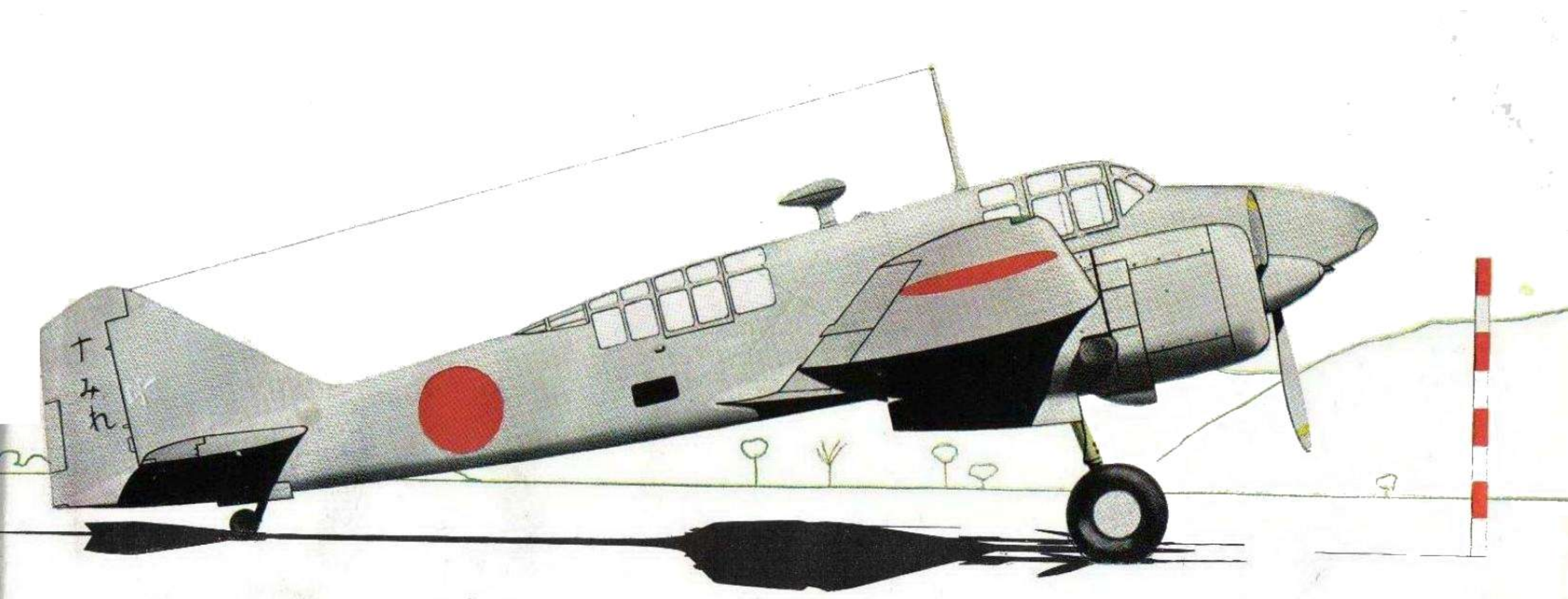
Used in the same way as the British photographic Mosquito, and the United States Lockheed F.5, Dinah was also reported in service originally as a fighter. This seems unlikely as, contrary to early reports, there is no evidence of forward armament.

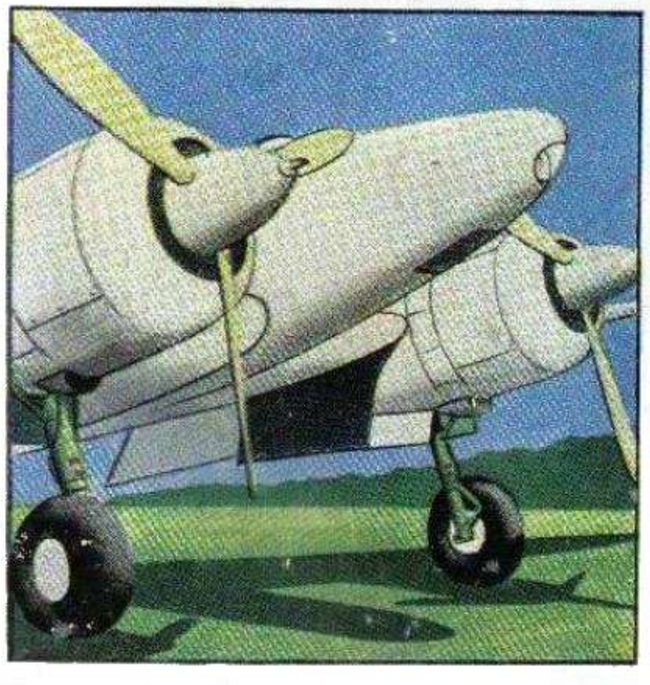
A number of Dinah monoplanes were among the 750 aeroplanes, mentioned in the description of Tojo on page 8, which took part in the fly-past over Tokyo.

The Dinah reconnaissance aeroplane was one of the types which put in appearances over Northern Australia. There is no information available to indicate whether or not any of these aeroplanes were shot down in this area.

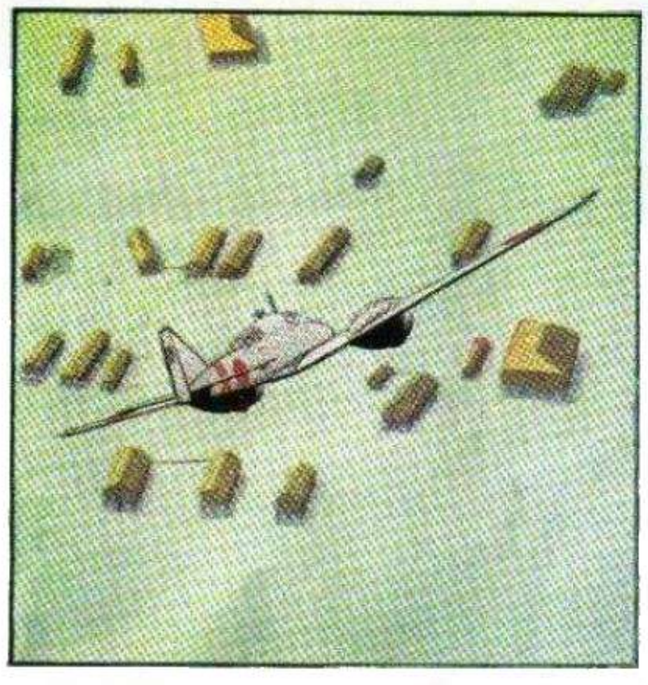
The aeroplane shown in the centre small drawing on the opposite page bears the Japanese word "*Ri*," painted on the rudder in Kana. This means Victory, and is the equivalent of our "V" sign.



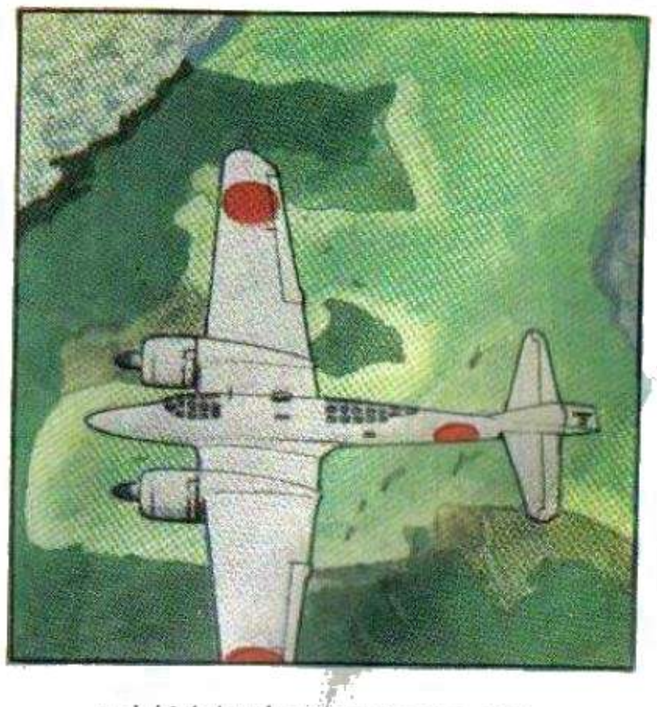




Dinah is a two-motor . . .



low-level . . .
(Over Hula water village near Port Moresby)



and high-level reconnaissance type.
(Over Rabaul)

HELEN

ARMY 100 BOMBER

NAKAJIMA

Japanese designation—Ki 492. Donryu

Model—2.

Duty—Bomber.

Designing company—Nakajima Aircraft Company, Ltd.

Layout—Mid-wing cantilever monoplane.

Construction—Metal.

Crew—Seven.

Motors—Two 14-cylinder Nakajima Type 2 air-cooled radials. 1,300 h.p. each at 18,000 ft. Two-speed superchargers. Model 1 had two Nakajima Type 100 motors.

Span—66 ft. 7 ins.

Length—53 ft. 0 in.

Loaded weight—26,491 lb.

Maximum speed—299 m.p.h. at 19,700 ft.

Range—Maximum fuel and bomb load, 2,260 miles.

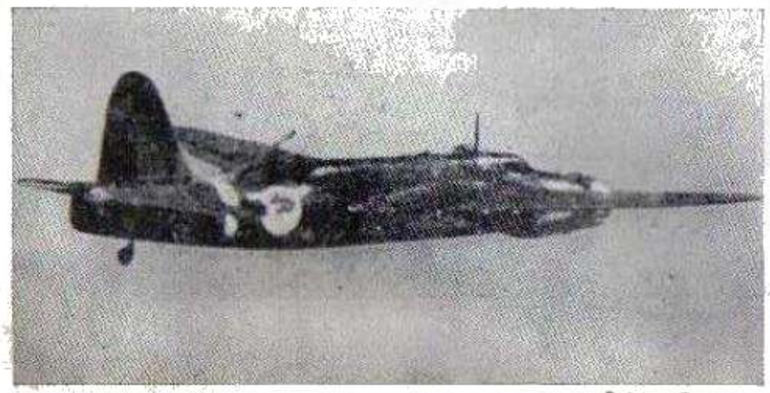
Service ceiling—29,200 ft.

Climb—1,030 ft./min. at 18,000 ft.

Fuel—996 Imperial gallons (1,200 U.S. gallons).

Armament—In rotatable nose position, dorsal and tail positions.

Bomb load—2,290 lb.



British Official

HELEN is the Nakajima two-motor Army bomber designed to supersede the 1937 Mitsubishi Sally. It is in service in quantity probably over a large area and definitely in New Guinea, where numbers have operated from Dagua and Hollandia. At both places they have been attacked on the ground by the Allied Air Forces.

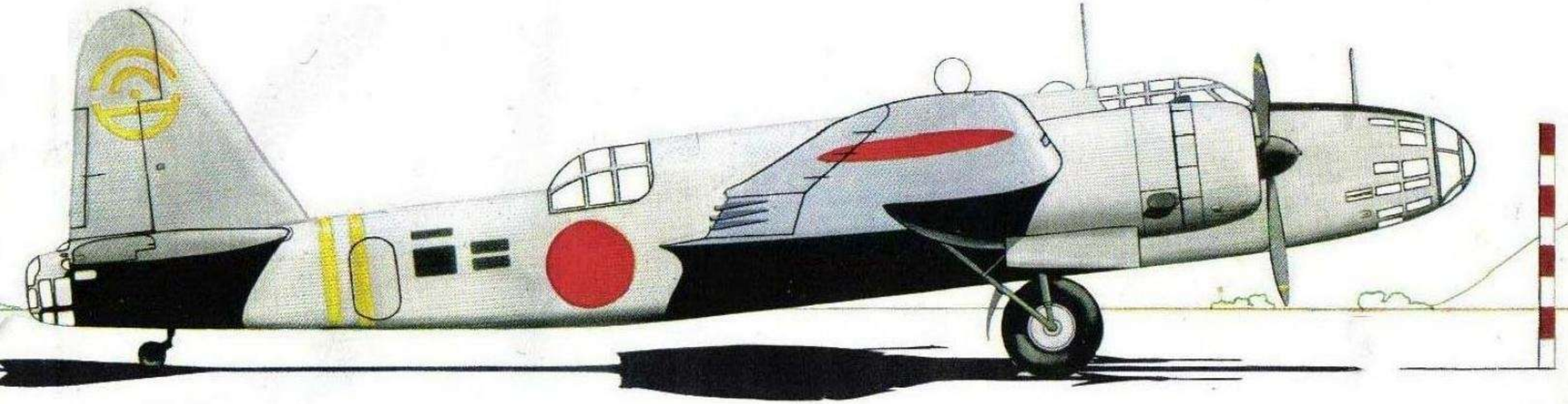
Helen is a deceptive aeroplane, its span is only 13 ins. greater than that of the Lockheed Hudson, while the length of Helen is nearly 9 ft. greater than that of the Hudson. The length, plus the fact that there is a form of tail gun turret, gives Helen the appearance of a much bigger aeroplane than she actually is.

This aeroplane is a departure from the normal design of the Nakajima Company, and is the firm's first two-motor bomber, although they did produce, in 1936, a two-motor civil transport known as the A.T. and later adopted as a military transport with the type number 97 and now bearing the Allied code name Thora. A photograph and brief details of this transport appear on page 55.

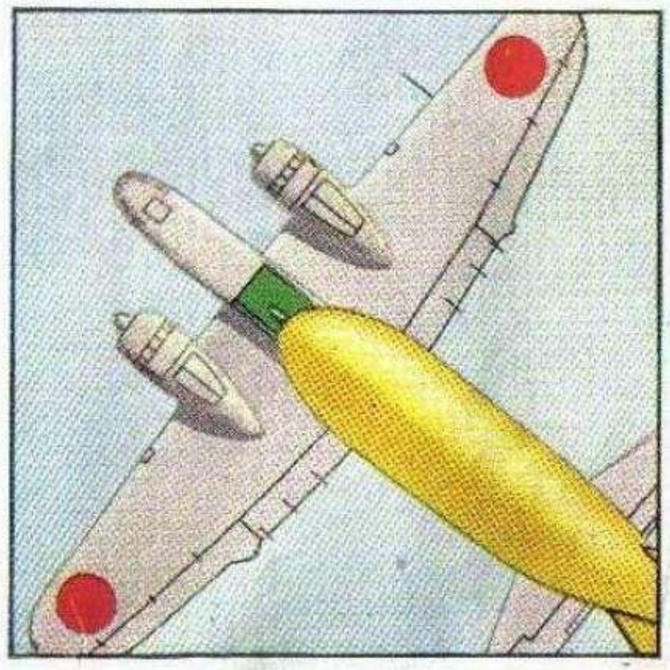
Helen may have been used in China although there is no definite evidence of this. It did take part in the Tokyo fly-past, and was referred to by Japan as the *Donryu* (Storm Dragon).

Two distinctive points about Helen are, first, the wing centre section, the leading edge of which is much farther forward than the leading edge root of the wing outboard of the motors as in the de Havilland Mosquito, and second, the three flap guides protruding behind the outer section of the flaps. These guides, in varying numbers, appear on other Nakajima types of aeroplane.

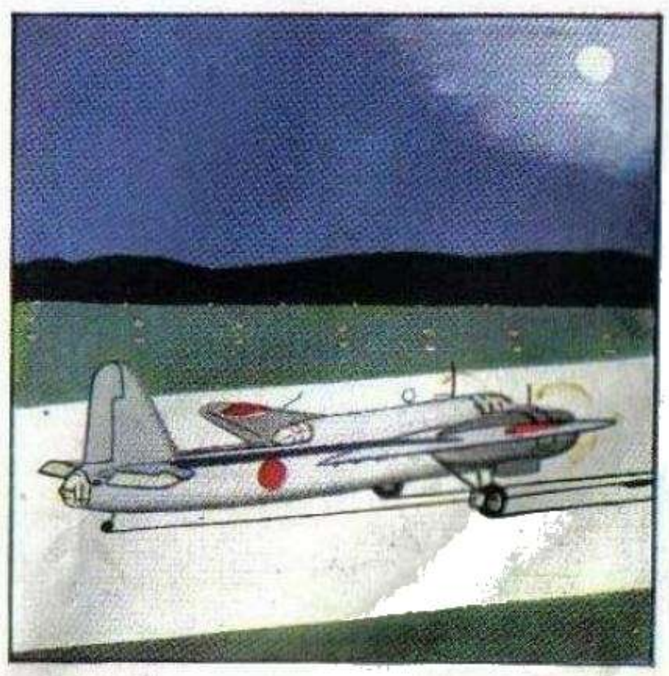
Although Helen is replacing the old Mitsubishi Army 97 Sally, the Mitsubishi design is still in service and will probably be used for some time to come.



Helen over Mount Fuji.



The centre section leading edge is forward of the mainplane.



Helen **on night** operations.

LILY
ARMY 99 BOMBER
KAWASAKI

Japanese designations—Ki 48 and 482.

Models—1 and 2.

Duty—Bomber.

Designing company—Kawasaki Aircraft Engineering Company, Ltd.

Layout—Mid-wing cantilever monoplane.

Construction—Metal with stressed skin. Fabric-covered control surfaces.

Crew—Four or five.

Motors—Model 1. Two 14-cylinder Kawasaki or Nakajima Type 99 air-cooled radials. 950 h.p. each. Model 2. Two 14-cylinder Kawasaki Type 2 air-cooled radials. 1,020 h.p. each at 15,600 ft. Two-speed superchargers.

Span—57 ft. 4 ins.

Length—42 ft. 1 in.

Loaded weight—Model 2, 15,500 lb.

Maximum speed—Model 1, 285 m.p.h. at 14,000 ft. Model 2, 312 m.p.h. at 17,000 ft.

Cruising speed—Model 1, 245 m.p.h.

Range—Model 1, 1,000-1,200 miles. Model 2, with maximum fuel and 800 lb. bomb load, 1,220 miles.

Service ceiling—Model 2, 31,900 ft.

Climb—Model 2, 1,845 ft./min. at 15,600 ft.

Fuel—Model 2, 373 Imperial gallons (450 U.S. gallons).

Armament—7·7 mm. nose, dorsal and ventral M.G.

Bomb load—Model 1, 1,500 lb. Model 2, 1,600 lb.

British Official

LILY is a two-motor medium bomber designed by Kawasaki, and put into service with the Japanese Army Air Service in 1939. This is the first two-motor Kawasaki military aeroplane to go into Army service since the Army 93 two-motor bomber illustrated on page 56.

An ugly aeroplane, Lily has seen service in China, and it was from bases in Burma that this type made raids on India, where some were shot down. Many aeroplanes of this type were destroyed while dispersed on Hollandia aerodrome in New Guinea, prior to the Allied landings in that area on 22 April, 1944. Lily was also among the victims of Allied air raids on the But aerodrome in the Wewak area.

Kawasaki Lily bombers which were based in New Guinea raided the Port Darwin area of Northern Territory, Australia. These raids became less frequent with the appearance of the Spitfire as a defender of Australia. Lily was also used in the Marshall Islands, and a number of wrecked aircraft were found after the capture of the islands by the United States Marines in February 1944.

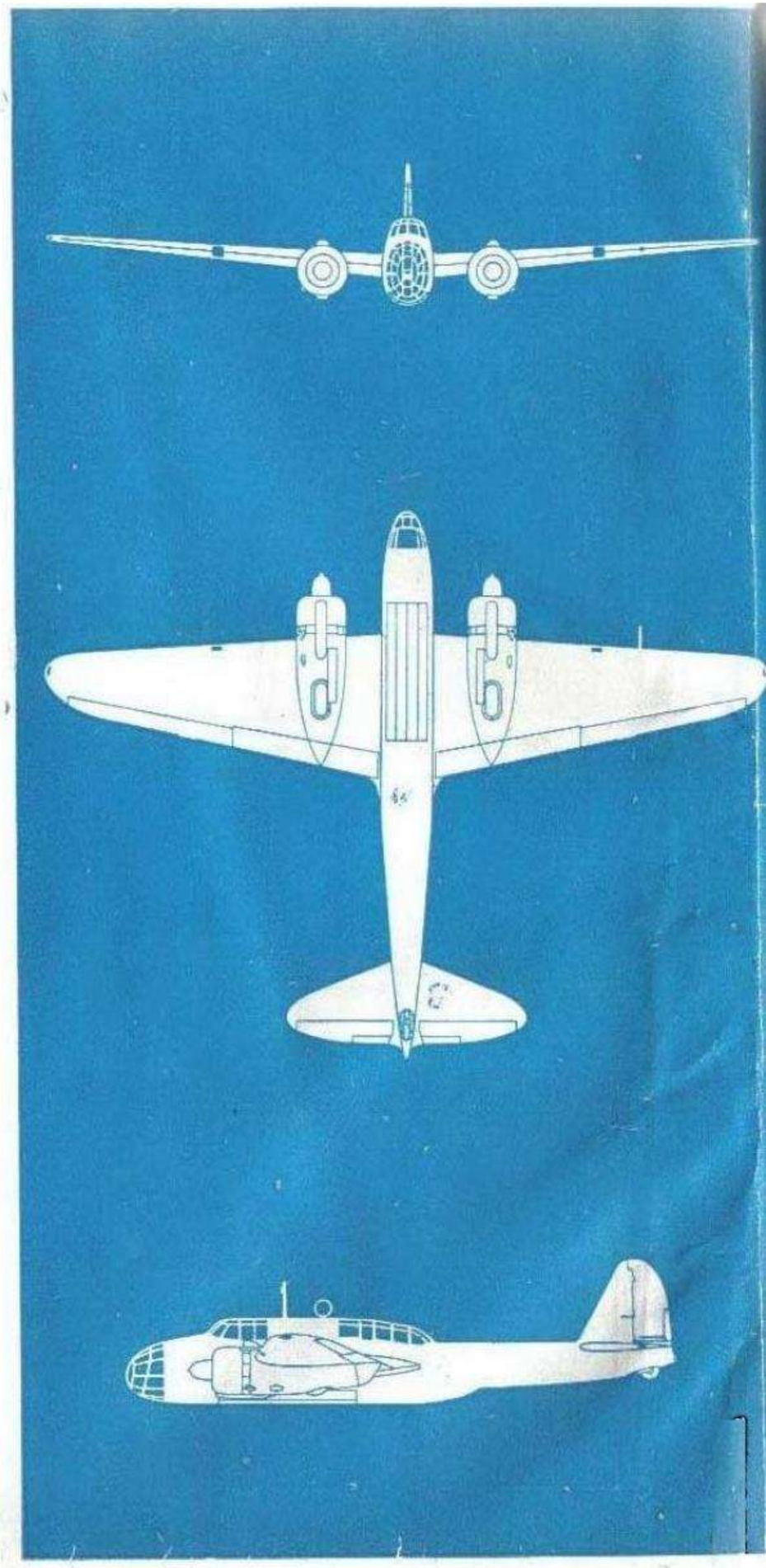
Two types of Lily known to be in service are the Models 1 and 2 which differ in the type of motor installed. There is now a version also with a continuous transparent cabin from the pilot's cockpit to the rear gun position, and yet another type with a power-operated dorsal turret.

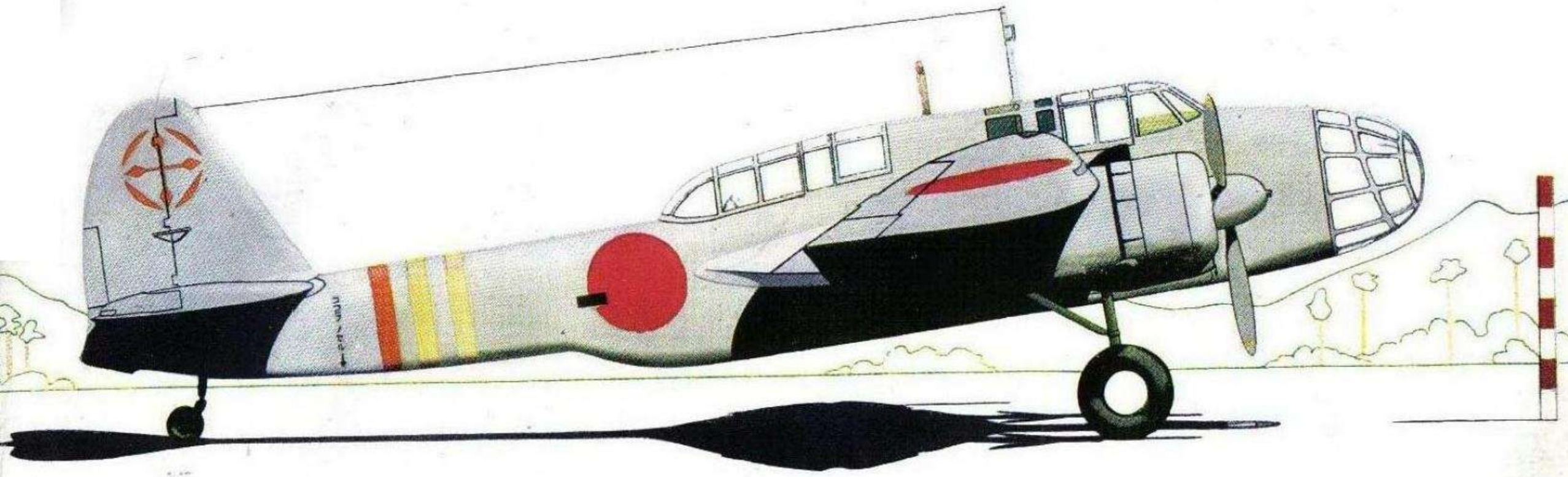
Kawasaki, the designers of Lily, have, for a number of years, concentrated on the production of Army aeroplanes, and Lily is the fifth Kawasaki bomber design to go into Army service since 1928. The other four types, the types 88 and 93 single-motor biplanes, the type 93 two-motor monoplane, and the type 98 single-motor monoplane all appear in the history of the Kawasaki Company on pages 56 and 57.

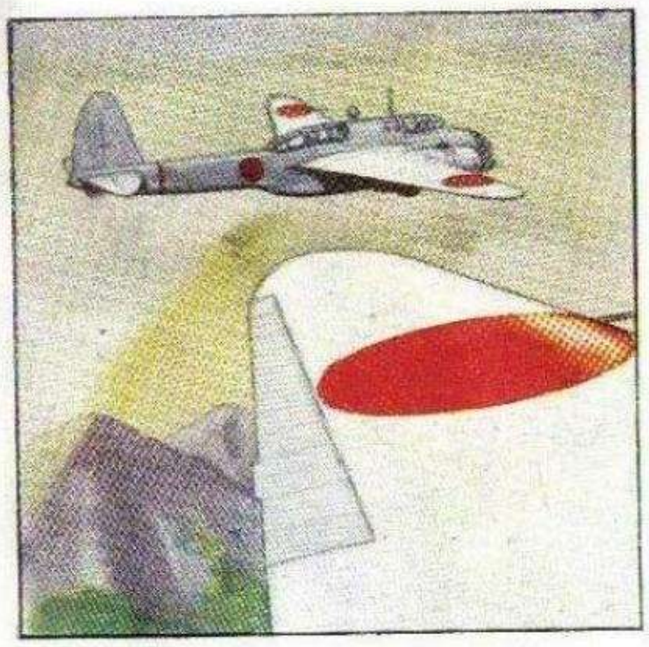
Lily has a distinctive but not distinguished appearance, having a deep and narrow fuselage with high raised cockpit, from which the top line of the fuselage runs back to the rear cockpit before dropping down to run in a straight line to the base of the fin.

The bottom line of the fuselage runs fairly straight to a point just behind the rear cabin, where it sweeps up forming a ventral gun position before it curves back to the tail. The rear fuselage is slender, and with the fin and rudder is similar to the rear fuselage and fin and rudder of the two-motor Kawasaki fighter Nick.

The Model 2 is known to have dive brakes.







Lily seen from another of the type

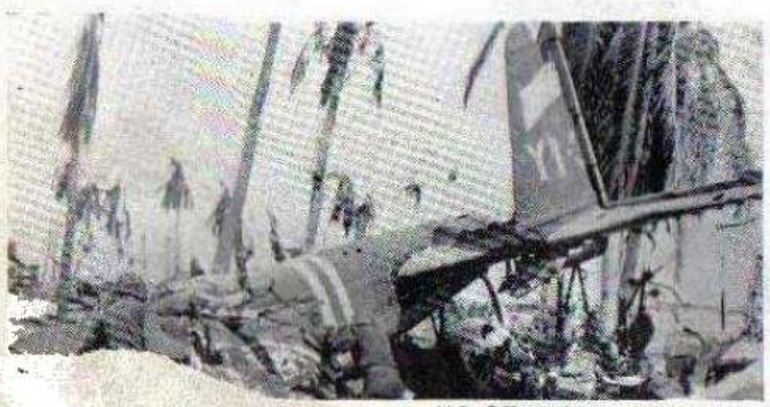
Lily bombers
(Supporting type 2595 light tanks)

Lily over the Burma Road

NELL
NAVY 96 BOMBER
MITSUBISHI

Japanese designation—G3M2.
Model—2-2.
Duty—Bomber.
Designing company—Mitsubishi Heavy Industries, Ltd.
Layout—Mid-wing cantilever monoplane.
Construction—All-metal.
Crew—Four to seven.
Motors—Two 14-cylinder Mitsubishi *Kinsei* (Golden Star) Model 45 air-cooled radials. 1,055 h.p. each at 13,800 ft. The Model 2-3 has Mitsubishi *Kinsei* Model 52 air-cooled radials.
Span—82 ft. 0 in.
Length—54 ft. 0 in.
Wing area—800 sq. ft.
Loaded weight—21,745 lb.
Wing loading—27·1 lb./sq. ft.
Maximum speed—241 m.p.h. at 15,000 ft.
Cruising speed—195 m.p.h.
Range—With 823 Imperial gallons of petrol and maximum bomb load 2,240 miles.
Service ceiling—28,800 ft.
Climb—1,230 ft./min. at 13,800 ft.
Fuel—Maximum 1,134 Imperial gallons (1,367 U.S. gallons).
Armament—Uncertain. Believed fixed M.G. in nose and tail positions, also dorsal and lateral M.G. positions in blister turrets.
Bomb load—2,200 lb.

NELL, designed by the Mitsubishi concern, was once a standard Japanese Navy two-motor bomber. The design is now over ten years old, the first version of this aeroplane having gone into service in 1935, although the aeroplane known as Nell actually is the type 96. A Junkers-designed two-motor bomber, the S-36, built in Sweden was, in about 1930, sent out to Japan, and the Mitsubishi factory produced two bombers based on this design. They were the Army 93 two-motor bombers shown on page 53. Both types were of corrugated metal construction like the Junkers aeroplane sent to Japan. Some time later a development of these bombers appeared in the form of a large two-motor Mitsubishi bomber produced in small numbers. It had two upright V liquid-cooled motors, a large deep fuselage, Junkers type "double-wing" ailerons, and twin fins and rudders. From this design a new bomber was evolved. It was the Mitsubishi Navy 95 powered by two 12-cylinder broad-arrow liquid-cooled motors, and it was the first of the aeroplanes now known as Nell. In 1936 this aeroplane went into service in fair numbers fitted with two Mitsubishi *Kinsei* radial air-cooled motors under the type number 96. Used in the war against China, they made raids on Chungking and many other Chinese towns, most of which were without air defence.



U.S. Office of War Information

At the time of the Japanese attack on the British Empire and the United States of America, Nell was the standard Navy two-motor bomber, although by that time a new version had appeared with a large blister turret on top of the fuselage, and staggered lateral turrets each containing defensive armament. The starboard turret is just aft of the wing, while the port turret is much farther back along the fuselage.

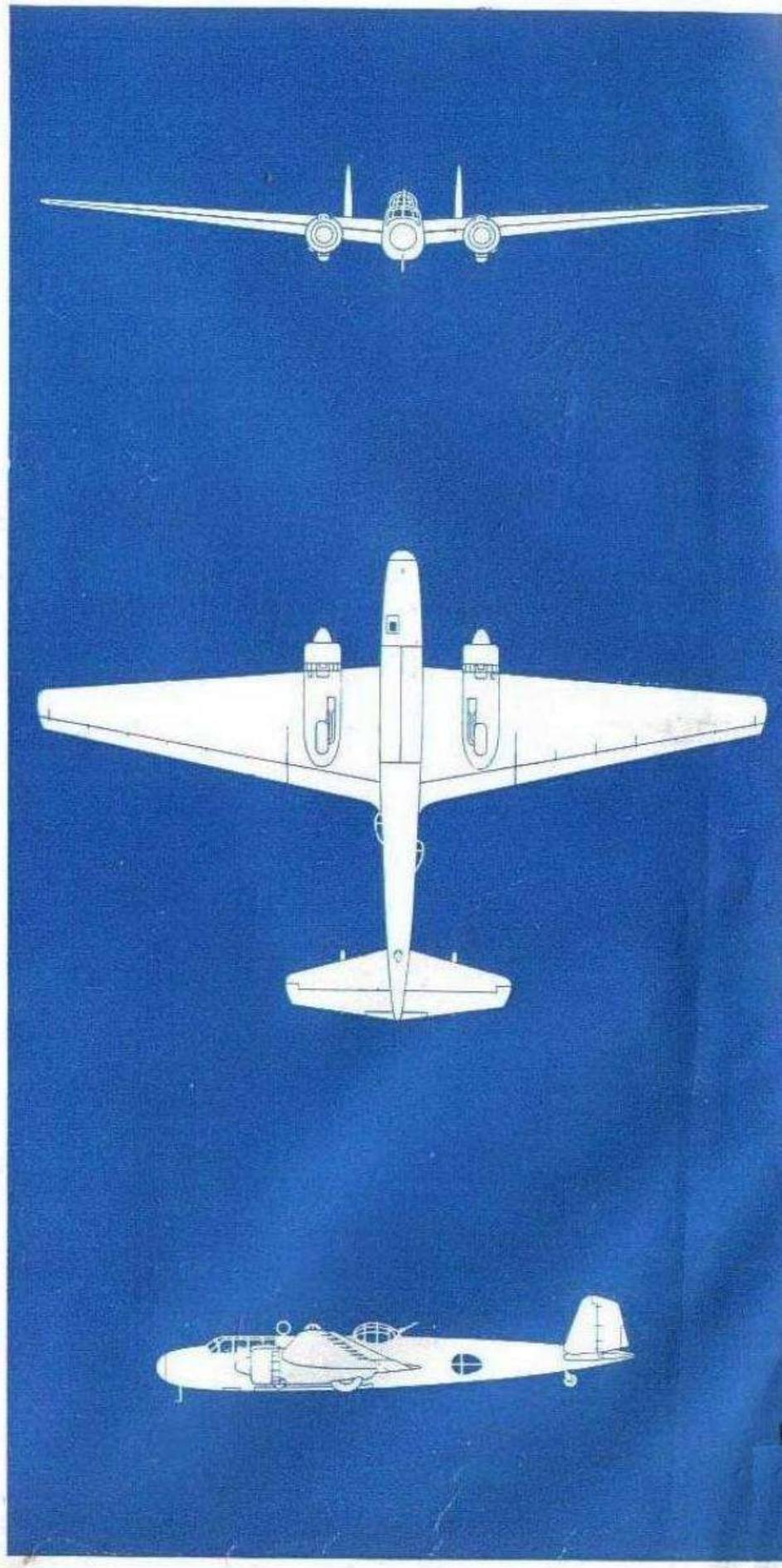
Nell is supposed to have taken part in the attacks on the British battleships *Prince of Wales* and *Repulse* in the South China Sea in December 1941, and the reports to that effect may well be true.

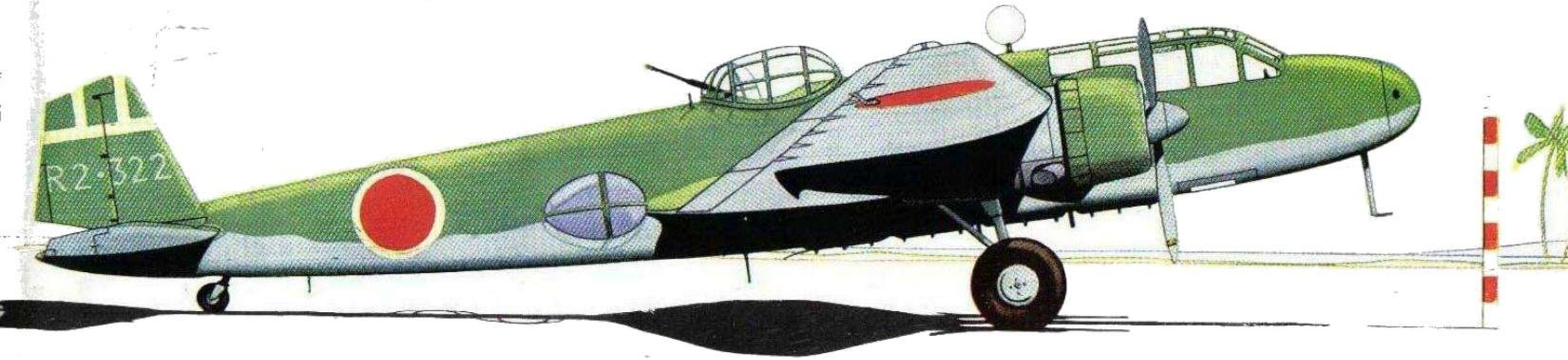
In addition to their work in China, Nell aeroplanes have been found at Tarawa, in the Gilbert Islands; in the Marshall Islands; on Shinchiku aerodrome, Formosa; and also at Lae in New Guinea. The photograph on this page shows a crashed Nell on Tarawa.

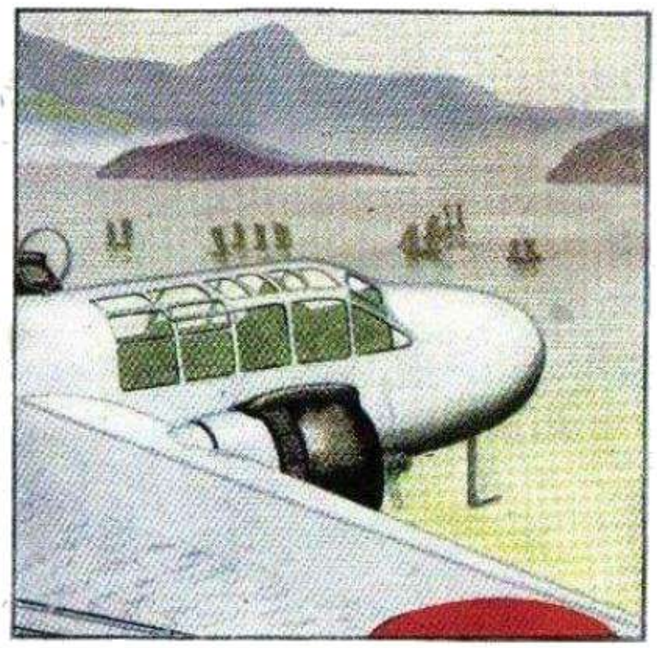
Although provision is made for the stowage of bombs within the fuselage, bombs are sometimes slung from racks mounted outside the fuselage under the main bomb compartment.

Nell retains the Junkers "double-wing" type ailerons fitted to the earlier Mitsubishi bombers, and it is this feature which has been mainly responsible for the assumption that Nell is a copy of the Junkers Ju 86. Although the design has been influenced by Junkers aircraft, it is a much longer story and goes back to the time when German companies built their military designs in Sweden, Switzerland, and the U.S.S.R. to evade the ban imposed by the Allies in 1919 on building these types of aeroplanes in Germany.

The M.C.21 civil freight version of the Mitsubishi Navy 96 bomber Nell was put into service by the Japan Airways Co., and details of these aeroplanes, together with a photograph of that version, appear on page 49.







An unpainted Nell
(Flying over Japanese home waters)

A camouflaged Nell
(Taking-off from Singapore Airport)

Mitsubishi M.C.21 civil transports
(At Haneda Airport, Tokyo)

SALLY
ARMY 97 BOMBER
MITSUBISHI

Japanese designation—Ki 21 (Model 1).

Models—1 and 2.

Duty—Bomber.

Designing company—Mitsubishi Heavy Industries, Ltd.

Layout—Mid-wing cantilever monoplane.

Construction—Metal with stressed skin. Fabric-covered control surfaces.

Crew—Five to seven.

Motors—Model 1. Two 14-cylinder Mitsubishi Type 97 air-cooled radials. 870 h.p. each. Model 2. Two 14-cylinder Mitsubishi Type 100 air-cooled radials. 1,280 h.p. each at 13,200 ft.

Span—Model 1, 73 ft. 0 in. Model 2, 74 ft. 5 ins.

Length—Model 1, 51 ft. 8 ins. Model 2, 52 ft. 0 in.

Wing area—Model 1, 675 sq. ft.

Empty weight—Model 1, 10,450 lb.

Loaded weight—Model 1, 22,000 lb. Model 2, 21,570 lb.

Wing loading—Model 1, 32.5 lb./sq. ft.

Maximum speed—Model 1, 248 m.p.h. at 8,000 ft. Model 2, 285 m.p.h. at 14.500 ft.

Cruising speed—Model 1, 190 m.p.h.

Range—Model 1, normal 1,180 miles. Model 2, with normal fuel and maximum bomb load, 1,475 miles.

Service ceiling—Model 1, 22,000 ft. Model 2, 29,900 ft.

Climb—Model 2, 1,220 ft./min. at 13,200 ft.

Fuel—Model 2, maximum 680 Imperial gallons (820 U.S. gallons).

Armament—Early Model 1, M.G. in nose, dorsal, and ventral positions. Later Model 1, M.G. in nose, dorsal, ventral, and tail positions. Model 2, M.G. in nose, ventral, and tail positions and in dorsal turret.

Bomb load—Model 2, 2,200 lb.

Pictorial Press

SALLY, designed by the Mitsubishi Company, has been a standard Japanese Army two-motor bomber since 1937, although it has now been largely superseded by the Nakajima Helen.

The Sally Model 1 has been used in quantity in China, and has raided many Chinese cities, and apparently met enough opposition to cause it to appear with a remote-controlled rearward-firing machine-gun in the extreme tail.

Although the original Sally was still in service in large numbers when Japan extended her war considerably in 1941, a new version appeared, the Model 2, which had increased span, new and more powerful motors, and a dorsal turret mounted on top of the fuselage which had a cleaner top line, compared with the earlier version having a long rear cockpit enclosure.

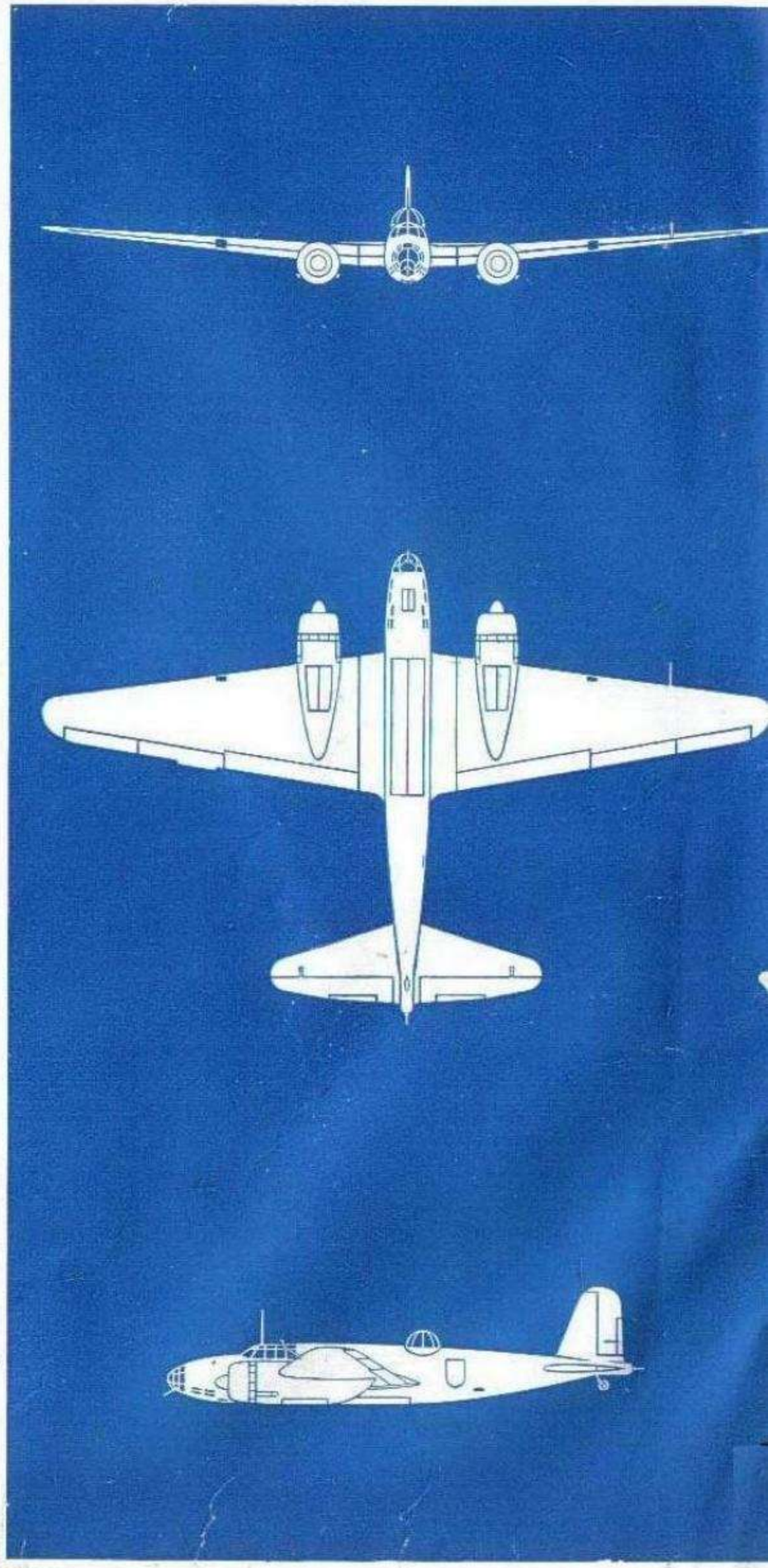
Sally is probably mostly used in the China area, although the Model 2 has appeared on Boeroe Island near Celebes, in the Admiralty Islands and at Tinian in the Marianas Islands. It is on record that a formation of these bombers attacked Major-General Chennault's Fourteenth United States Army Air Force headquarters in China, late in 1943. Seventeen enemy aircraft, including bombers and their escorts, were destroyed during this raid.

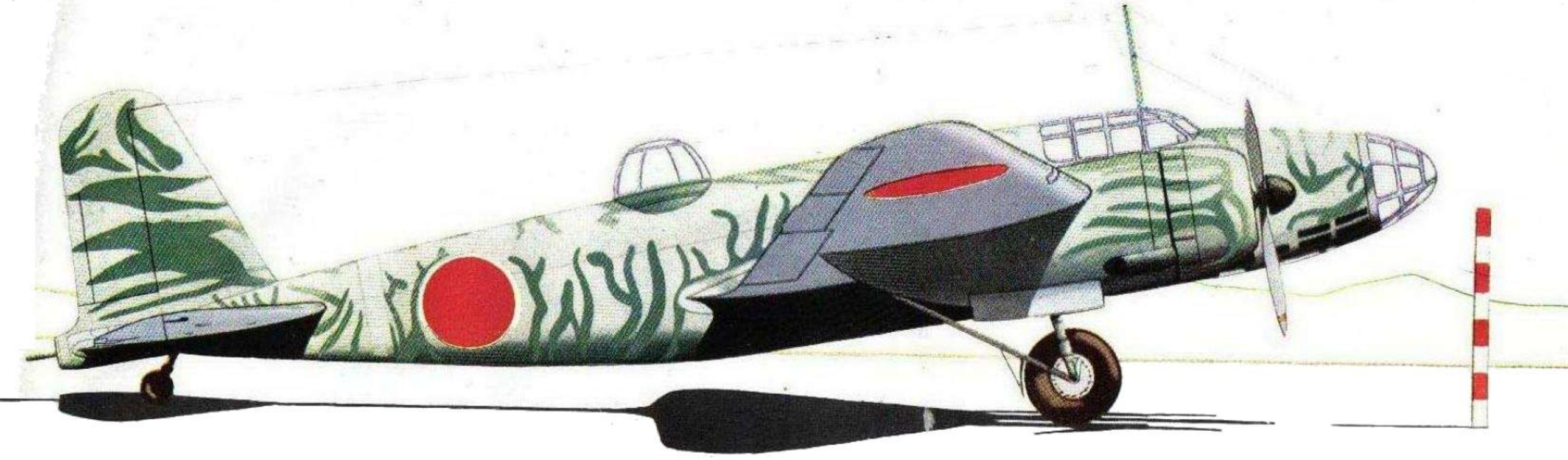
The Sally bomber with the two diagonal stripes and the star on the fuselage shown in the photograph on this page is one belonging to a squadron which, in 1941, was based in North China, and carried out raids against Chungking, and also Yenan, in Shensi province. The photograph on page 53 shows five Model 1 aeroplanes of this same squadron, flying over mountains on their way to Chungking.

Judging by its appearance, Sally is a good aeroplane, and is probably a nice aeroplane to fly. Three of the crew are housed in the main cockpit, and there are dual controls.

A civil transport version of Sally was built, with accommodation for a crew of two and five passengers, and one of these aeroplanes was registered J-BACN. The transport type is believed to be the Mitsubishi Type 19 ; it has always been reported as the Nakajima Type 19, but this is not accurate, and as the next Mitsubishi civil transport was designated M.C.20, it seems likely that 19 is the correct number for the civil Sally. It is not absolutely certain whether the civil type was a modified bomber, or whether the civil type was developed into the 97 bomber.

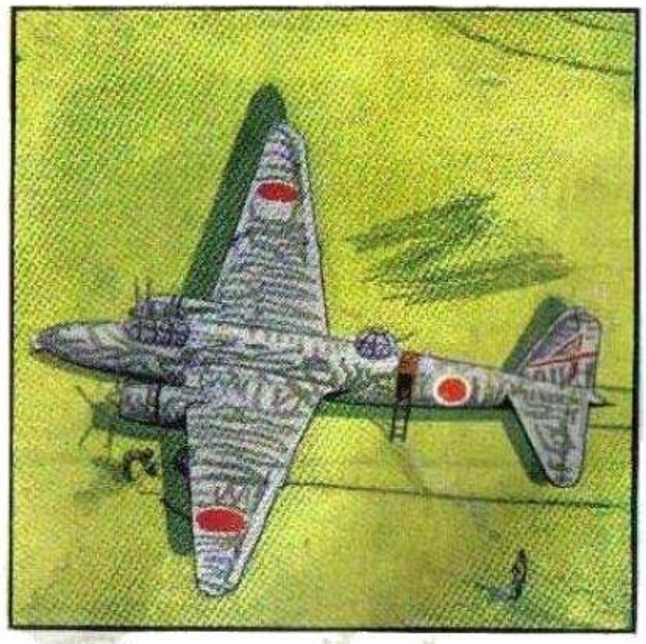
Sally has the same friendly atmosphere around it as has our Wellington, but, like the Wellington, after many years of hard work, Sally has had to give place to the newer types, but, again like the Wellington, the Sally will still be found doing the odd jobs for some time to come.





Sally Model 1 . . . . . .

with rear fuselage gun



Sally Model 2

JAKE

NAVY 0 RECONNAISSANCE

AICHI

Japanese designation—E13A1.

Model—1-1.

Duty—Reconnaissance.

Designing company—Aichi Watch and Electric Machinery Company, Ltd.

Assembled by—Aichi, Hiro Naval Yard and Watanabe Iron Works, Ltd.

Layout—Twin-float low-wing cantilever monoplane.

Construction—Metal with stressed skin, wooden tailplane and wing tips. Believed to have fabric-covered control surfaces.

Crew—Three.

Motor—One 14-cylinder Mitsubishi *Kinsei* (Golden Star) Model 43 or 44 air-cooled radial. 1,060 h.p. at 6,500 ft.

Span—47 ft. 6 ins.

Length—36 ft. 11 ins.

Maximum speed—222 m.p.h. at 7,600 ft.

Range—With 305 Imperial gallons of fuel and 530 lb. bomb load, 1,415 miles.

Service ceiling—24,400 ft.

Climb—1,540 ft./min. at 6,500 ft.

Fuel—305 Imperial gallons (368 U.S. gallons).

Armament—Believed to have two 7·7 mm. fixed forward firing M.G. and one or two movable rear M.G.

Bomb load—528 lb.

British Official

JAKE, when it was first seen, was thought to be a float version of the Aichi 99 Navy dive-bomber Val, but it is now known to be an original Aichi design assembled by the parent company, the Hiro Naval Yard and by Watanabe Tekkosho Kabushiki Kaisha (Watanabe Iron Works, Ltd.) at Zatsushono-kuma, Fukuoka on Kyushu Island. This last-named company was established in 1886.

Jake was one of the types of floatplane based at Kiska in the days when the Japanese were active in the Aleutians. This type of aeroplane was also seen by the crews of United States Army Air Force Aleutian-based Liberators when they raided Paramushiru on 11 August, 1943. The Aichi Navy 0 Jake was again found to be operating in the Marshall Islands along with Mitsubishi 0 Pete float biplanes.

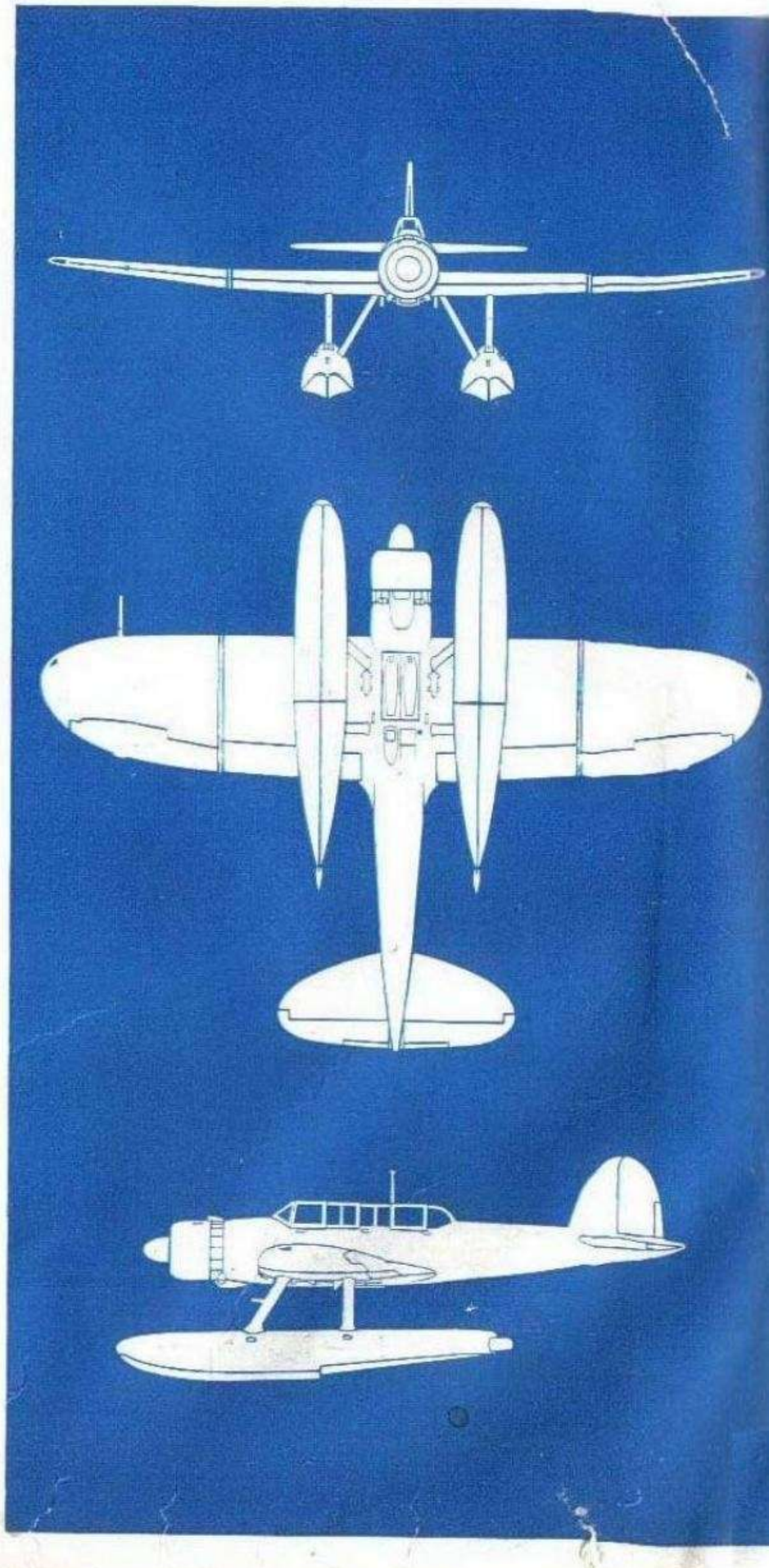
Photographic evidence suggests that at least one Jake was painted in the yellow and red colour scheme used during the attacks on Pearl Harbour, and it may well be that Jake was the type of floatplane which was reported over the area on reconnaissance before the attack, although it is possible that reconnaissance flights were made over Pearl Harbour by the small folding-wing floatplanes* carried aboard some Japanese submarines, and which later put in an appearance off the Pacific coast of the United States of America, and again over the east coast of Australia in the Sydney area, just before the attack on Sydney Harbour by Japanese midget submarines on 1 June, 1942.

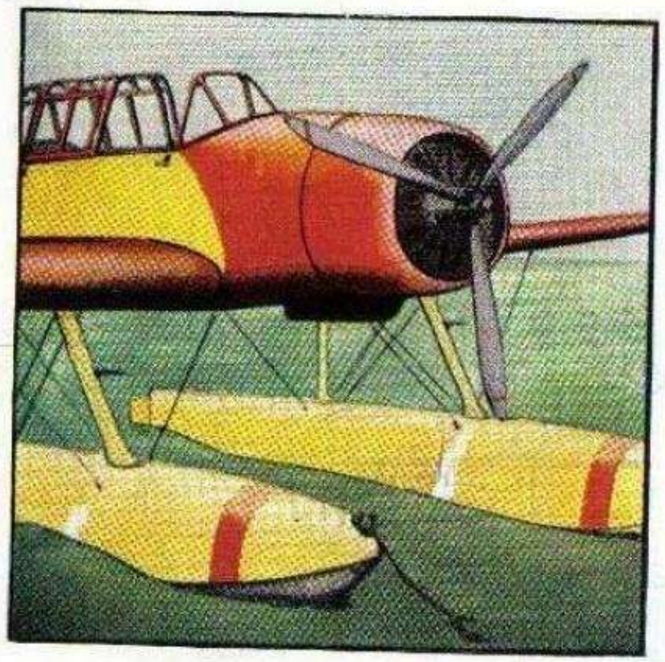
The Aichi Jake is a conventional low-wing twin-float seaplane of metal construction, and is one of the few twin-float monoplanes still in service among the main Powers. Photographs of Jake and also of Rufe floatplanes that have been submerged in the sea for some time suggest that the floats are efficiently treated to withstand the effect of sea water, but that the fuselage, wings, and tail unit are not so treated.

Jake carries two bombs, each weighing 60 kg. internally in a small bomb compartment under the front cockpit, and two further 60 kg. bombs hung on racks under the centre section, one each side of the main bomb bay doors.

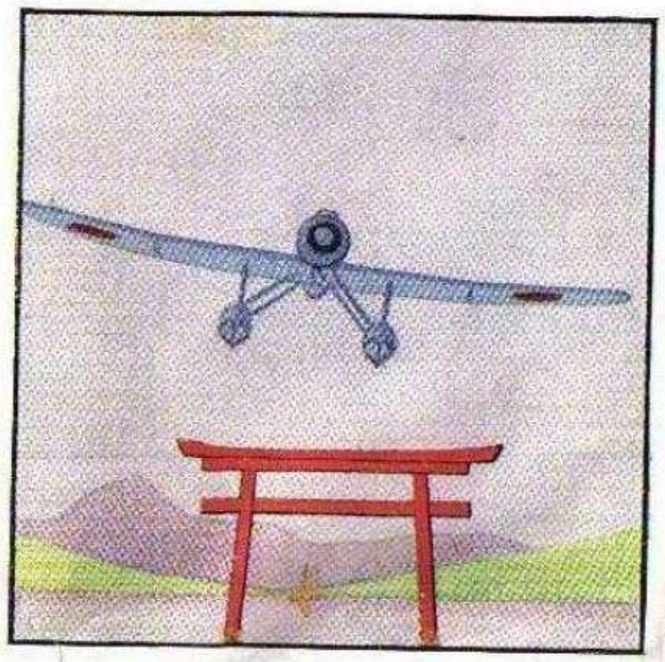
An interesting feature of Jake is the dihedral angle on the main plane which does not start until about 12 ft. out from the centre line of the fuselage.

* See page 61.

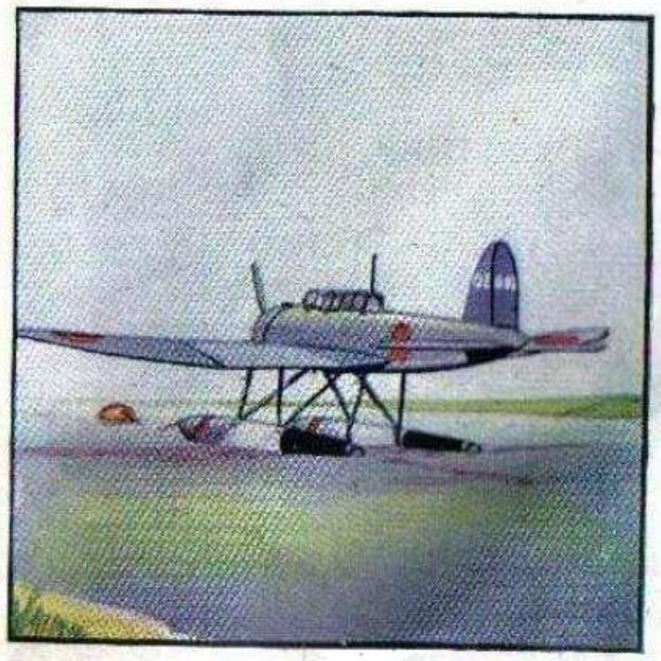




Jake, an early model



Jake Model 1-1
(Over Shinto Shrine symbol)



Jake Model 1-1 moored

PETE
NAVY 0 RECONNAISSANCE
MITSUBISHI

Japanese designation—F1M2.

Model—1-1.

Duty—Reconnaissance.

Designing company—Mitsubishi Heavy Industries, Ltd.

Assembled by—Mitsubishi and the Sasebo Naval Air Arsenal.

Layout—Single-float braced-biplane.

Construction—Metal with stressed skin. Fabric-covered control surfaces.

Crew—Two.

Motor—One 14-cylinder Mitsubishi *Zuisei* (Holy Star) Model 13 air-cooled radial. Believed 1,000 h.p. at 6,500 ft. Two-speed supercharger.

Span—36 ft. 0 in.

Length—31 ft. 4 ins.

Maximum speed—200 m.p.h. at 5,000 ft.

Range—450 miles.

Service ceiling—Over 33,000 ft.

Armament—Two 7·7 mm. fixed forward firing M.G. and one 7·7 mm. movable rear M.G.

Bomb load—Believed to carry one small bomb under each wing.

British Official

PETE is the only operational biplane in service with the Japanese air services. It is a small single-float reconnaissance seaplane designed by Mitsubishi and assembled by the parent company and the Sasebo Naval Air Arsenal, and designated the Navy Type 0.

The Sasebo Naval Air Arsenal is part of the big Sasebo (now known officially as Saseho) Naval Arsenal at the port of the same name. The air branch of the arsenal is equipped to build complete aeroplanes of its own design, or to the design of other concerns, apart from undertaking repair work on Navy airframes and aero motors, while the Naval Arsenal proper builds naval vessels, including the largest classes. Reports indicate that in June 1938 a pocket battleship or heavy armoured cruiser named *Niitaka* was laid down in the Sasebo yards. The *Niitaka* may just possibly be an aircraft carrier. Other examples of its work are the 5,170-ton cruisers *Nagara* and *Yura*, both of which are named after Japanese rivers.

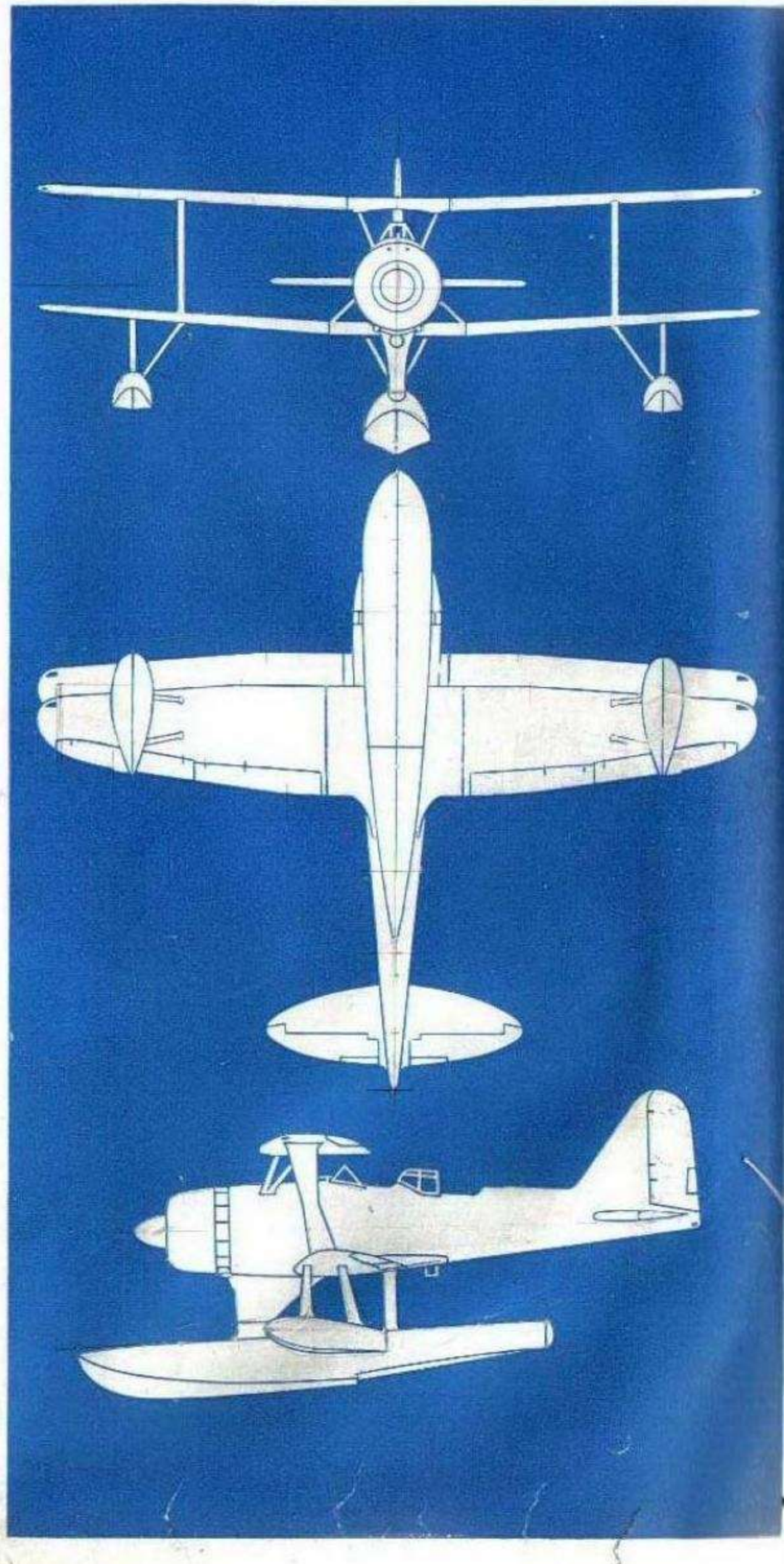
Following on the lines of the Nakajima Navy 90–2 and the Nakajima Navy 95 Dave (both illustrated on page 54), Pete conforms to the same layout with its large central float and small wing tip floats, and it probably is used as a reconnaissance floatplane operating from Japanese battleships and cruisers, as did the Nakajima designs during their operational lives.

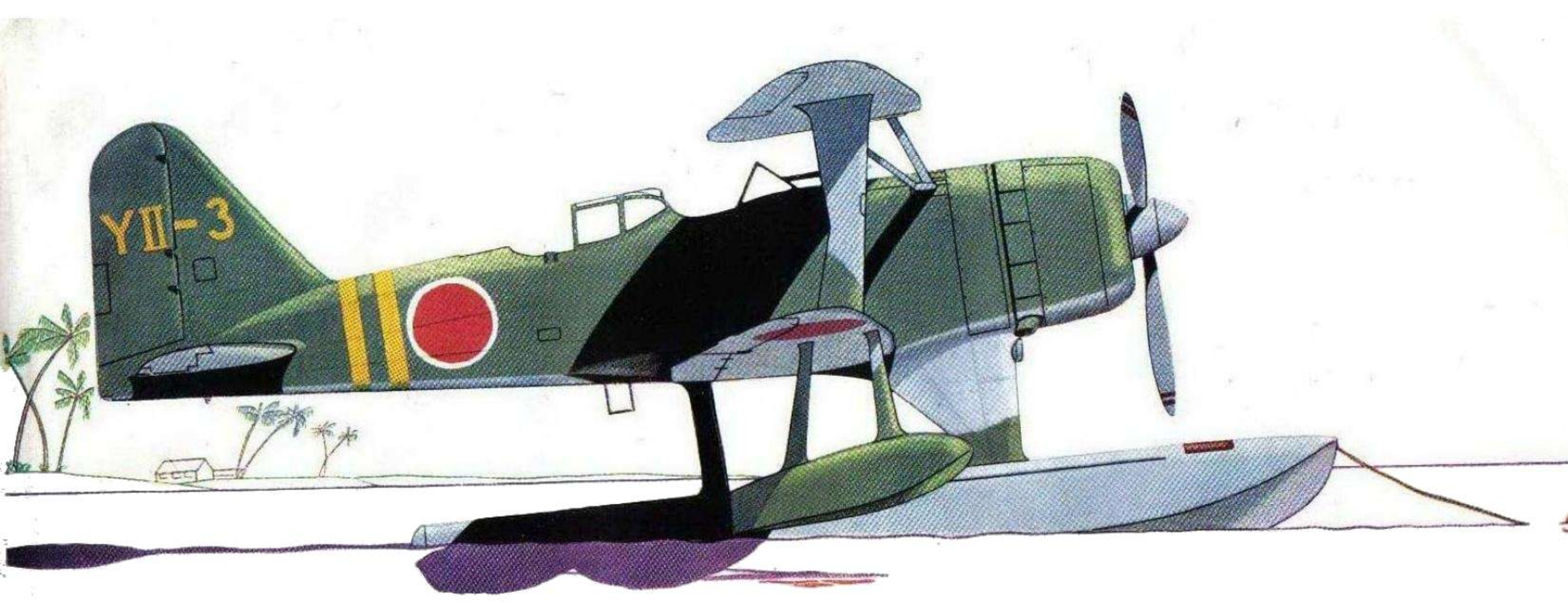
Pete, however, is known to operate from sheltered island bases throughout the Pacific, and it was seen in the Marshall Islands, where it shared anchorages with the Aichi Jake monoplane.

A number of Pete floatplanes were shot down by United States Naval Forces in the Battle of the Coral Sea on 7 and 8 May, 1942. The Petes engaged were most likely launched from the four Japanese heavy cruisers engaged in the battle. One at least of the Mitsubishi Petes taking part in this engagement was shot down on the beach of an island in the Louisiade Archipelago.

Pete's maximum speed of 200 m.p.h. makes it one of the fastest float biplanes ever built. The German Heinkel He.114 has a top speed of 208 m.p.h., while the only comparable Allied types, the Curtiss SOC-4 Seagull and the Grumman Duck have top speeds of 165 m.p.h. and 180 m.p.h. respectively. These figures are, of course, for operational floatplanes, although it must be remembered that the 1929 Gloster IV racing float biplane had a top speed of 300 m.p.h.

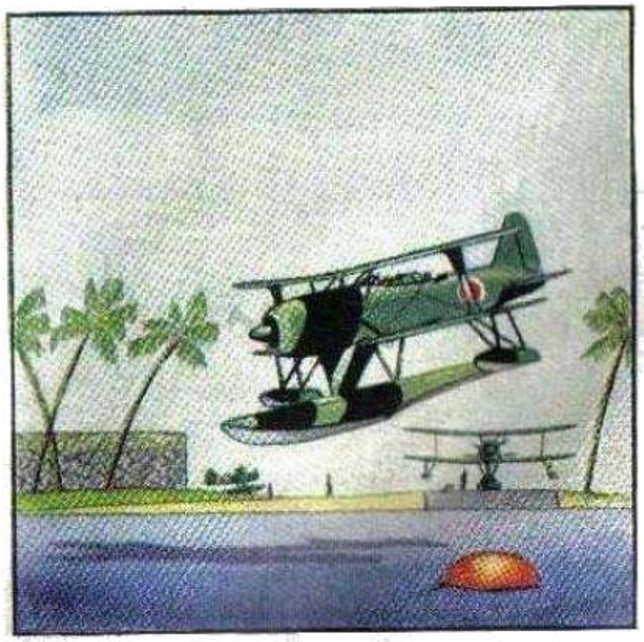
Pete is a useful type of aeroplane to a nation so dependent on sea communications, but although it has a good performance it is probably the last of the Japanese float biplanes.





Pete at moorings

Pete over a Pacific Atoll



Pete alighting

RUFE

NAVY 2 FIGHTER

MITSUBISHI

Japanese designation—A6M2–N.

Model—1–1.

Duty—Fighter.

Designing company—Mitsubishi Heavy Industries, Ltd.

Assembled by—Nakajima Aircraft Company, Ltd.

Layout—Single-float low-wing cantilever monoplane.

Construction—Metal with stressed skin. Fabric-covered control surfaces.

Crew—One.

Motor—One 14-cylinder Nakajima *Sakae* (Prosperity) Model 12 air-cooled radial. 955 h.p. at 14,500 ft.

Span—39 ft. 5 ins.

Length—34 ft. 6 ins.

Loaded weight—5,920 lb.

Maximum speed—278 m.p.h. at 16,000 ft.

Maximum range—With maximum fuel, 1,280 miles.

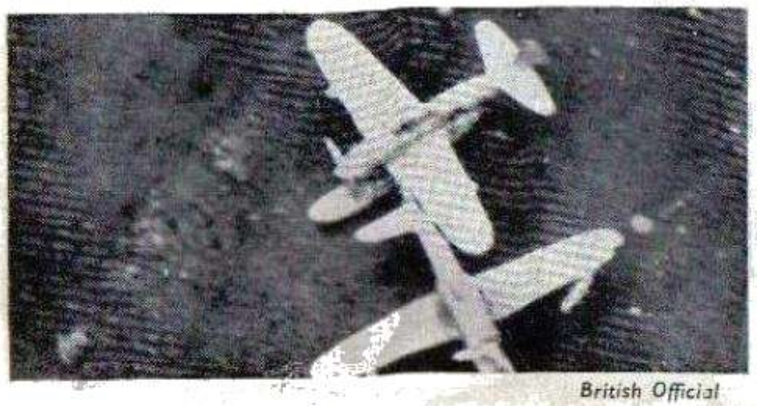
Service ceiling—35,400 ft.

Climb—2,090 ft./min. at 14,000 ft.

Fuel—188 Imperial gallons (227 U.S. gallons).

Armament—Two 20 mm. cannon and two 7·7 mm. M.G. Fixed forward firing.

Bomb load—May carry small bombs under wings.



British Official

RUFE is one of the two floatplane fighters most used in numbers in this war, the other type being the German Arado Ar 196 used against British Coastal Command aircraft operating over the Bay of Biscay, and in the early days of the war from German pocket battleships.

Rufe is a Mitsubishi design assembled by the Nakajima Aircraft Company. Rufe is generally similar to the land fighter Zeke Model 2–1, the airframe and wings being identical, but having been mounted on a large single float and wing tip floats added. The tail unit has been slightly modified to counteract the additional side area of the floats.

Rufe was designed for regions in which land fighters have difficulty in operating, and was the principal type of aeroplane used to defend Japanese positions in the Aleutian Islands in 1942, and many were based on Kiska. The United States Navy salvaged a damaged Rufe on Attu Island, which is the most western island in the Aleutians, and one of the Near Island group. This is the closest of these United States islands to Japanese territory, and is about 650 miles from Paramushiru, where Rufe has also been in action against U.S.A.A.F. Liberator bombers.

Rufe was at one time the fastest floatplane in service, the floats having reduced the speed by 50 m.p.h. over the land version, but two new Japanese Kawanishi floatplanes Rex and Norm are considerably faster.

Rufe has a new service designation, it is the 2 and not just a new model number added to Zeke's 0.

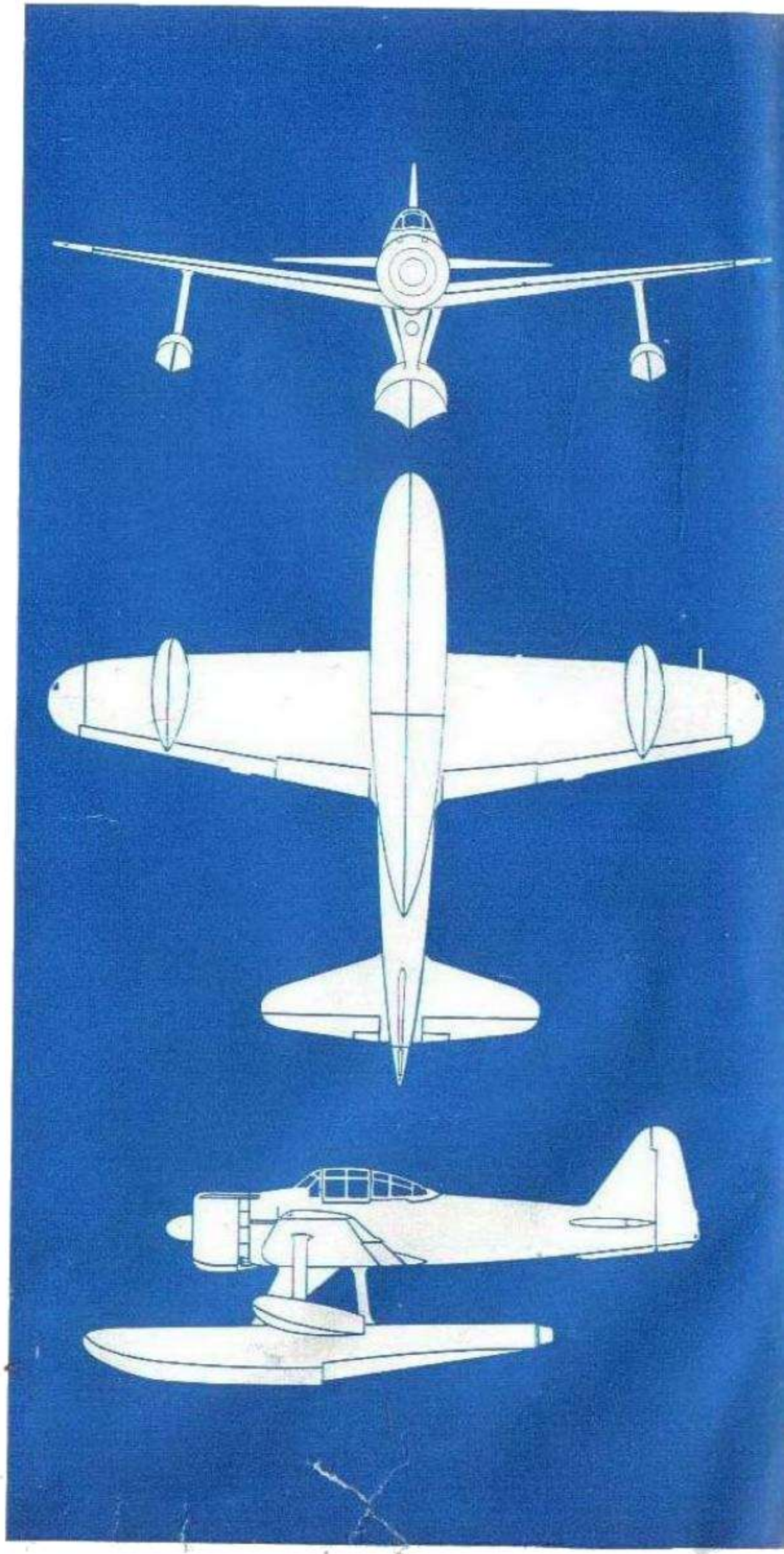
In addition to Rufe's operations in the Northern Pacific, these seaplanes have been seen in the Solomons.

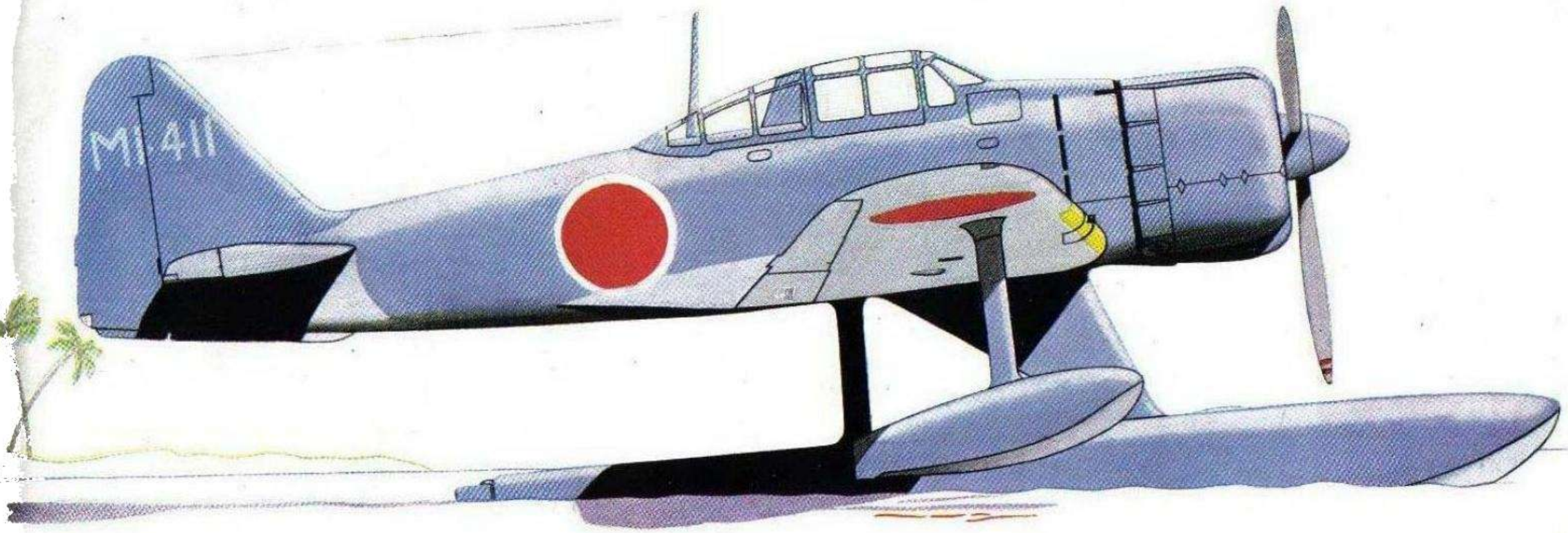
Although these aeroplanes normally operate in small numbers the photograph on page 53 is part of a larger photograph showing eight Rufes flying in the formation " Echelon stepped up to port ".

Large parts of Rufes, in some cases the complete aeroplane apart from the tail, have been salvaged and shipped to the United States for examination.

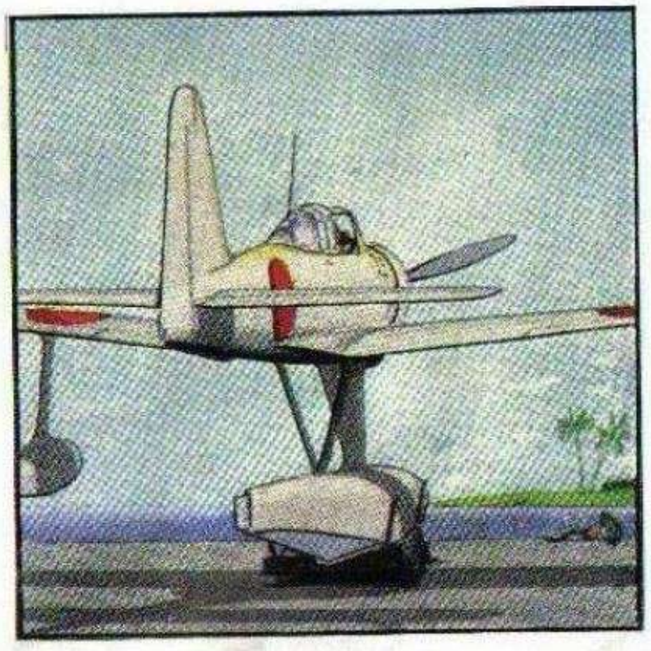
Many Mitsubishi Rufes have been painted light-grey blue on all surfaces, but some carry dark camouflage similar to the United States Navy's camouflage of dark blue on the upper surfaces with light blue underneath. These floatplanes have had a yellow strip along the leading edge of the wing extending from the wing roots to about half span.

Rufe may be seen with or without the radio mast protruding from the rear of the cockpit enclosure.

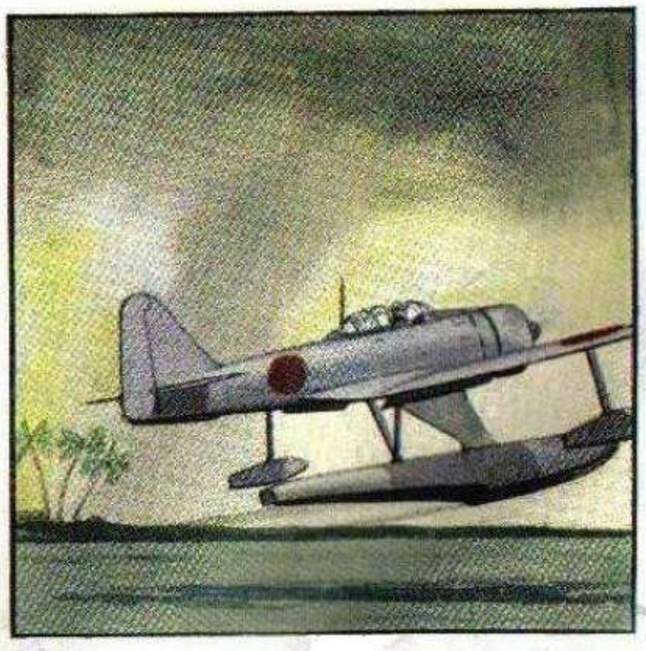




Rufe over Dutch Harbour



Rufe on beaching trolley



Rufe taking-off

EMILY

NAVY 2 RECONNAISSANCE KAWANISHI

Japanese designation—H8K2.

Model—1-2.

Duty—Reconnaissance flying-boat.

Designing company—Kawanishi Aircraft Company, Ltd.

Layout—High-wing cantilever monoplane flying-boat with braced wing tip floats.

Construction—All-metal.

Crew—Nine.

Motors—Four 14-cylinder Mitsubishi *Kasei* (Mars) Model 22 air-cooled radials. 1,400 h.p. each. Model 1-1 had *Kasei* Model 12 motors.

Span—124 ft. 7 ins.

Length—92 ft. 3 ins.

Loaded weight—About 68,000 lb.

Maximum speed—290 m.p.h.

Range—Over 4,000 miles.

Armament—Five 20mm. cannon in nose, dorsal, lateral and tail turrets, and four 12·7mm. MG.

U.S. Office of War Information

EMILY is the latest Kawanishi flying-boat known to be in service ; it is designated the Navy 2 and is replacing the older Kawanishi 97 Mavis. The first good photographs of Emily were some amazingly good " stills " from combat film taken by a United States Navy carrier-borne Hellcat in September 1943, when the first Emily to be shot down was one of the first enemy aeroplanes to fall to the guns of the then new Hellcat. This action took place to the east of the Gilbert Islands.

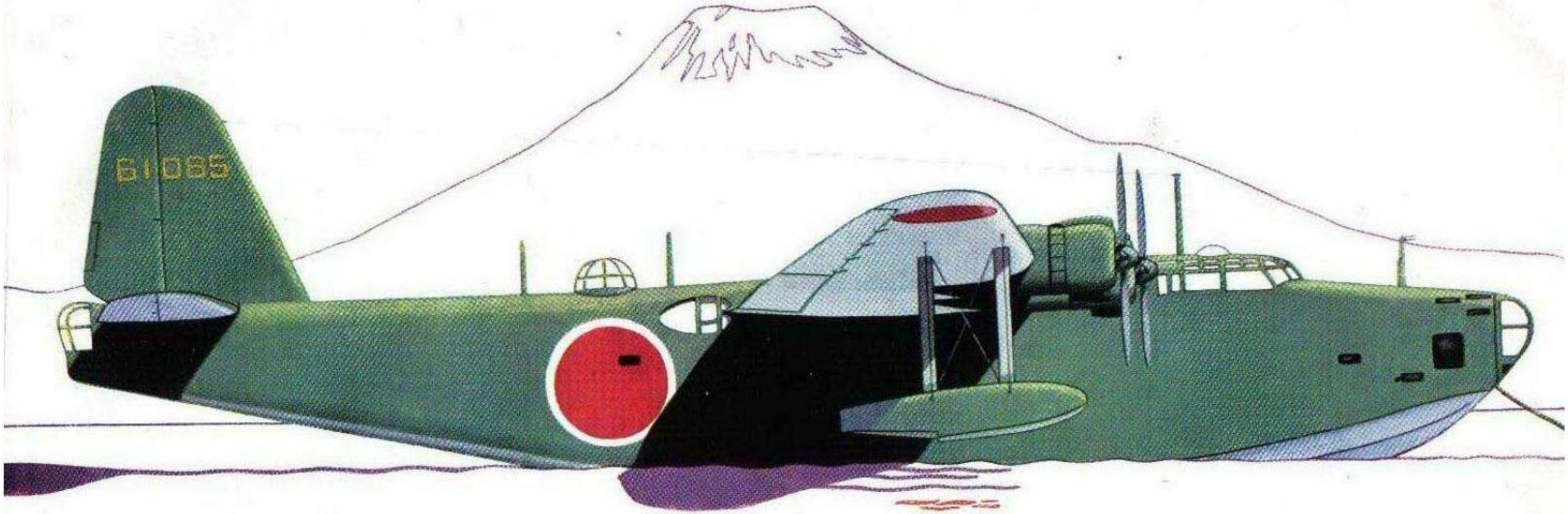
Although Emily has a smaller span than the other Kawanishi flying-boat Mavis, it is the biggest deep hulled four-motor flying-boat in regular service in numbers in the Pacific. The United States Navy Coronado has a span of 115 ft. compared with the 124 ft. of Emily. The other four-motor flying-boats in the Pacific are the Qantas Empire Airways Short " C " class Empire flying-boats with a span of 114 ft., and the Sunderlands with a slightly smaller span. The only other really big boat is the one Martin Mars with a span of 200 ft., now operating in the Eastern Pacific as a cargo transport.

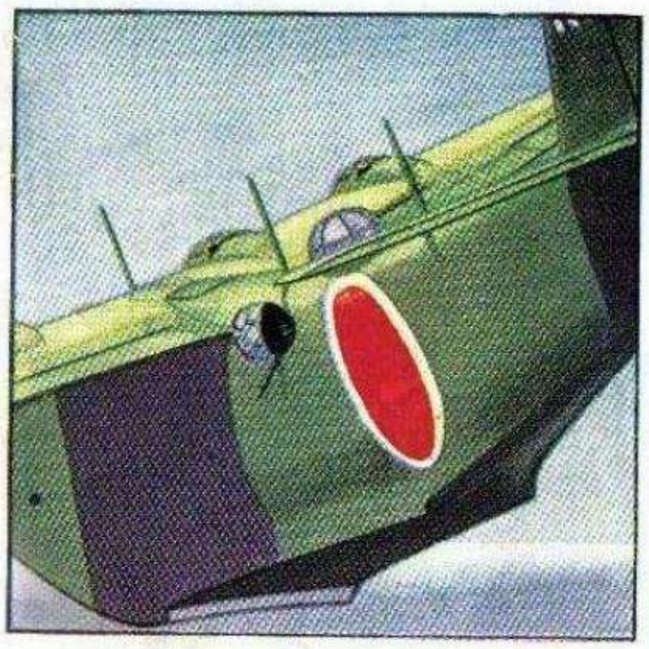
After the capture of Makin Island in the Gilberts announced on 22 November, 1943, United States Marines found a reasonably whole Emily beached after being " shot up " by United States aeroplanes. Japanese snipers used the damaged hull of the flying-boat as a point from which they harassed the Marines' landings.

Although at the time of writing a larger number of Mavis flying-boats have been encountered than the number of Emilys, at least five of the newer flying-boats were destroyed on the slipways of their base at Tanapag Harbour to the north of Garapan on Saipan Island in the Marianas. These boats were destroyed by U.S. land artillery during the capture of the island by the U.S. 2nd and 4th Marine Divisions, and the 27th Army Division in June 1944. Sharing the base at Tanapag with the Emilys was at least one Mavis which was also destroyed.

A number of masts spaced out along the top of the hull of Emily suggests that this type of flying-boat is equipped with A.S.V. (Anti-submarine vectors).

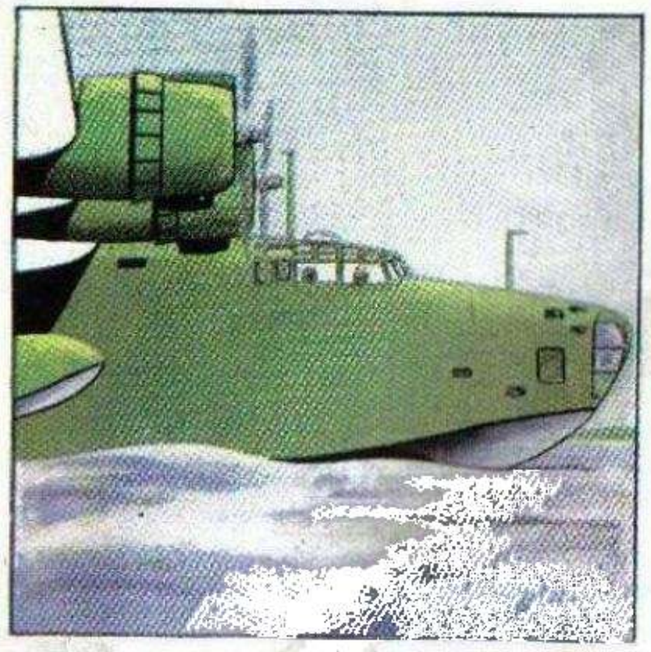
The Model 3-2 used as a transport is known as Seiku (Clear Sky).





Emily Model 1-1
(Showing deep hull and blister turret)

Emily flying-boats moored
(Mount Fuji in background)



Emily Model 1-1

MAVIS

NAVY 97 RECONNAISSANCE

KAWANISHI

Japanese designation—H6K3.

Model—1-1.

Duty—Reconnaissance and transport flying-boat.

Designing company—Kawanishi Aircraft Company, Ltd.

Layout—Braced parasol monoplane flying-boat with braced wing tip floats.

Construction—Metal with fabric-covered control surfaces.

Crew—Eight to ten.

Motors—Four 14-cylinder Mitsubishi *Kinsei* (Golden Star) Model 46 air-cooled radials. 1,060 h.p. each at 13,800 ft.

Span—131 ft. 0 in.

Length—84 ft. 6 ins.

Loaded weight—43,156 lb.

Maximum speed—237 m.p.h. at 15,000 ft.

Maximum range—With maximum fuel and no bomb load, 4,400 miles.

Service ceiling—27,700 ft.

Climb—1,230 ft./min. at 13,800 ft.

Fuel—Maximum, 2,913 Imperial gallons (3,510 U.S. gallons).

Armament—Uncertain.

Bomb load—3,528 lb.

Asahi

MAVIS is probably still the more common of the two types of Japanese four-motor flying-boats, although Emily is the newer type and will probably be met in increasing numbers.

The design was originally for a large passenger flying-boat to operate on the Pacific Islands services of the Japan Airways Company, Ltd. (Dai Nippon Koku Kabushiki Kaisha). Accommodation in these flying-boats was for twenty passengers in three cabins on day services, and a smaller number of passengers in two-decked berths on night services. It is possible that the full number of passengers was never carried and that some bunks were always made up as on Imperial Airways' Short "C" class Empire flying-boats.

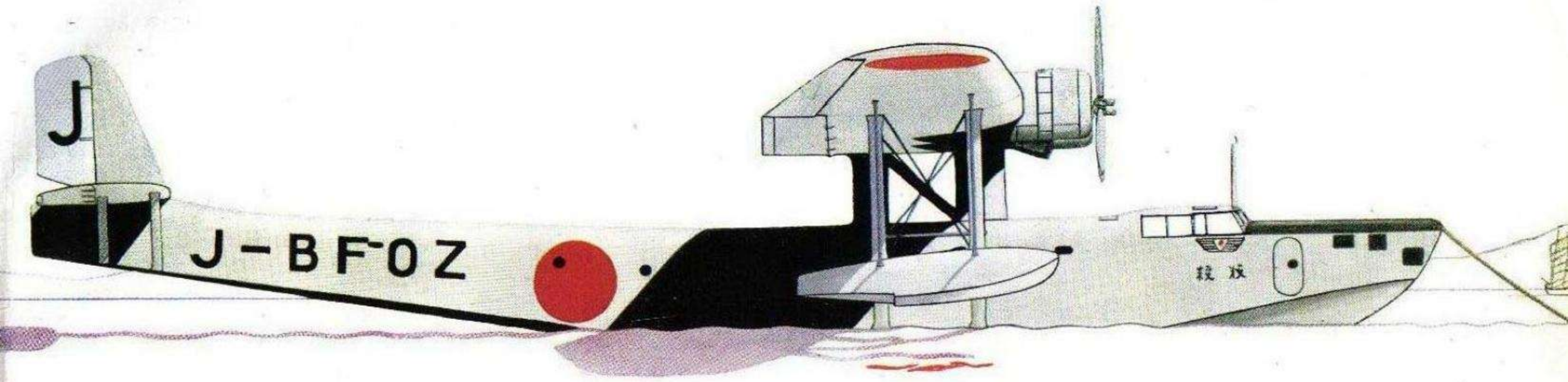
One of these Kawanishi flying-boats named *Ayanami* (Waves whose beauty suggests figures woven in silk) made experimental flights between Japan and the South Pacific Islands in 1940, and it was probably the type of aeroplane used on the Pacific services linking Canton (China) with Jaluit in the Marshall Islands via the Palau Islands and the Caroline Islands, calling at Yap, Pikelot, Truk, Nomoi and Ponape ; and on the services between Yokohama on Honshu Island and Dili in Portuguese Timor by way of Saipan in the Marianas Islands, and the Palau Islands.

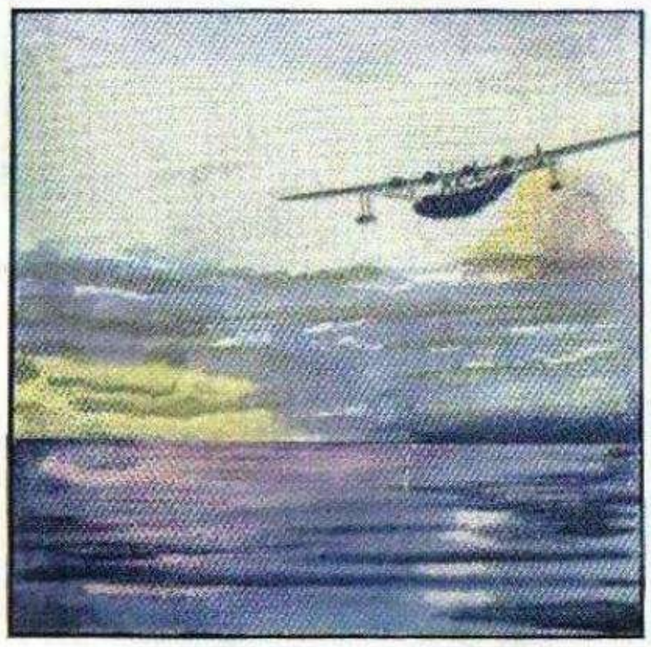
Mavis, the Naval version of the Kawanishi transport, is the Navy Type 97, and used originally for long-range reconnaissance and bombing, is now mainly in service as a transport type. After the attack on Pearl Harbour Mavis was seen in the Midway area, and during the attack by the United States Navy aeroplanes on Wake Island on 5 October, 1943, Mavis flying-boats were seen on the slipways.

Six Kawanishi Mavis flying-boats were at their moorings in the harbour when United States Army Air Force Liberators from the Aleutians raided Shumushu on 11 August, 1943.

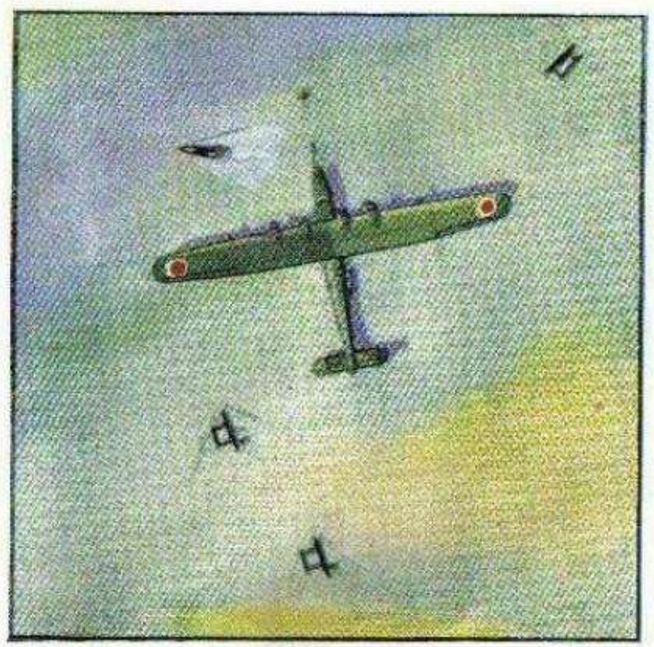
A number of Mavis flying-boats have been shot down over the Pacific in air combat, some operating from Saipan.

Although photographs of Mavis flying-boats are available, information on the armament is uncertain and for this reason the flying-boat featured in the main drawing is one of those operated by Japan Airways Company. The main exterior difference in the Navy version is the addition of gun positions in the bows and tail and possibly amidship. The photograph on page 58 is of the flying-boat J-BFOZ *Ayanami*, the registration letters of another of these flying-boats, the *Sazanami* (Rippling waves) are not known.

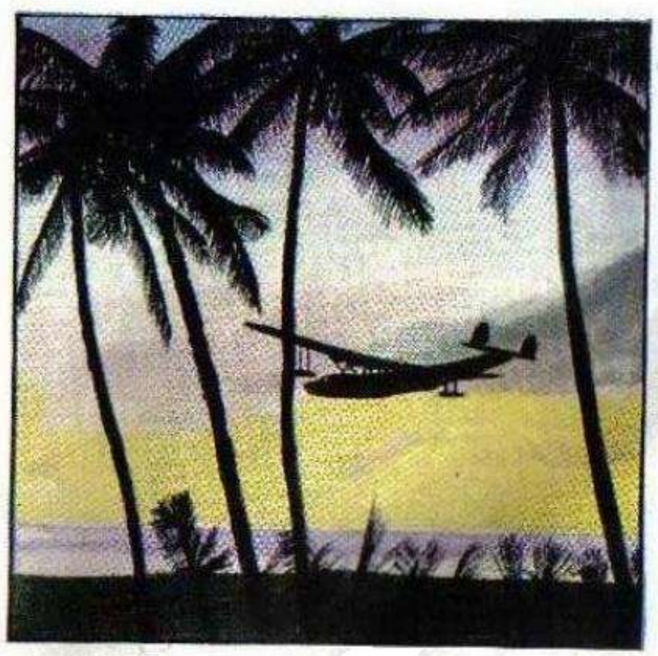




Mavis on ocean patrol



Mavis at moorings



Mavis returning from patrol

TRANSPORT AND TRAINING AEROPLANES

TRANSPORTS

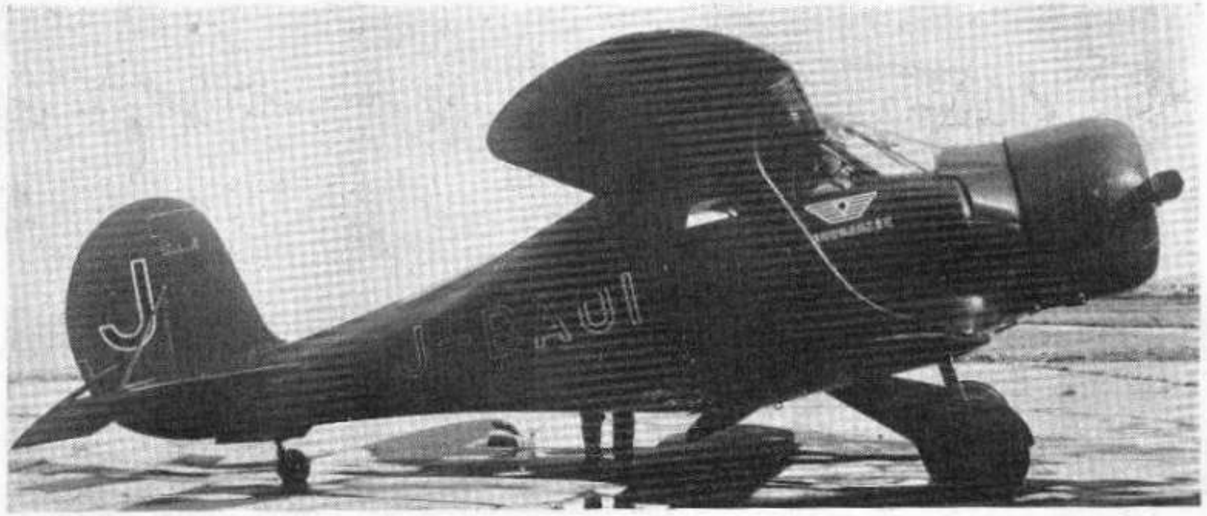
In addition to the main operational types of Japanese aeroplanes shown on the preceding pages a number of types is in service for both civil and military transport duties.

The main military types in service are : TABBY, Douglas DC-3 Type 0 (probably built by Nakajima) ; TESS, Nakajima-Douglas DC-2 Type 0 (page 48) ; THELMA, Lockheed 14 Type ~~100~~ (Ki-56) ; THORA, Nakajima A.T. Type 97 (page 55) ; and TOPSY, Mitsubishi MC. 20 Type 100 (Ki 57) (page 53). On the civil air routes and other communications services within Japan the aircraft used include : Beechcraft C-17E (page 48) ; Heinkel He 116 ; Junkers Ju 52/3m ; Mitsubishi M.C.21 (page 49) ; Mitsubishi *Hinazuru* (page 48) ; Mitsubishi *Karigane* (page 53) ; Mitsubishi *Otori* (page 52) ; N.K.K. TK.3 once known as Teresa ; Tokyo Gasu Denki *Chidori-go*, KR-2 and TR-1 (page 59) ; as well as the military types listed above.

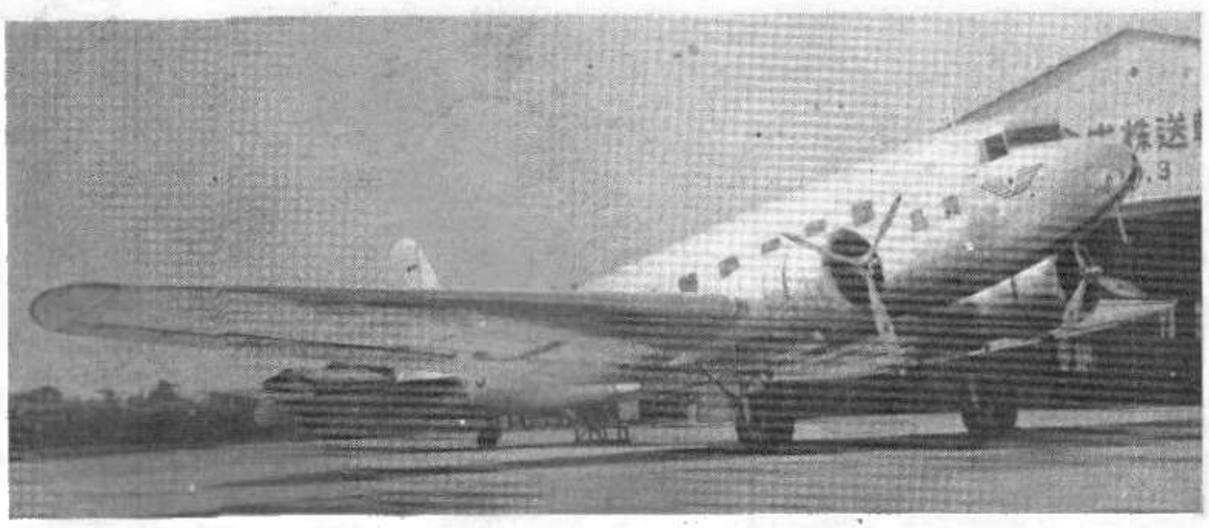
Transport versions of Betty, Emily, Liz, Mavis and Nell are also in service.

Theresa Kokusai ki-59 Army Type 1 Transport

MITSUBISHI *HINAZURU* (Young Crane). This aeroplane is the British Airspeed Envoy built under licence by the Mitsubishi Company. It is in service in small numbers with the Japan Airways Co., Ltd.
Two 240 h.p. Mitsubishi-built Armstrong Siddeley *Lynx* IVc motors. Span : 52 ft. 4 ins. Top speed 174 m.p.h. Accommodation : 1 pilot and 8 passengers.



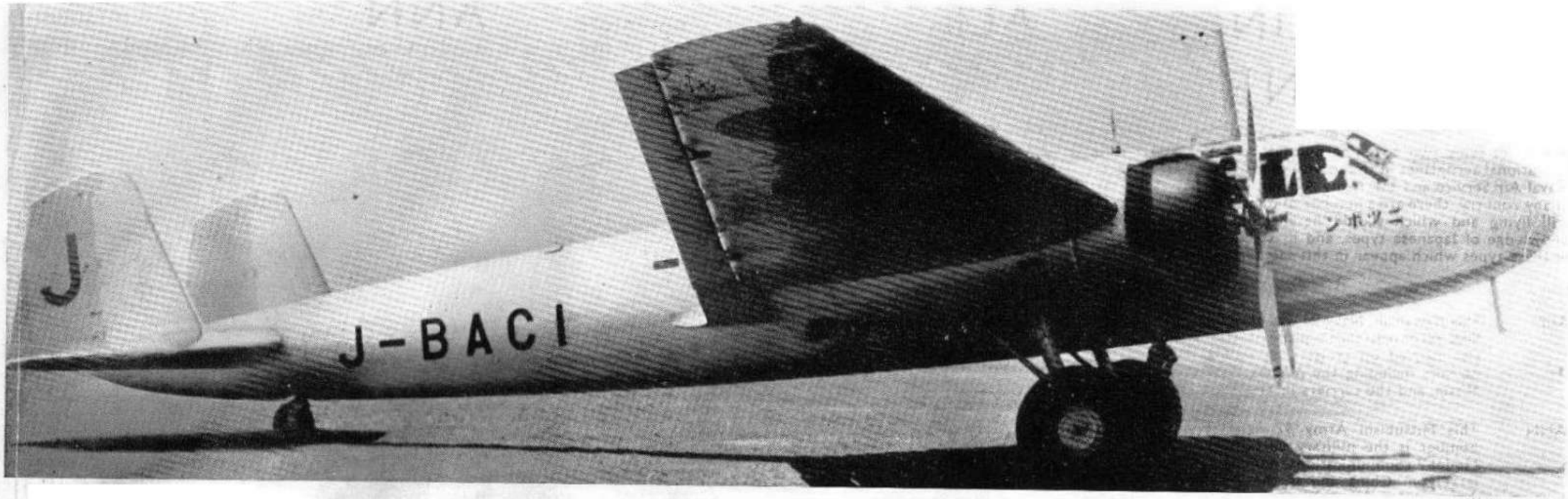
BEECHCRAFT C-17E. A licence to build these aeroplanes is held by Tokyo Aircraft Co., Ltd (Tokyo Hikoki Kabushiki Kaisha), a branch of the Japan Airways Company, on whose services these aeroplanes are used.
One 285 h.p. Wright *Whirlwind* motor probably made in Japan. Span : 32 ft. 0 in. Top speed : about 185 m.p.h. Accommodation : 1 pilot and 3 or 4 passengers.



NAKAJIMA-DOUGLAS DC-2. Built under licence and used by the Japan Airways Company, this aeroplane is also used as a military transport as the Type 0 Tess.
Two 710 h.p. Wright [illegible] motors. Span : 85 ft. 0 in. Top speed : 217 m.p.h. Accommodation : Civil version, 14 passengers.

NAKAJIMA-FOKKER UNIVERSAL. Built under licence, this American Fokker design is still in service with the Japan Airways Company and the Japanese Army and Navy Air Services.
One 450 h.p. Nakajima-built *Jupiter* motor. Span : 50 ft. 8 ins. Top speed : 142 m.p.h. Accommodation : 2 crew and 6 passengers.

All the World's Aircraft photographs



William Larkins

MITSUBISHI M.C.21. This aeroplane is a civil freight version of the Navy 96 bomber Nell. A number of these aeroplanes is used by the Japan Airways Company on its Tokyo-Bangkok service. One of these aeroplanes named *Soyokaze* (Zephyr) made a survey flight from Tokyo to Teheran and back in 1939, while another named *Nippon* late in 1939 made a limited world flight, and the photograph on this page shows the *Nippon* in the United States of America while on this flight. Another Mitsubishi freighter, the *Yamato* (Japan), flew at least once to Rome. The known names and registration letters of these aeroplanes are J-BACI *Nippon* (Japan), J-BEOA *Soyokaze* (Zephyr), J-BEOC *Yamato* (Japan), J-BEOG *Matukaze* (Wind among the Pine Trees), and J-BEOE.
Two 900 h.p. Mitsubishi *Kinsei* motors. Span : 82 ft. 0 in. Cruising speed : 161 m.p.h.

TRAINERS

Little information is available on modern Japanese training aeroplanes, and the two types shown on this page have been in service since 1935. A large number of Japanese pilots in the past received their flying instruction on various types of Aiba biplane ; two of these types appear on page 59.

Newer types are known to be in service. Navy training aeroplanes bear the names of trees, flowers and plants.

TATIKAWA ARMY 95-1. Built by the Tatikawa Aircraft Co. (until 1936 the Ishikawajima Aircraft Co., Ltd.). This type is one of the few known Japanese advanced trainers. One 350 h.p. Type 95 motor. Span : 32 ft. 9½ ins. Top speed : 142 m.p.h.

TATIKAWA ARMY 95-3. This 1935 Primary trainer is probably still the principal aeroplane for the initial flying instruction of Japanese Army pilots. One 150 h.p. Type 95 motor. Span : 32 ft. 9½ ins. Top speed : The Tatikawa Company also builds a small Hermes-motored ambulance.

SECOND LINE AEROPLANES

A total of some two dozen aeroplanes covers the principal operational aeroplanes in the service of the Imperial Japanese Naval Air Service and the Army Air Service, but in Japan, as in any country, there are a number of obsolescent aeroplanes still flying and which should be included in a complete knowledge of Japanese types, and it is the more important of these types which appear in this section.

ALF — This Kawanishi Navy 94 was once a standard twin-float reconnaissance biplane used in China. It was also carried on cruisers as well as on seaplane carriers including the *Miduho*, *Titose*, *Tiyoda* and *Nissin*, and the carriers in the *Kagu* (*Muru*) class.

ANN — This Mitsubishi Army 97 light reconnaissance-bomber is the military version of the *Karigane* Model 2 communications monoplane. It was used largely in China and is the type of aeroplane appearing in the photograph of a formation over Mount Fuji, on page 2.

BABS — This Mitsubishi Army 97 light reconnaissance-bomber is the military version of the *Karigane* Model 1 communications monoplane built for the Asahi Newspaper and which flew from Tokyo to London in 1937.

CHERRY — This is a Navy 99 reconnaissance flying-boat about which little is known.

CLAUDE — This Mitsubishi Navy 96 fighter was once the standard carrier-borne type. It was very manœuvrable and is one of the ancestors of Zeke.

DAVE — This Nakajima Navy 95 reconnaissance floatplane was used in China and on the Imperial Japanese Navy's cruisers and seaplane carriers.

IDA — This Mitsubishi Army 98 light reconnaissance-bomber was the last of the *Karigane* designs. It saw service in China.

MARY — This Kawasaki Army 98 reconnaissance-bomber was used in fair numbers in China and took part in the capture of Hongkong.

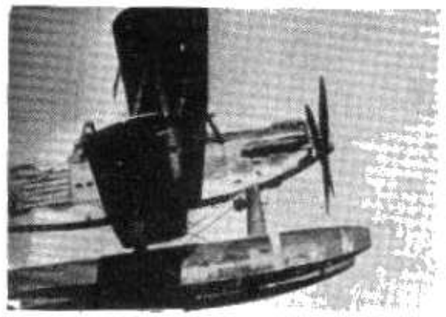
NATE — This Nakajima Army 97 fighter was for a number of years the standard Army fighter. It saw much service in China and was used in Burma until the introduction of Oscar.

SONIA — This Mitsubishi Army 99 light reconnaissance-bomber was used in the attacks on United States Forces in the Philippines in 1941 and 1942. Some are still in service.

ALF

NAVY 94 RECONNAISSANCE

KAWANISHI E7k



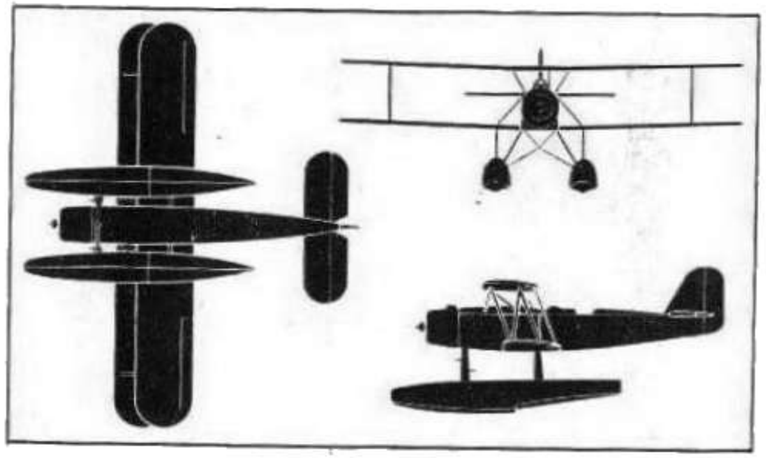
One 600 h.p. Kawanishi Hiro 91 in-line or one Mitsubishi *Zuisei* radial motor.

Crew—Two.

Span—45 ft. 10 ins.

Top speed—140 m.p.h.

Pictorial Press



ANN

ARMY 97 RECONNAISSANCE-BOMBER

MITSUBISH Ki-30

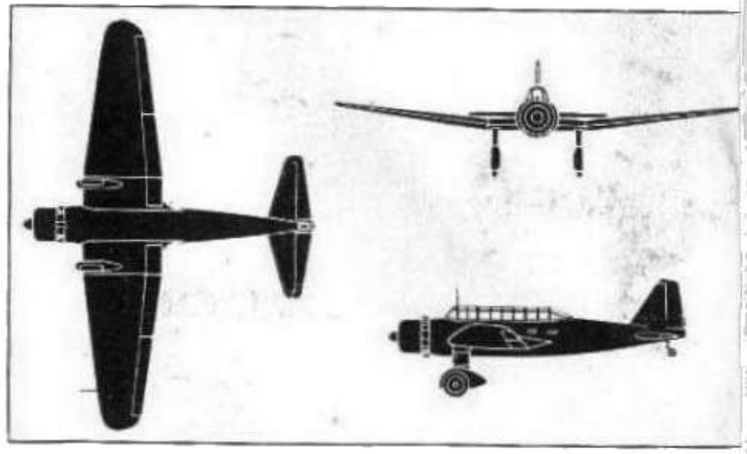
One 900 h.p. Mitsubish *Kinsei* motor.

Crew—Two.

Span—48 ft. 0 in.

Top speed—271 m.p.h.

Pictorial Press



DAVE

NAVY 95 RECONNAISSANCE

NAKAJIMA E8N

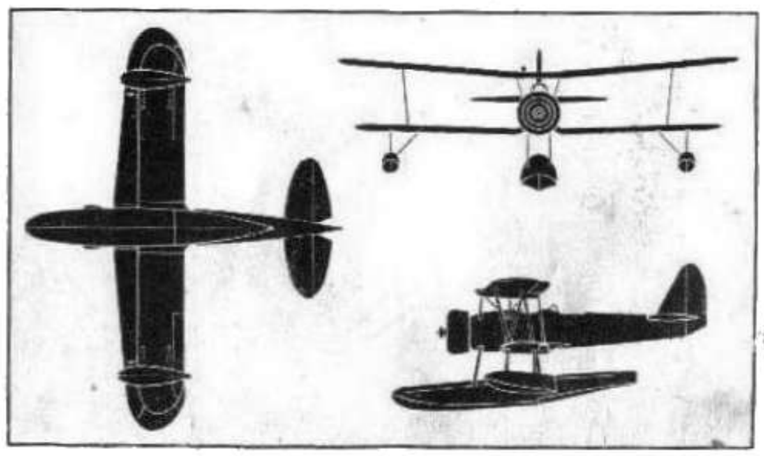
One 600 h.p. Nakajima *Kotobuki* motor.

Crew—Two.

Span—36 ft. 1 in.

Top speed—160 m.p.h.

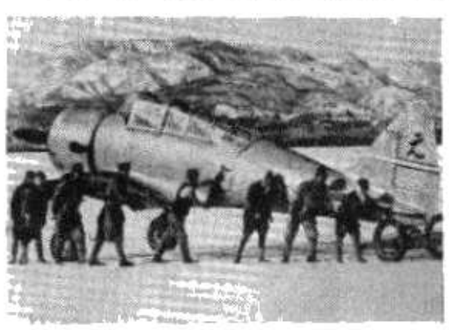
Keystone



IDA

ARMY 98 RECONNAISSANCE

MITSUBISH Ki-36



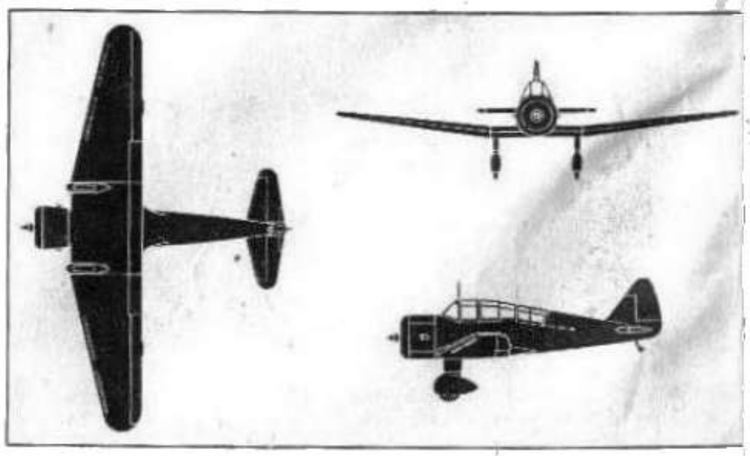
One 900 h.p. Mitsubish *Kinsei* motor.

Crew—Two.

Span—39 ft. 5 ins.

Top speed—250 m.p.h.

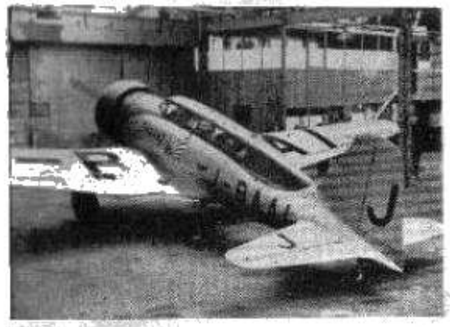
British Official



BABS

ARMY 97 RECONNAISSANCE

MITSUBISHI
Ki-15



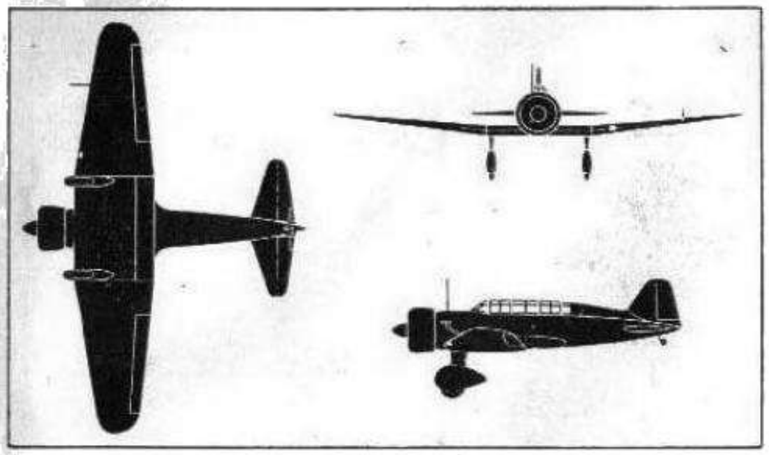
One 550 h.p. Nakajima *Kotobuki* motor.

Crew—Two.

Span—39 ft. 4⅜ ins.

Top speed—310 m.p.h.

The Aeroplane



CHERRY

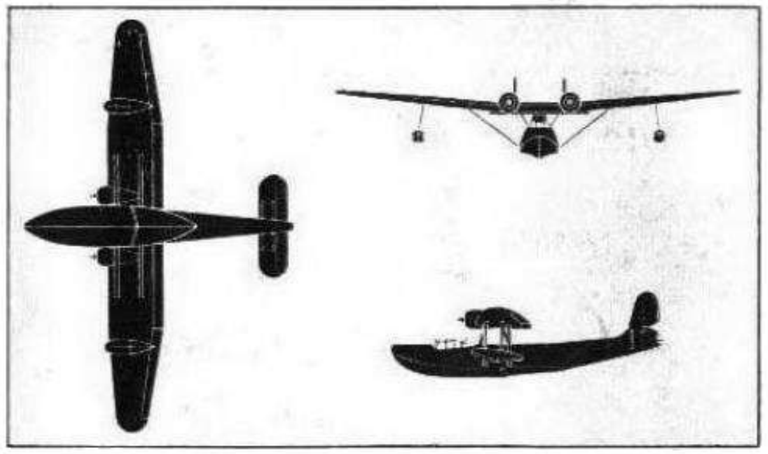
NAVY 99 RECONNAISSANCE

Yokosuka
H5Y

Two radial motors.

Span—~~77 ft. 0 in.~~ 103 Ft 7 inch

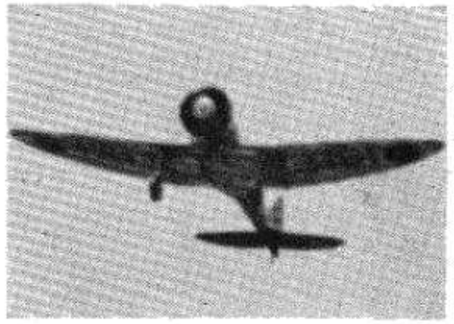
John Stroud



CLAUDE

NAVY 96 FIGHTER

MITSUBISHI
A5M



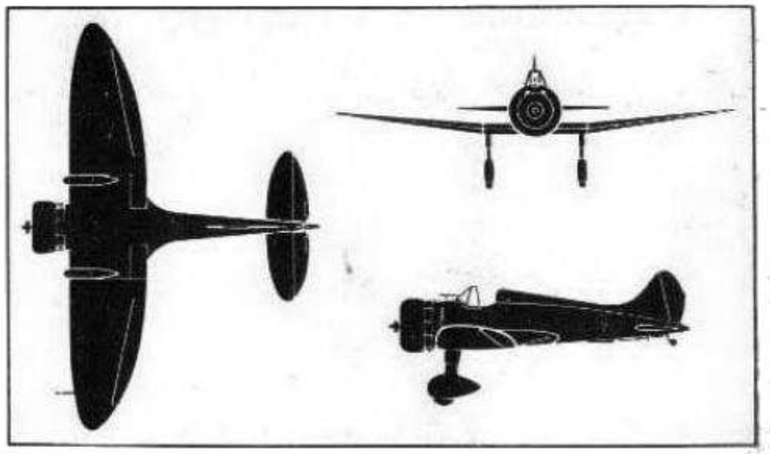
One 730 h.p. Mitsubishi *Kinsei* motor.

Crew—One.

Span—36 ft. 2 ins.

Top speed—250 m.p.h.

All the World's Aircraft



MARY

ARMY 98 RECONNAISSANCE-BOMBER

KAWASAKI
Ki-32

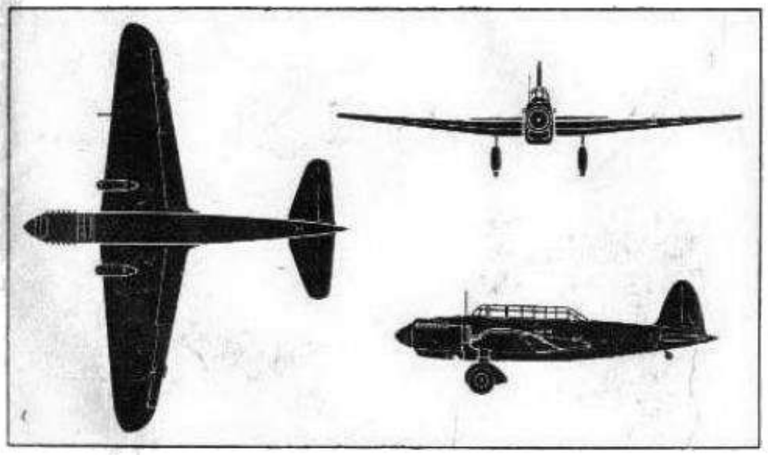
One 900 h.p. Kawasaki Type 98 motor.

Crew—Two.

Span—47 ft. 7 ins.

Top speed—236 m.p.h.

Pictorial Press



NATE

ARMY 97 FIGHTER

NAKAJIMA
Ki-27

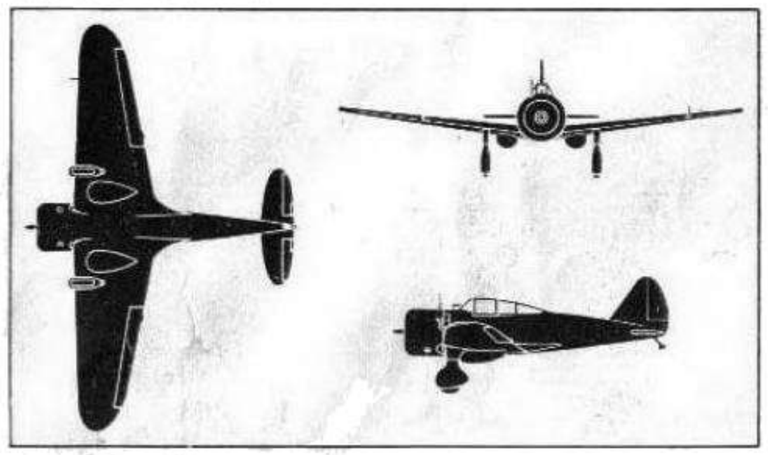
One 915 h.p. Nakajima *Hikari* motor.

Crew—One.

Span—35 ft. 9 ins.

Top speed—284 m.p.h.

Revista d'Aeronautica



SONIA

ARMY 99 RECONNAISSANCE-BOMBER

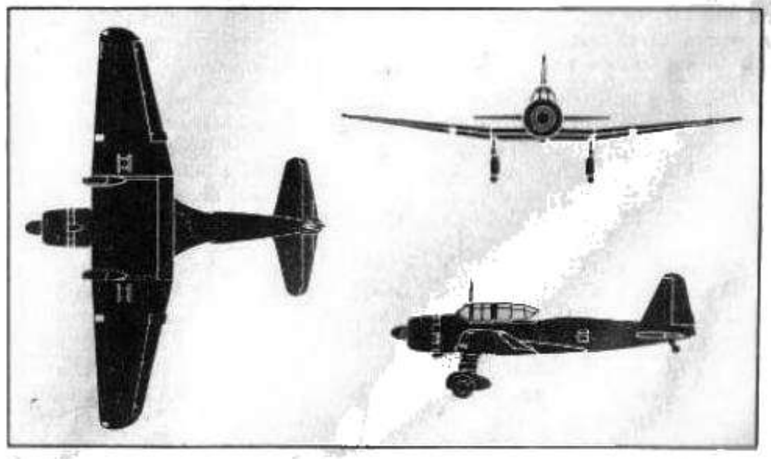
MITSUBISHI
Ki-51

One Nakajima Type 99 Model 2 motor.

Crew—Two.

Span—39 ft. 10 ins.

l'Illustration



MITSUBISHI

MITSUBISHI JUKOGYO KABUSHIKI KAISHA (Mitsubishi Heavy Industries, Ltd.). The history of this company goes back a very long way, it being one of the oldest and largest industrial organizations in the East. Nearly ninety years ago it started its work in the Nagasaki Naval Repair Works. In 1884 the shipyard at Nagasaki was leased to Mitsubishi, ownership of the yard falling to the company a few years later.

After rapid expansion a Mitsubishi shipbuilding and engineering works was opened in Kobe in August 1905. In 1917 an arms works was opened in Nagasaki, and in the same year the Mitsubishi Shipbuilding and Engineering Company was registered.

In 1920 the Mitsubishi Internal Combustion Engine Company was evolved from the Kobe Internal Combustion Engine Works of the Mitsubishi Shipbuilding and Engineering Company. In 1928 the Kobe Internal Combustion Engine Works went back to the shipbuilding company and the aircraft manufacturing concern was registered as the Mitsubishi Aircraft Company, Ltd. (Mitsubishi Kokuki Kabushiki Kaisha). In 1934 the shipbuilding company changed its name to the present Mitsubishi Heavy Industries, Ltd., and in so doing amalgamated with the Mitsubishi Aircraft Company. From 1921 the main aircraft works have been at Nagoya.

In 1921 the chief designer of Mitsubishi aircraft was H. Smith, late of the British Sopwith Company, and a number of his designs went into service with the Japanese Imperial Naval Air Service. These early types included : The No. 1 single-seat biplane fighter, with a 300 h.p. Mitsubishi-built Hispano Suiza motor and a top speed of 145 m.p.h. ; the No. 2 two-seat biplane fighter, with a 300 h.p. Hispano Suiza motor and a top speed of 130 m.p.h. ; the No. 3 single-seat torpedo triplane, with a 450 h.p. Napier *Lion* motor ; and the No. 4 two-seat torpedo biplane, with either a 300 h.p. Hispano Suiza or a 450 h.p. Napier *Lion* motor.

Other early Mitsubishi Navy aeroplanes were a 1924 deck-landing fleet spotter biplane, a 1925 two-seat reconnaissance float biplane, and a 1926 two-seat long-range bomber known as the *Torago* (Tiger).

In 1925 a licence was acquired for the construction of German Rohrbach all-metal flying-boats, but they were not found suitable for the Japanese Navy. French Hanriot 14 training biplanes were also built under licence ; at the same time licences were obtained for building British Blackburn, French Lavasseur, and United States Curtiss aeroplanes, as well as Armstrong Siddeley *Jaguar* and Hispano Suiza aero motors. In 1929 a number of Junkers F-13 single-motor transport monoplanes were built for Japanese civil air lines.

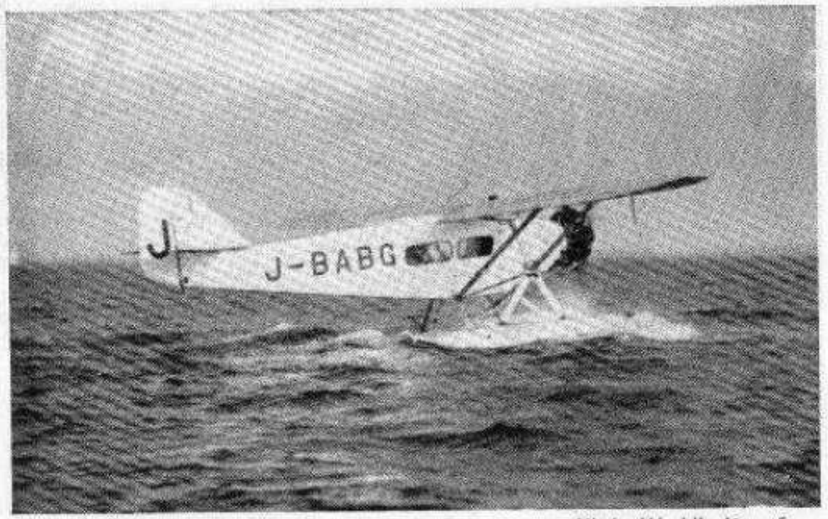
At about this time Mitsubishi produced a 450 h.p. Hispano Suiza motored single-seat ship-board fighter very definitely influenced by Lavasseur designs, and a four-passenger biplane called the MC-1 with a 400 h.p. Mitsubishi-built *Jaguar* motor and a top speed of 124 m.p.h. This aeroplane could be equipped with either wheel or float undercarriage.

Three extremely ugly aeroplanes were built by the company at this period ; they were a high-wing single-seat fighter monoplane, a two-seat reconnaissance biplane, and a two-seat bomber sesquiplane with very high aspect ratio wings. All three types had a 450 h.p. Hispano Suiza motor, and the last mentioned aeroplane was known as the *Washi* (Eagle).

In 1932 the two-seat reconnaissance monoplane, shown on this page, went into service with the Army and was used a lot in China, and from this type a three-seat air survey monoplane was evolved, which was similar in appearance and was known as the *Hato* (Pigeon).

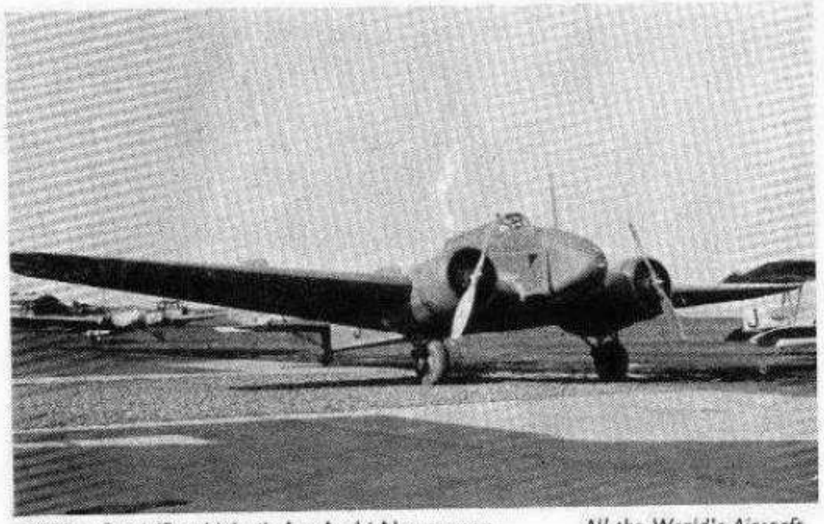
Most of the military types produced within the last ten years are described elsewhere in this volume, but two of the civil aeroplanes shown here are worthy of note. They are the *Karigane* (Wild Goose) and the *Otori* (Stork). Both types are 1936 designs and both were built in the first place for the Asahi Newspaper. The *Karigane* (J-BAAI) illustrated is the *Kamikaze* (Divine Wind) which in April 1937 flew from Tokyo to London, 9,900 miles in 94½ hours on a " goodwill " flight. The pilot was Masaki Jinuma and the radio operator was Kemji Tsukagoshi. A second aeroplane of this type, the *Asakaze* (Morning Breeze), was also owned by the Asahi Shimbun and was registered J-BAAL. A small number of these aeroplanes went into Army service as the Type 97 (Babs).

The *Otori* J-BAAE in 1936 flew non-stop from Tokyo to Bangkok, a distance of over 2,000 miles. An experimental military version was built, but it was not put into service. Mitsubishi aircraft have already played a big part in this war and many new examples of their work will yet be seen.

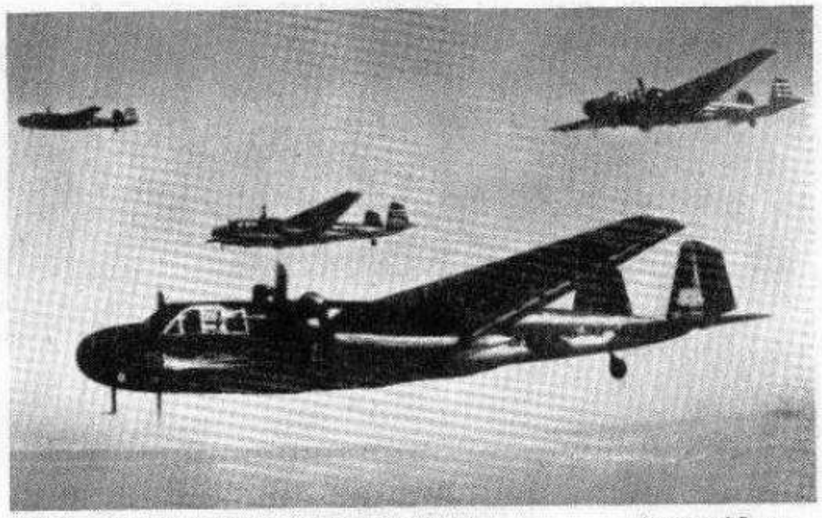


1931. M.S.1 six-passenger float or land transport. *All the World's Aircraft*
420 h.p. Nakajima-built *Jupiter* motor.
Span—52 ft. 5 ins. Top speed—124 m.p.h.
Operated by Tokyo Aviation Company.

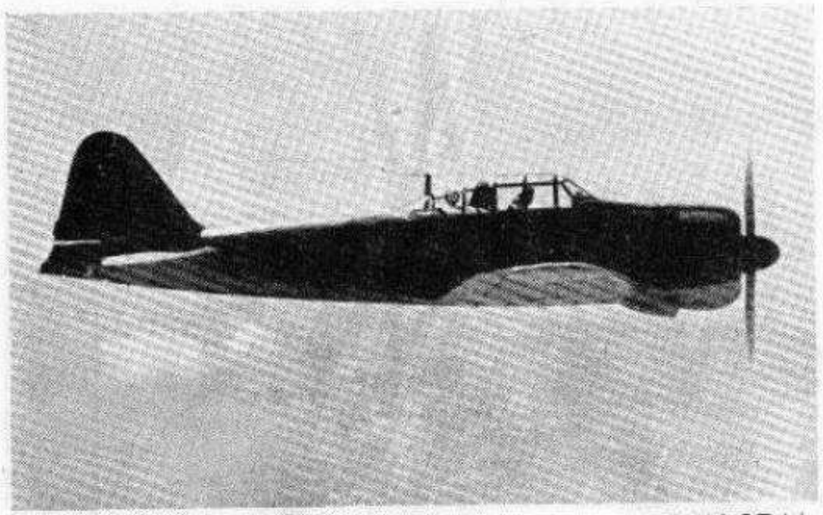
1932. Army 92 Reconnaissance. *All the World's Aircraft*
420 h.p. Mitsubishi-built *Jaguar* motor.
Span—41 ft. 8 ins. Top speed—136 m.p.h.
One-time standard Army reconnaissance type.



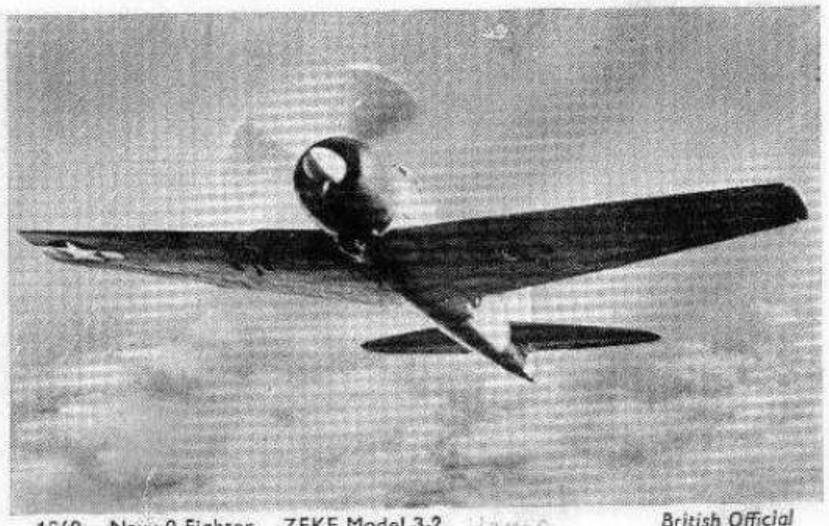
1936. *Otori* (Stork) built for Asahi Newspaper. *All the World's Aircraft*
Two 550 h.p. Nakajima *Kotobuki* motors.
Span—55 ft. approx. Top speed—240 m.p.h.
An experimental bomber version was built.



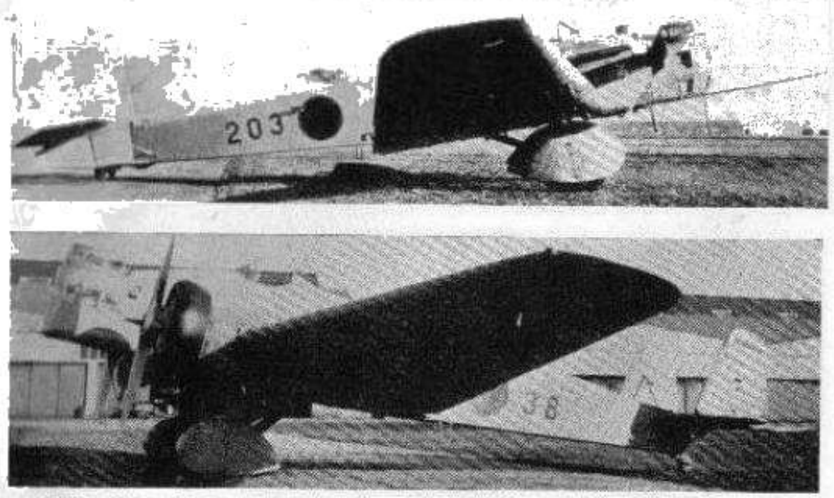
1936. Navy 96 Bomber. NELL. Model 2-2. *Associated Press*
Two 1,055 h.p. Mitsubishi *Kinsei* motors.
Span—82 ft. 0 in. Top speed—241 m.p.h.
One-time standard Navy bomber.



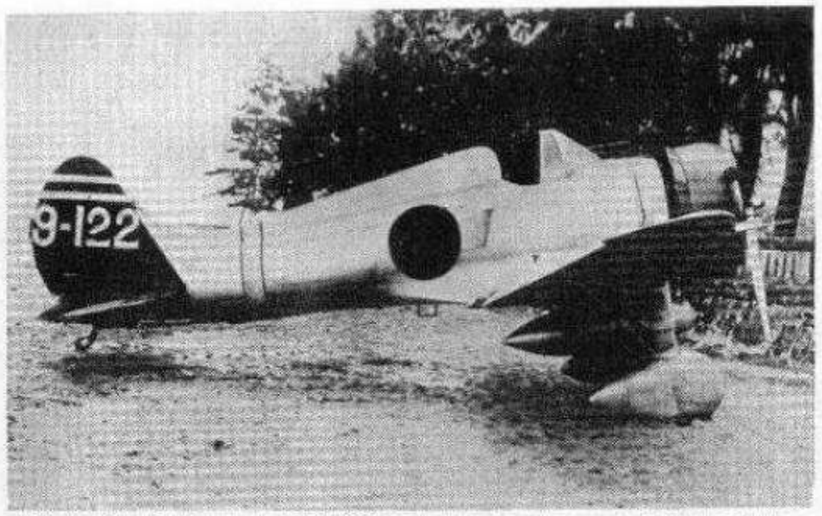
1940. Navy 0 Fighter. ZEKE Model 2-1. *British Official*
955 h.p. Nakajima *Sakae* motor.
Span—39 ft. 5 ins. Top speed—328 m.p.h.
Standard Navy fighter.



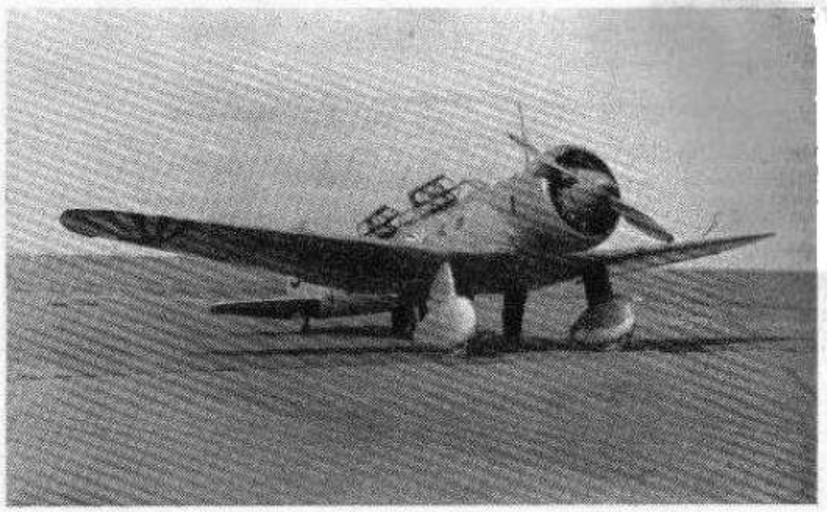
1940. Navy 0 Fighter. ZEKE Model 3-2. *British Official*
930 h.p. Nakajima *Sakae* motor.
Span—36 ft. 2 ins. Top speed—348 m.p.h.
Modification of Model 2-1.



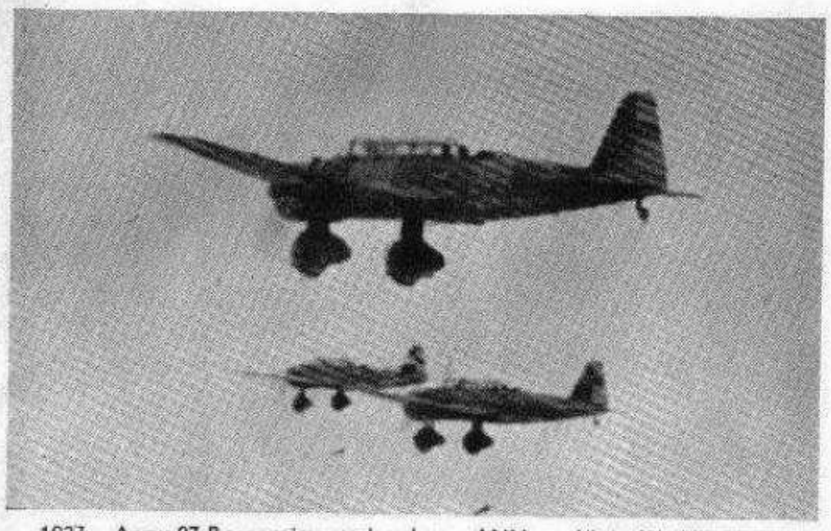
1933. Army 93 Bombers. *All the World's Aircraft*
Upper—Two 700 h.p. Kawasaki motors. Span—88 ft. 6 ins.
Lower—Two 450 h.p. Nakajima *Jupiter* motors. Span 65 ft. 7 ins.
Developed from Junkers S.36 built in Sweden.



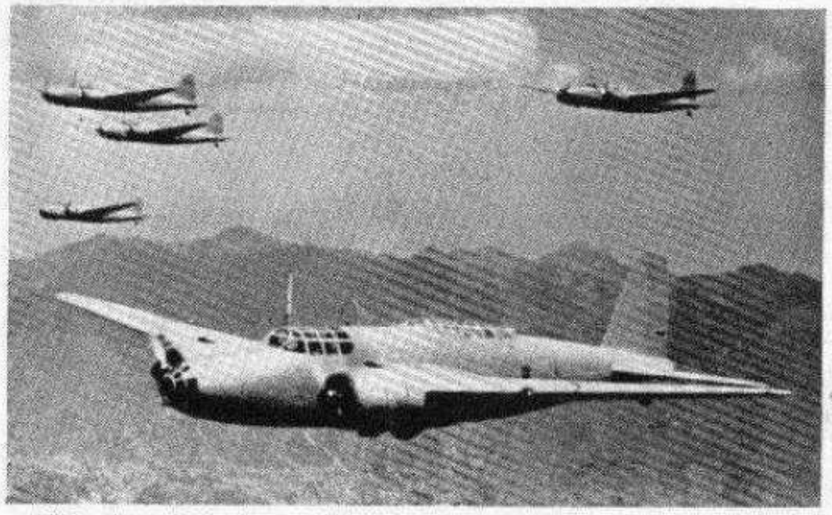
1936. Navy 96 Fighter. CLAUDE. *British Official*
730 h.p. Mitsubishi *Kinsei* motor.
Span—36 ft. 2 ins. Top speed—250 m.p.h.
One-time standard Navy fighter.



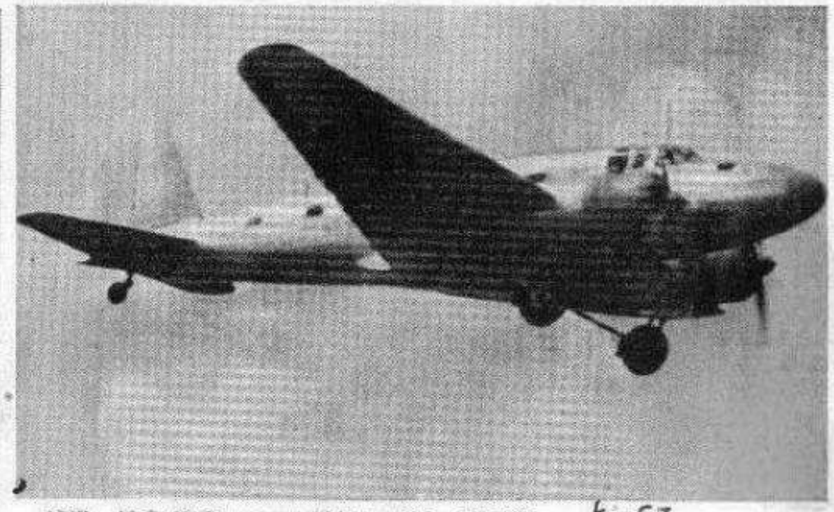
1936. *Karigane* (Wild Goose) Communications. *All the World's Aircraft*
550 h.p. Nakajima *Kotobuki* motor.
Span—39 ft. 4½ ins. Top speed—310 m.p.h.
One, the *Kamikaze* (Divine Wind), flew to London in 1937.



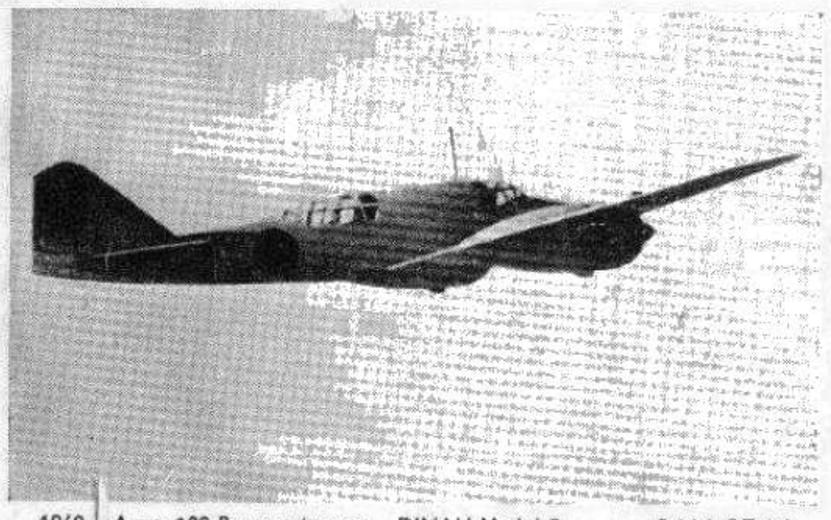
1937. Army 97 Reconnaissance-bomber. ANN. *All the World's Aircraft*
900 h.p. Mitsubishi *Kinsei* motor.
Span—48 ft. 0 in. Top speed—271 m.p.h
One-time standard Army type.



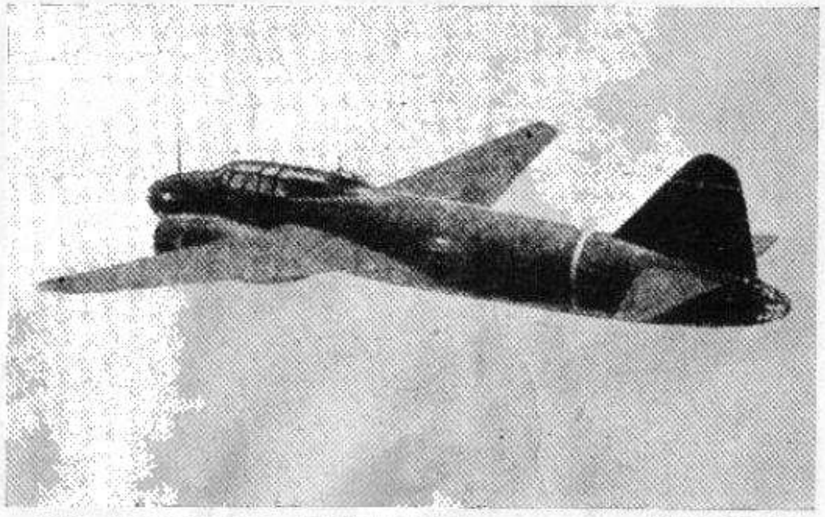
1937. Army 97 Bomber. SALLY Model 1. *Pictorial Press*
Two 870 h.p. Mitsubishi Type 97 motors.
Span—73 ft. 0 in. Top speed—248 m.p.h.
One-time standard Army type.



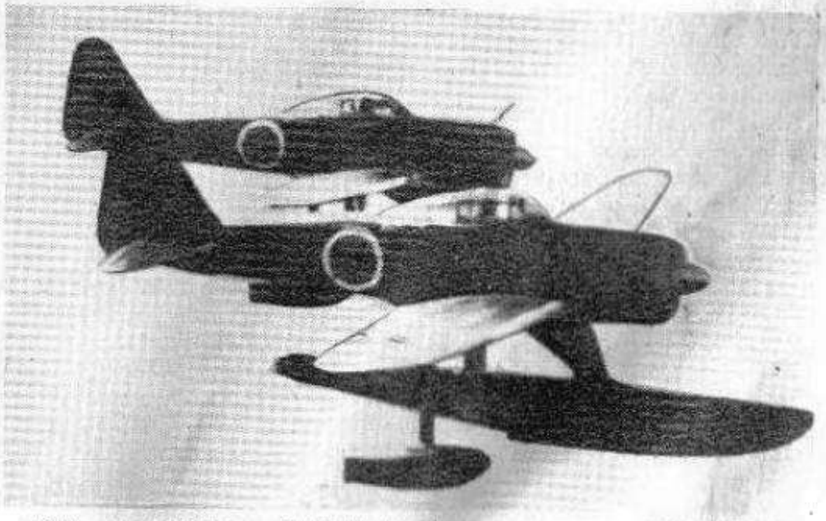
1937. M.C. 20 Transport, Military 100. TOPSY. *Ki-57*
Two 985 h.p. Mitsubishi *Kinsei* motors.
Span—74 ft. 0 in. Top speed—266 m.p.h.
11 passengers in civil type.



1940. Army 100 Reconnaissance. DINAH Model 3. *British Official*
Two Mitsubishi Type 2 motors.
Span—48 ft. 3 ins. Top speed 370 m.p.h.
Standard Army reconnaissance.



1941. Navy 1 Bomber. BETTY Model 1-1. *British Official*
Two 1,300 h.p. Mitsubishi *Kasei* motors.
Span—82 ft. 4 ins. Top speed—276 m.p.h.
Standard Navy bomber.



1942. Navy 2 Fighter. RUFE Model 1-1. *British Official*
955 h.p. Nakajima *Sakae* motor.
Span—39 ft. 5 ins. Top speed—278 m.p.h.
Standard Navy floatplane fighter.

NAKAJIMA

NAKAJIMA HIKOKI KABUSHIKI KAISHA (Nakajima Aircraft Company, Ltd.), Ohta, Gumma-Ken, was established in 1914 as the Japan Aeroplane Works. By 1924 the name had been changed to the Nakajima Aircraft Works, Ltd.

Aeroplanes built at the Japan Aeroplane Works by Captain Nakajima, an ex-Japanese naval officer, were the most outstanding of all Japanese aeroplanes built during the War 1914-18.

The Nakajima No. 4 with a 150 h.p. Hall Scott motor won first prize at the first Japanese Mail flying contest in 1919 piloted by A. Satoh. The Nakajima No. 6 with a 200 h.p. Hall Scott motor made a Japanese long-distance record in 1919 flown by K. Midzuta.

Nakajima built the first Japanese all-duralumin biplane. Based on a Breguet design, this aeroplane appeared in two forms, the B 6, a two-seat bomber, and the P 6, a four-seat limousine ; both types had a 360 h.p. Rolls Royce motor. In November 1922 the B 6, flown by the company's test pilot Kato, flew non-stop from Tokyo to Osaka and back to Tokyo in 4 hours 49 minutes, and in December 1923 the same pilot and aeroplane gained second prize in H.I.H. Prince Yamashina's Cup race.

A number of foreign building licences were obtained and in the middle nineteen twenties the following types were built : For the Navy—Avro 504 training seaplanes (believed to have been re-named Type 13), Brandenburg float monoplanes, and Breguet XIX A.2b twin-float reconnaissance biplanes ; and for the Army—Nieuport 29 C.1 fighters and Salmson training biplanes.

In 1926 the manufacturing rights were obtained for 450 h.p. Lorraine and 450 h.p. Bristol *Jupiter* motors.

News arrived in Britain in 1930 to the effect that the Nakajima Company were building American Fokker-Universal transport monoplanes for the Japan Airways Company.

At the same time three Nakajima designs appeared, the N-35 two-seat long-distance reconnaissance-bomber biplane with a 650 h.p. Lorraine motor and a speed of 147 m.p.h., the N-36 commercial biplane with a *Jupiter* motor, and a twin-float Fishery Spotting biplane with a 300 h.p. Hispano-Suiza motor.

In 1937 the company was building Douglas DC-2 transports, and by July of that year had already delivered two of its own A.T. transports for service in Manchuquo and had five more building for Japan Airways' Tokyo—Hsingking and Tokyo—Tientsin services.

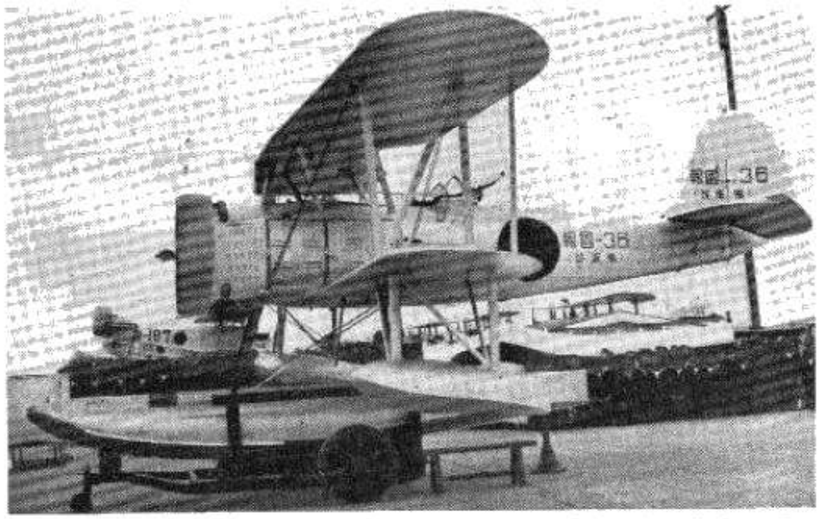
Also in existence at this time were the AN-1 Export Fighter, a low-wing single-seat monoplane, with fixed undercarriage, covered cockpit, 550 h.p. Nakajima *Kotobuki* motor and a top speed of 261 m.p.h.

Developed from the Nakajima Navy 90-2B shown on this page, was the P-1 single-motor mailplane, a number of which went into service on Japan Airways' Tokyo-Osaka mail route.

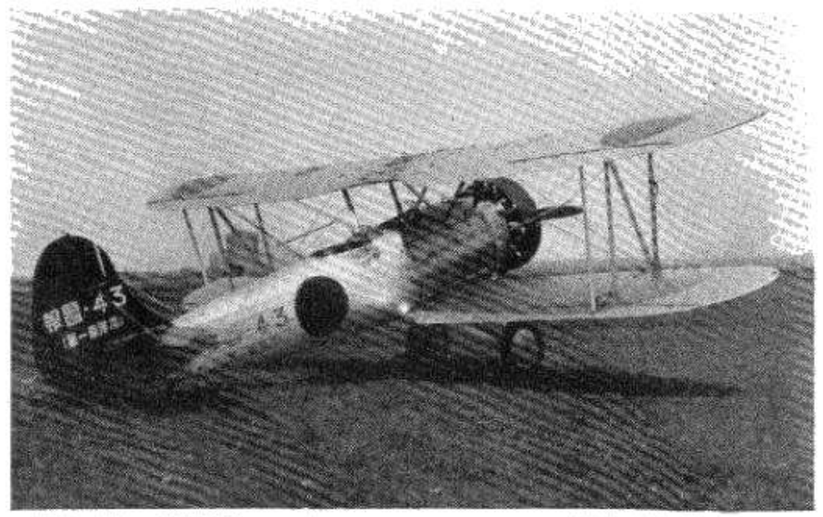
The Tokyo Aviation Company operated services with a cabin version of the Navy 90-2B mounted on twin floats.

1939 brought news of a two-motor, six-seat, low-wing monoplane built for the Manchuria Aviation Company, which was named *Akatsuki* (Dawn), and which had two 750 h.p. Nakajima motors, a retractable undercarriage and a top speed of 205 m.p.h.

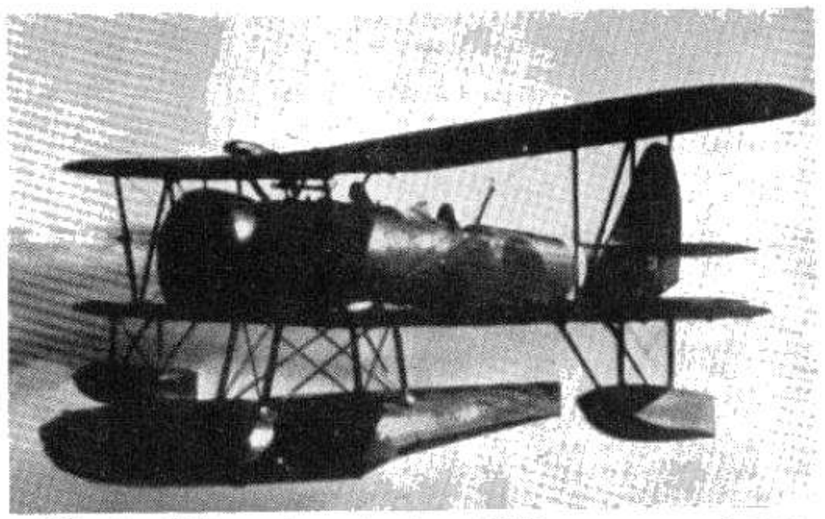
Nakajima products have always formed a large part of the equipment of the Navy and Army Air Services, and the main types introduced into both services from 1930 to 1943 are shown here.



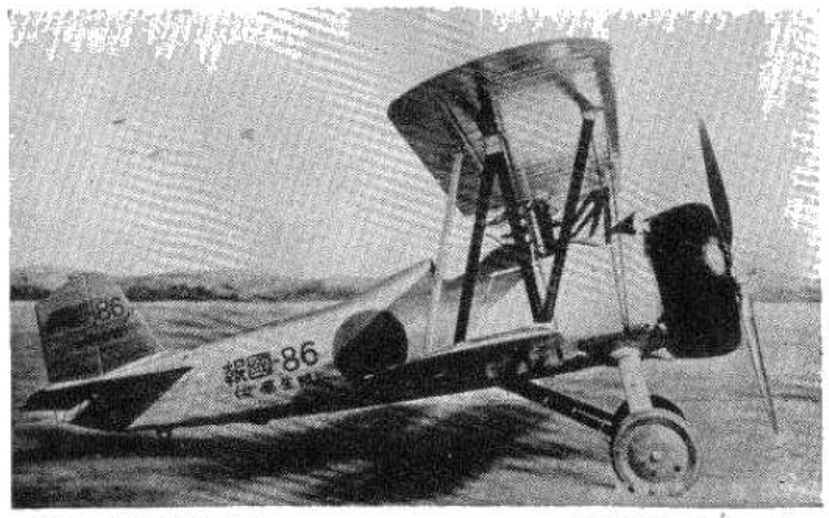
1930. Navy 90-2 Reconnaissance floatplane. *All the World's Aircraft*
450 h.p. Nakajima-built *Jupiter* motor.
Span—39 ft. 4 ins.
One-time standard Navy type.



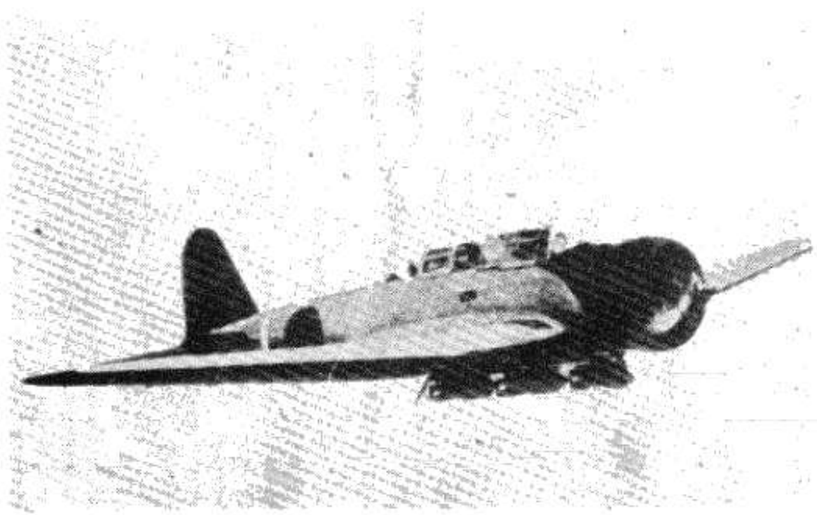
1930. Navy 90-2B Reconnaissance. *All the World's Aircraft*
450 h.p. Nakajima-built *Jupiter* motor.
Span—39 ft. 4 ins.



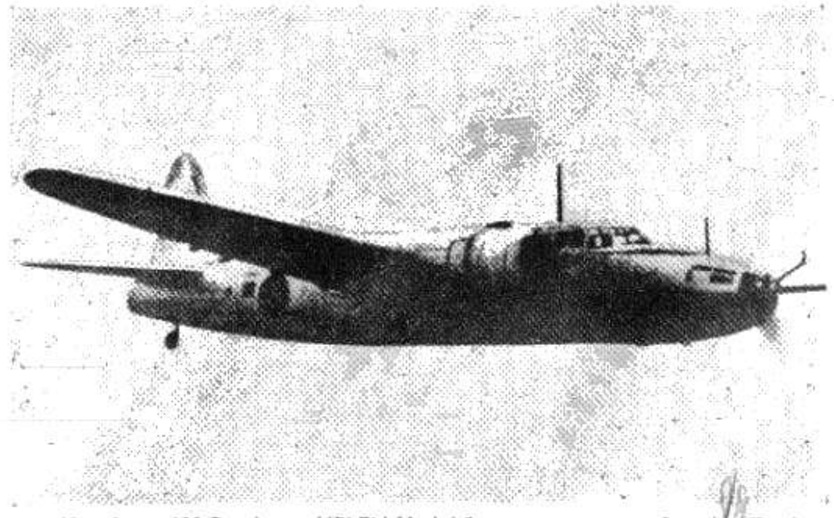
1935. Navy 95 Reconnaissance floatplane. DAVE. *Keystone*
600 h.p. Nakajima *Kotobuki* motor.
Span—36 ft. 1 in. Top speed—160 m.p.h.
One-time standard Navy type.



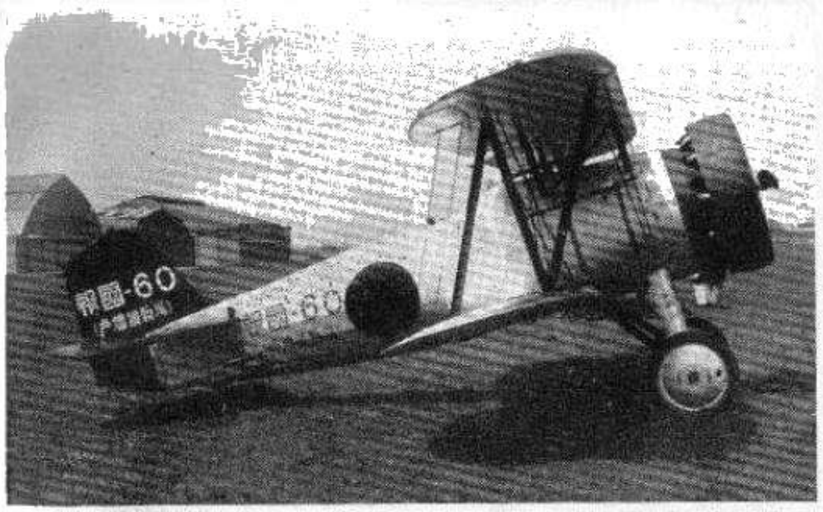
1935. Navy 95 Fighter. *All the World's Aircraft*
460 h.p. Nakajima *Kotobuki* motor.
Span—32 ft. 9 ins. Top speed—217 m.p.h.
Superseded Navy 90 Fighter.



1937. Navy 97 Torpedo-bomber. KATE. *British Official*
985 h.p. Nakajima *Sakae* motor.
Span—50 ft. 11 ins. Top speed—222 m.p.h.
Photograph shows early model.

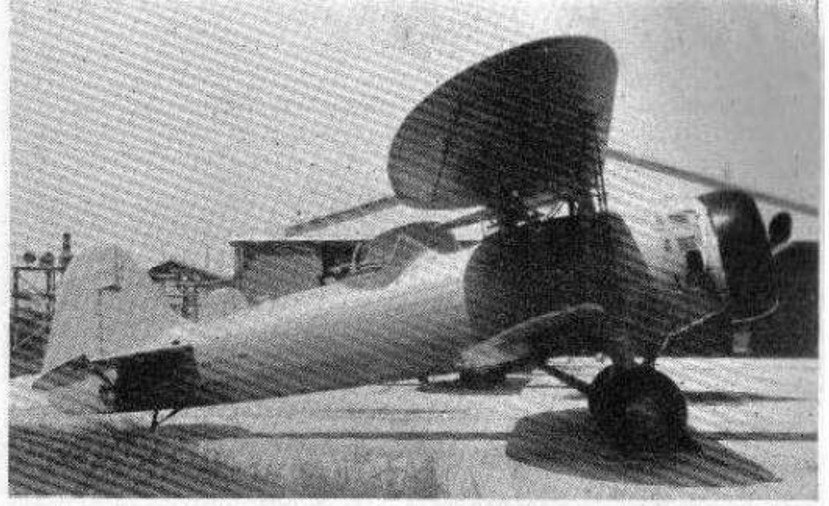


1940. Army 100 Bomber. HELEN Model 2. *British Official*
Two 1,300 h.p. Nakajima Type 2 motors.
Span—66 ft. 7 ins. Top speed—299 m.p.h.
Standard Army type.

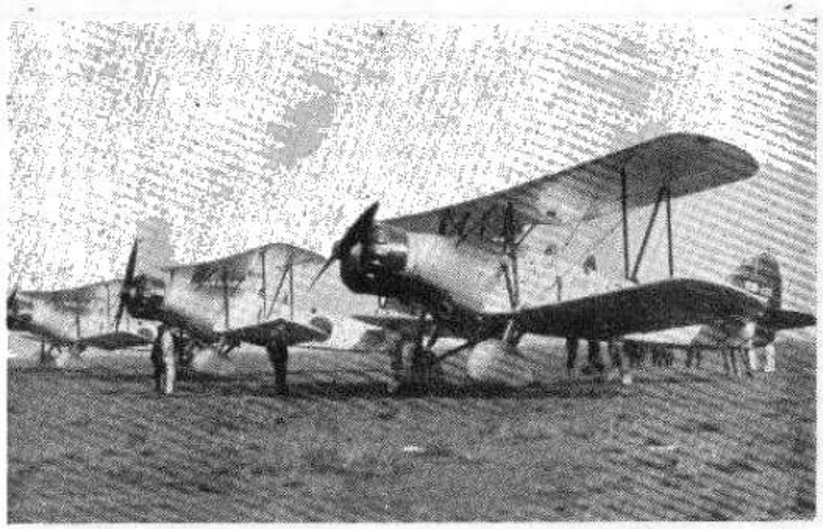


1930. Navy 90 Fighter. *All the World's Aircraft*
450 h.p. Nakajima-built *Jupiter* motor.
Span—30 ft. 10½ ins. Top speed—192 m.p.h.
One-time standard carrier-borne type.

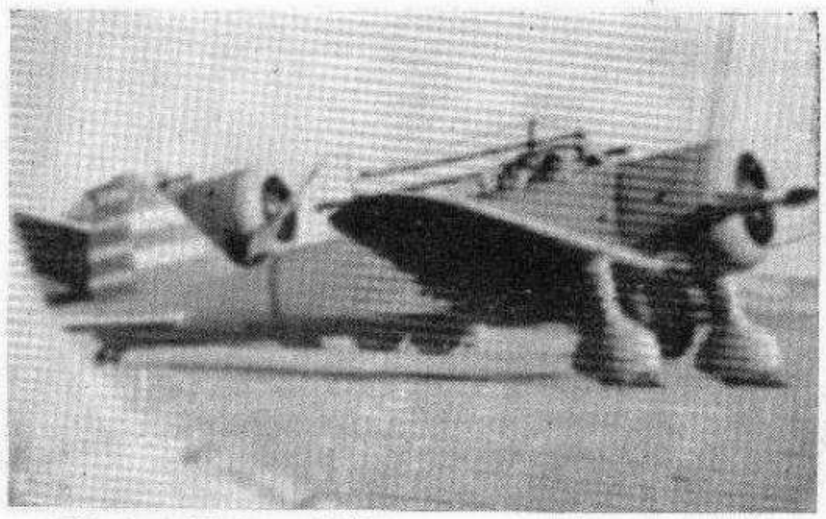
1931. Army 91 Fighter. *All the World's Aircraft*
450 h.p. Nakajima-built *Jupiter* motor.
Span 36 ft. 0 in. Top speed—201 m.p.h.
One-time standard Army type.



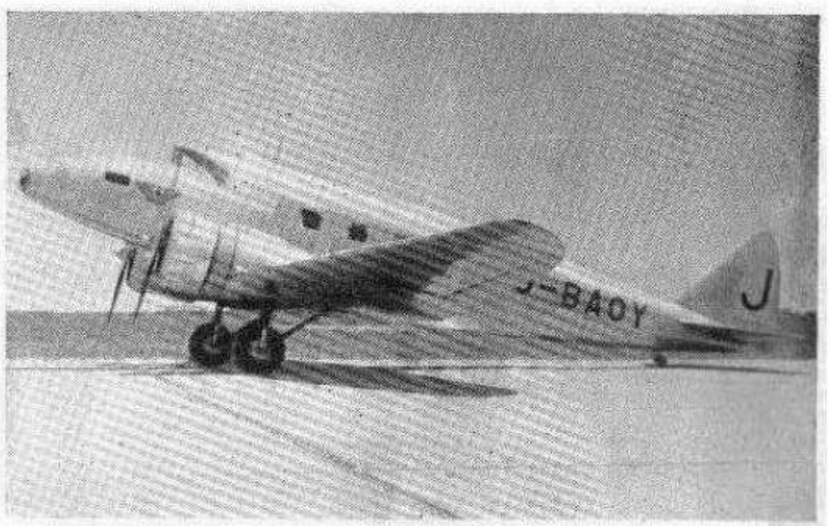
1934. Army 94 Reconnaissance. *All the World's Aircraft*
550 h.p. Nakajima *Kotobuki* motor.
Span—36 ft. 7 ins. Top speed—186 m.p.h.
Now used as advanced trainer.



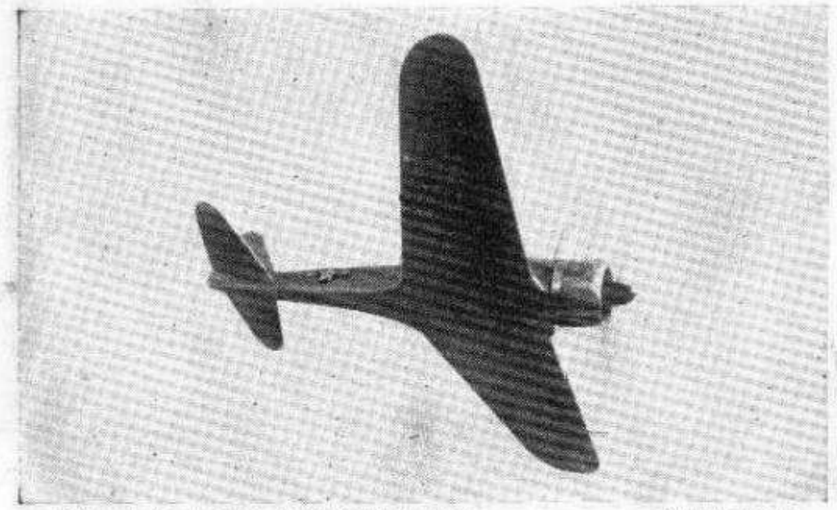
1936. Navy 96 Torpedo-bomber. *All the World's Aircraft*
600 h.p. Nakajima *Kotobuki* motor.
Span—49 ft. 0 in. Top speed—168 m.p.h.
Superseded by Navy 97 Kate.



1937. Army 97 Fighter. NATE.
915 h.p. Nakajima *Hikari* motor.
Span—35 ft. 9 ins. Top speed—284 m.p.h.
Standard Army fighter till 1941.

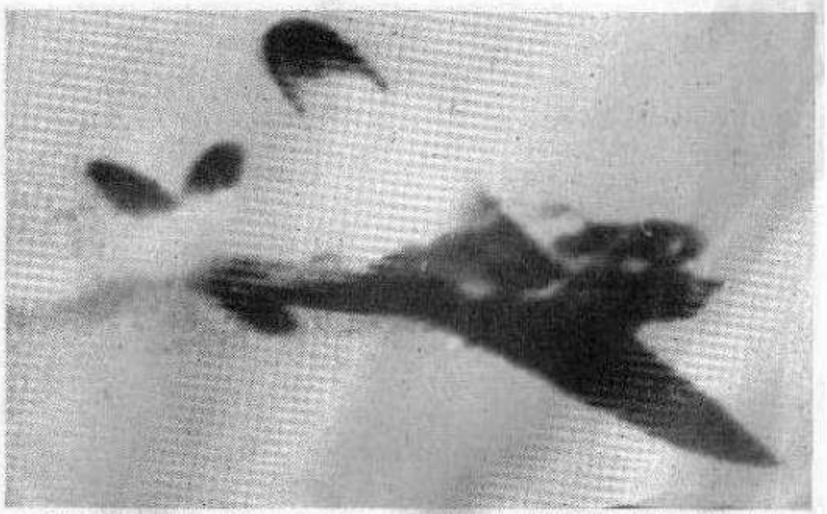


1937. A.T. Transport. Military 97 THORA. *All the World's Aircraft*
Ki-34
Two 460 h.p. Nakajima *Kotobuki* motors.
Span—65 ft. 4 ins. Top speed—230 m.p.h.
Eight passengers on civil routes.



1941. Army 1 Fighter. OSCAR Model 1. *British Official*
955 h.p. Nakajima Type 99 or 1 motor.
Span—37 ft. 9 ins. Top speed—317 m.p.h.
Standard Army type.

1942. Army 2 Fighter. TOJO Model 1. *British Official*
1,250 h.p. Nakajima motor.
Span—31 ft. 0 in. Top speed—(Model 2) 380 m.p.h.
Standard Army type.



1942. Navy *Tenzan* Torpedo-bomber. JILL. *U.S. Office of War Information*
BLN
Mitsubishi *Kasei* motor.
Span—48 ft. 6 ins. Top Speed—310 m.p.h.
Standard Navy type

KAWASAKI

KAWASAKI KOKUKU KOGYO KABUSHIKI KAISHA (Kawasaki Aircraft Engineering Company, Ltd.), Kobe. This company was formerly the Aviation Department of the famous shipbuilding Kawasaki Dockyard Company, Ltd.

The Kawasaki Dockyard Company built Salmson biplanes and their motors under licence and supplied them in large numbers to the Japanese Army Air Service.

In 1923 Dr. Richard Vogt became the company's chief designer ; he retained that position for ten years, after which he became chief designer to the German Blohm und Voss Company, of Hamburg.

In 1924 a licence was acquired for the building of Dornier aeroplanes and flying-boats, and for B.M.W. aero motors, and in December of that year the first Kawasaki-built Dornier *Wal* (Whale) two-motor, all-metal flying-boat made a non-stop flight from Kobe to Kasumigaura and back to Kobe. The *Wal* was flown by the company's German test pilot Herr Yuoest.

During 1925 a number of other Dornier aeroplanes were put into production at the Kawasaki works. They included :—

The *Falke* (Falcon).—Single-seat, single-motor fighter seaplane.

The *Komet III* (Comet).—Single-motor transport monoplane, some with 360 h.p. Rolls Royce *Eagle* motor, and others with the 450-625 h.p. B.M.W. VI motor.

The *Libelle* (Dragonfly).—A small single-motor flying-boat.

The Do. C.—General service Navy seaplane with a 500 h.p. B.M.W. motor.

The Do. F (Japanese Do. N).—Army bomber with one pusher and one tractor motor.

All these aeroplanes were of all-metal construction, and the *Komet* type was used on the Tokyo—Osaka service of the Eastern and Western Aviation Association (Tozai Teiki Koku Kwai).

In 1928 two Kawasaki single-motor biplanes went into service with the Japanese Army Air Service. Both types were known as the Army 88 and differed only in armament and internal equipment. One type was used for reconnaissance, while the other was a light bomber, and both were used in China.

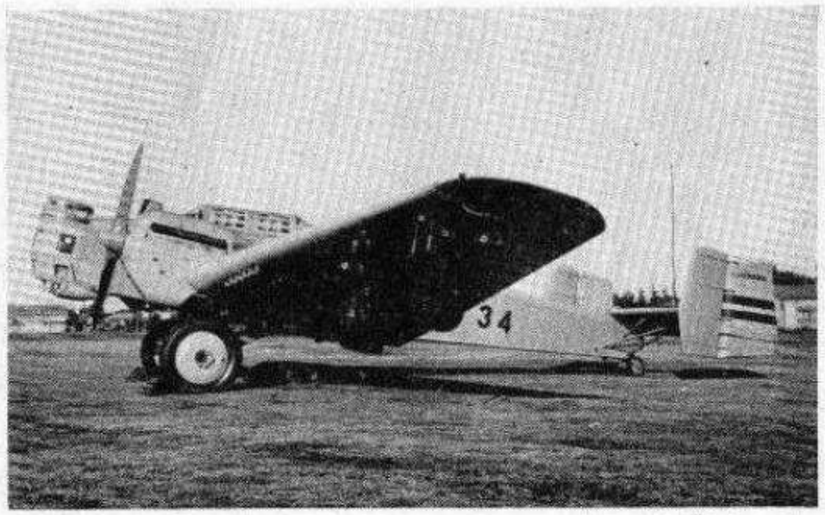
A commercial development of the Kawasaki Army 88 was the K.D.C.2 with accommodation for six passengers. This aeroplane could operate either as a landplane or on floats, and it was used on the air lines of the Asahi Periodical Air Navigation Society (Asahi Teiki Koku Kawai). The Army 88 is illustrated here, as are all the other main Kawasaki military aeroplanes produced since.

A number of Kawasaki aeroplanes have been presented to the Army by public subscription, including the Army 88 shown here, and at least one Army 92 fighter was presented by the people of Yokohama.

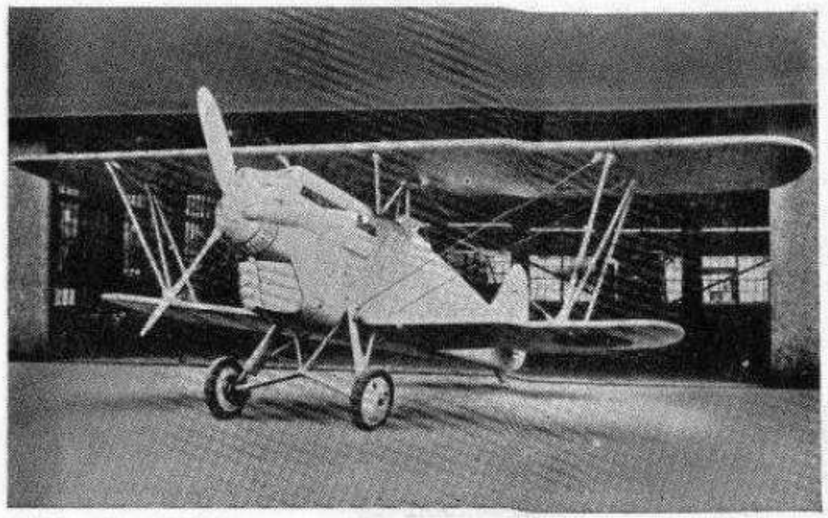
The A-6 civil mail development of the Army 93 light bomber was built, and also a low-wing, high-speed, single-motor monoplane known as the C-5. This aeroplane had a 600 h.p. Kawasaki-built B.M.W. VIII motor, a span of 44 ft., and a top speed of 240 m.p.h.

1928. Army 88 Reconnaissance. *All the World's Aircraft*
450 h.p. Kawasaki-built B.M.W. motor.
Span—49 ft. 10 ins. Top speed—136-142 m.p.h.
One-time standard Army type.

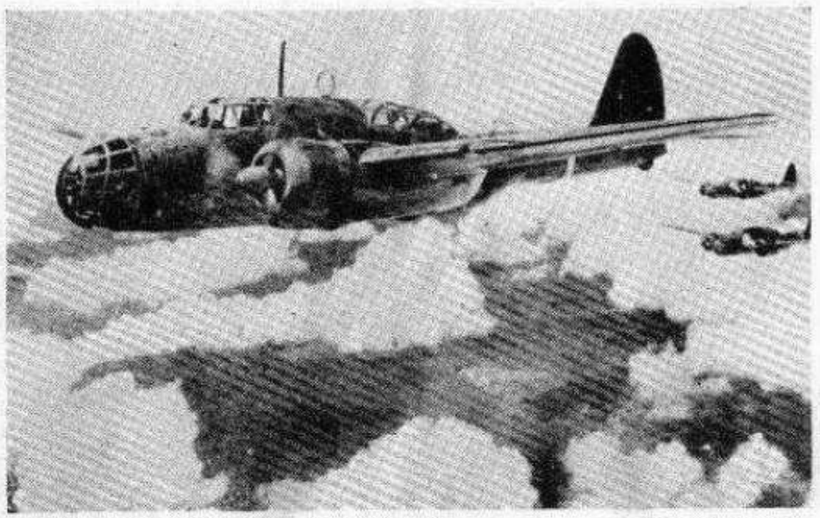
1932. Army 92 Fighter. *All the World's Aircraft*
450 h.p. Kawasaki-built B.M.W. motor.
Span—31 ft. 2 ins. Top speed—205 m.p.h.
One-time standard Army type.



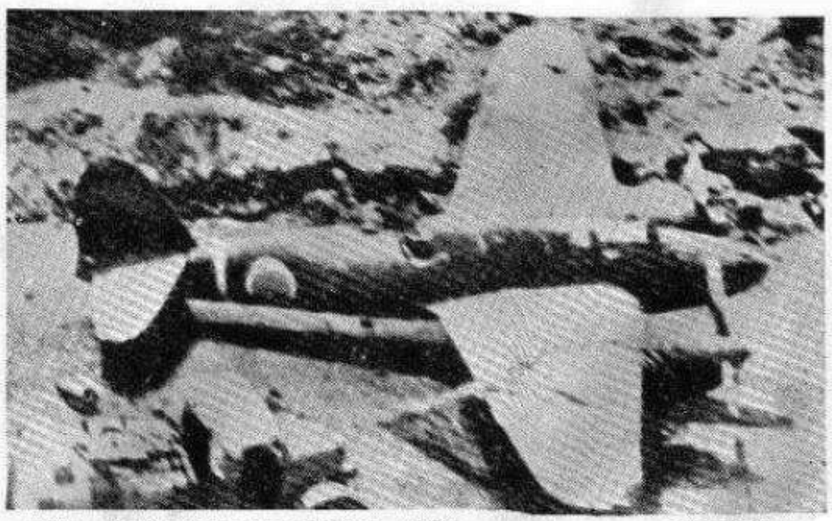
1933. Army 93 Bomber. *All the World's Aircraft*
Two 600 h.p. Kawasaki-built B.M.W. motors.
Span—88 ft. 7 ins. Top speed—136 m.p.h.



1935. Army 95 Fighter. *All the World's Aircraft*
600 h.p. Kawasaki-built B.M.W. motor.
Span—33 ft. 0 in. Top speed—250 m.p.h.
One version had spatted undercarriage.



1939. Army 99 Bomber. LILY Model 2. *British Official*
Two 1,020 h.p. Kawasaki Type 2 motors.
Span—57 ft. 4 ins. Top speed—312 m.p.h.



1942. Army 2 Two-motor Fighter. NICK. *British Official*
Two 1,020 h.p. Nakajima Type 2 motors.
Span—49 ft. 6 ins. Top speed—351 m.p.h.

AICHI

AICHI TOKEI DENKI KABUSHIKI KAISHA (Aichi Watch and Electric Machinery Co., Ltd.), at Nagoya, was established in 1899, and the company started building flying-boats in 1920 for the Japanese Naval Air Service. The first types built included the British F-5 flying-boat, and the German Brandenburg floatplane.

Between 1926 and 1928 this company produced a number of Avro 504 biplanes under licence, and in 1927-8 produced their own design of biplane in two forms, either as a two-seat mail aeroplane or four-seat passenger transport. These aeroplanes could be used in seaplane form (the AB-1) or as landplanes (the AB-2). The motor was a 450 h.p. Aichi-built Lorraine "W" type, water-cooled. Span 49 ft. 7 ins. Top speed 112-121 m.p.h. These aeroplanes were ordered by the Japanese Department of Communications and operated by the Japan Airways Company.

In 1933 news was released of a small, good-looking, twin-float sesquiplane built by Aichi for the Chinese Navy. This type was the AB-3 and was a single-seat fighter with a 130 h.p. T.G.D. air-cooled *Jimpu* radial motor, a span of 29 ft. 6 ins., and a top speed of 121 m.p.h. The AB-4 was a 45 ft. 11 ins. span biplane flying-boat of metal construction, powered by a 300 h.p. T.G.D. six-cylinder, water-cooled motor driving a pusher airscrew. The top speed was 105 m.p.h. This type was produced in about 1934, and a development of it, the AB-4B, was put into service on the routes of the Japan Air Transport Research Studio some time later. This flying-boat had a 450 h.p. Napier *Lion* motor, carried six passengers, and cruised at 80 m.p.h.

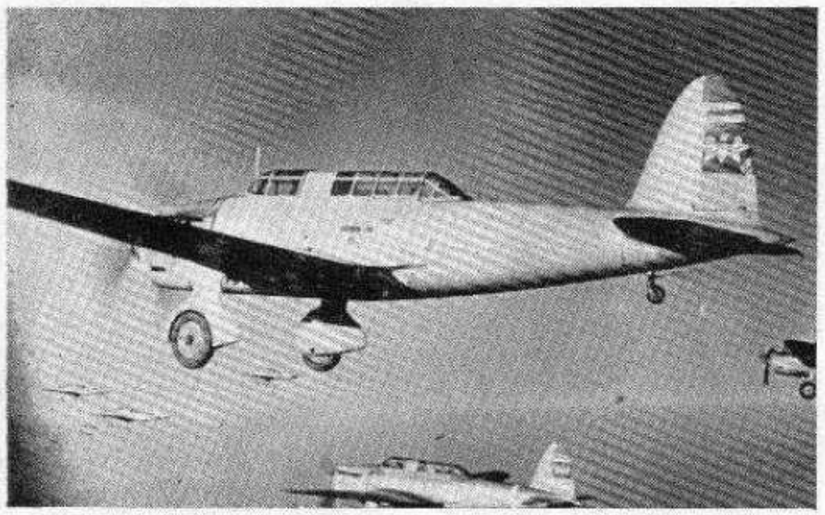
In 1932 an Aichi-designed reconnaissance biplane went into service with the Navy as the Type 92.

During the attack on Pearl Harbour a number of Japanese Navy dive-bombers were shot down and these proved to be Aichi-designed Navy 99 low-wing monoplanes, now given the Allied code name Val. This type of aeroplane has appeared in three forms, and is dealt with at length on pages 22 and 23.

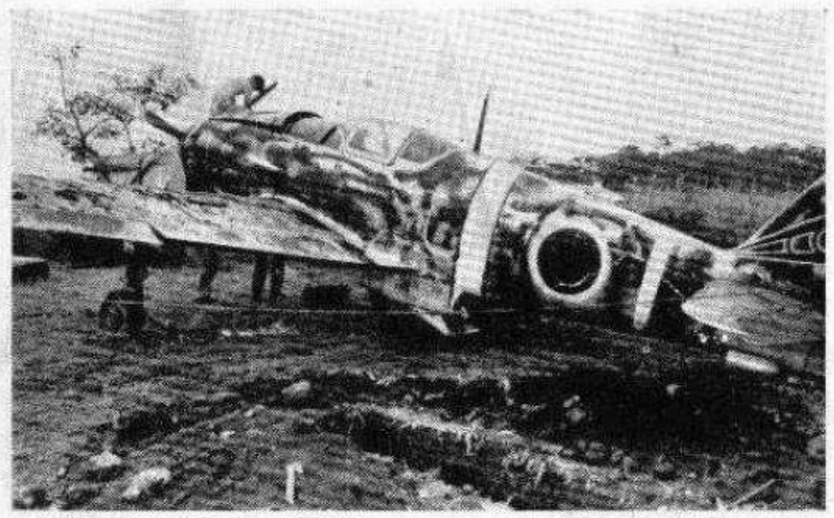
The last known Aichi types are the floatplane Paul and the torpedo-bomber Grace.

In addition to the business of building aeroplanes this company has for many years built aero-engines, first the Lorraine type under licence, and from 1931 its own designs. The motor fitted to the new Yokosuka Navy dive-bomber Judy is the latest known type of Aichi motor. Named *Atsuta*, the version used is the Model 21, and is a twelve-cylinder, liquid-cooled inverted "V" developing 1,160 h.p. at 14,800 ft. Aichi hold a building licence for the German Daimler Benz DB-601 motor, and the *Atsuta* is probably based on the German design.

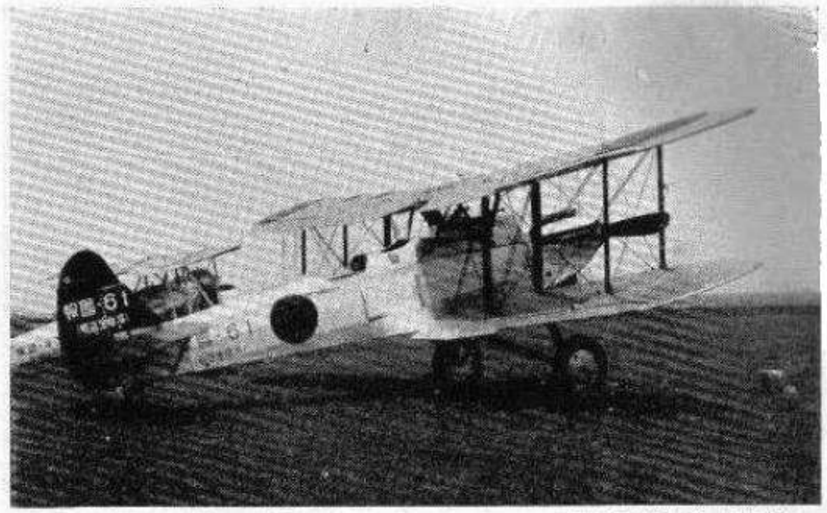
1933. Army 93 Light Bomber. *All the World's Aircraft*
600 h.p. Kawasaki-built B.M.W. motor.
Span—42 ft. 8 ins. Top speed—161 m.p.h.
Used in quantity in China.



1938. Army 98 Reconnaissance-bomber. MARY *Pictorial Press*
900 h.p. Kawasaki Type 98 motor.
Span—47 ft. 7 ins. Top speed—236 m.p.h.
Used in China as standard bomber.

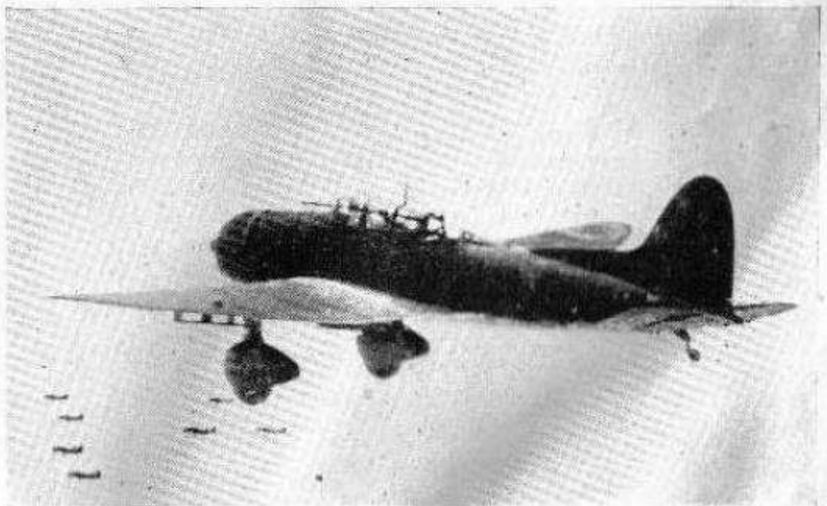


1943. Army 3 Fighter. TONY *U.S. Office of War Information*
1,100 h.p. Kawasaki Type 3 motor.
Span—39 ft. 4 ins. Top speed—356 m.p.h.
Standard Army type.



1932. Navy 92 Reconnaissance. *All the World's Aircraft*
600 h.p. Aichi-built Lorraine motor.
Span—44 ft. 3 ins.

1934. AB-4B Six-passenger flying-boat. *All the World's Aircraft*
450 h.p. Napier *Lion* pusher motor.
Span—45 ft. 11 ins. Top speed—96 m.p.h.
Earlier AB4—has 300 h.p. T.G.D. motor.



1939. Navy 99 Dive-bomber. VAL Model 2-2. *British Official*
Mitsubishi *Kinsei* motor.
Span—47 ft. 7 ins. Top speed—(Model 1-1) 241 m.p.h.
Used at Pearl Harbour.

KAWANISHI

KAWANISHI KOKUKI KABUSHIKI KAISHA (Kawanishi Aircraft Co., Ltd.), near Kobe, was established in its present form in 1928, and at that time took over the aircraft works and wind tunnel of the Kawanishi Machine Works. The first aeroplanes produced by this company were the Type 11 single-seat fighter biplane with a 460-625 h.p. B.M.W. motor, and the Type 12 long-distance monoplane with a 500-650 h.p. B.M.W. motor. The Type 11 was a wooden single-bay biplane with a span of 35 ft. 5 ins. and a top speed of 183 m.p.h., while the Type 12 was a wooden, high-wing monoplane with a span of 62 ft. 5 ins. and a top speed of 130 m.p.h.

Prior to 1928 the Kawanishi Aeroplane Works produced a number of aeroplanes including the No. 2, an all-wood, two-seat monoplane with a 200 h.p. motor, and the No. 3, a four-seat biplane with a 300 h.p. Maybach motor, both types produced prior to 1924.

The No. 6, a four-seat twin-float biplane, built in 1924, with a 260 h.p. Maybach motor, flew round Japan in July of that year, 2,729 miles in 33 hours 52 minutes. The No. 7, four-seat biplane, also built in 1924, was fitted with a 260 h.p. Maybach or a 400 h.p. Lorraine motor, and could operate on a wheel or float undercarriage. The No. 7B, built in 1925, was a development of the No. 7, and was used as a mail carrier on early Japanese air routes. The No. 10 was another four-seat biplane built for Japanese air routes.

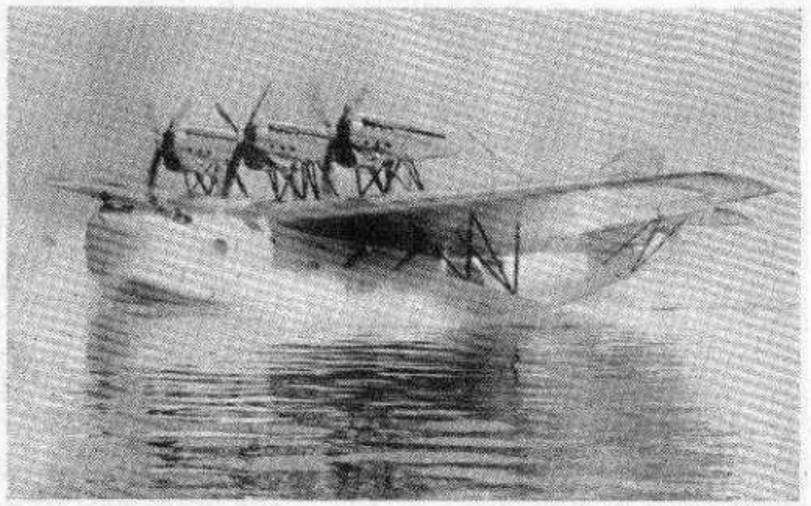
The Kawanishi Company held a licence for building Short flying-boats, and were also agents for Rolls Royce motors.

In 1930 Short Bros., Ltd., built a 98 ft. 5 ins. span biplane flying-boat at Rochester, England, and sent it to Japan where it was assembled by Kawanishi. A number was subsequently built for the Japanese Navy by Kawanishi as their Type K.F.1 and as the Japanese Navy 90-2. These flying-boats were powered by three Rolls Royce *Buzzard* motors. The top speed was 136 m.p.h.

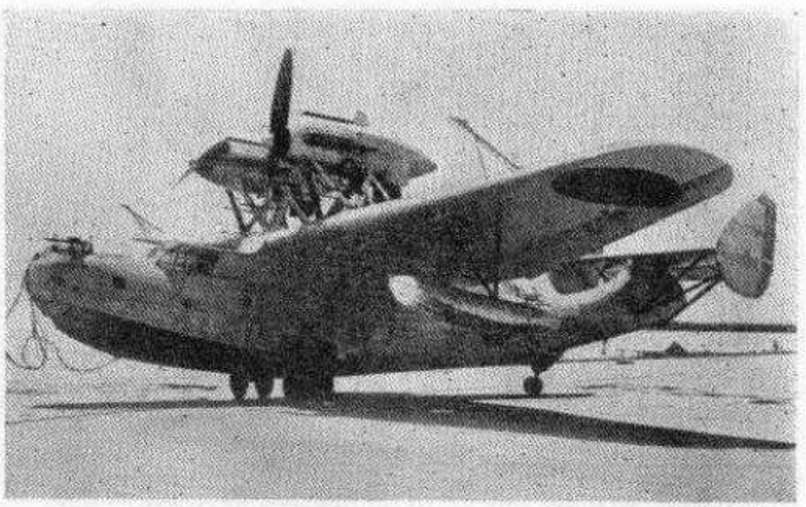
The contracts of the Japanese Navy have kept the Kawanishi Company busy for the past fifteen years, first with monoplane flying-boats having hulls based on Short designs, including the Type 91 flying-boats, the Model 1 with two in-line motors and the Model 2 with two radial motors. In 1933 a twin-float reconnaissance biplane, the Type 93, went into service with the Navy, to be followed during the next year by the Type 94 which has now been given the code name Alf.

In 1937, carrying on the flying-boat tradition, Kawanishi delivered to Japan Airways Company a number of large twenty-passenger four-motor flying-boats for operation on the transport company's Pacific routes. The work of these flying-boats is described in some detail on page 46. This flying-boat went into service with the Naval Air Service as the Type 97 and it is now known by the Allied code name Mavis.

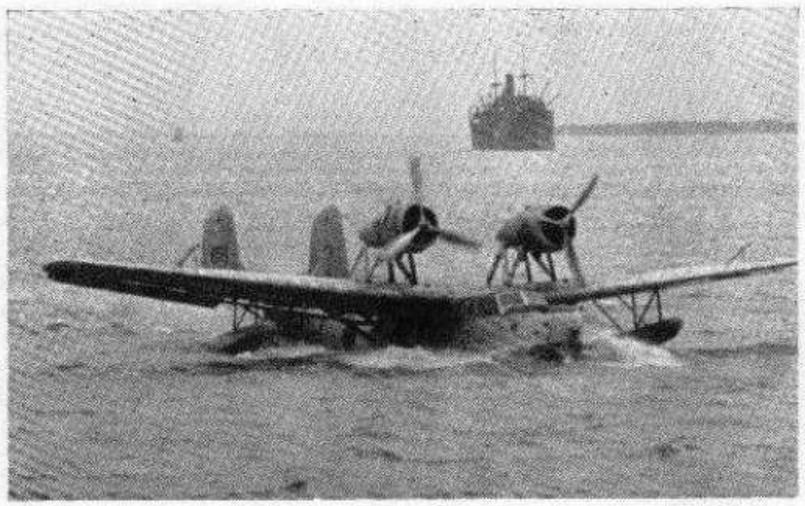
The latest known products of this company are the landplane fighter George and floatplanes Rex and Norm.



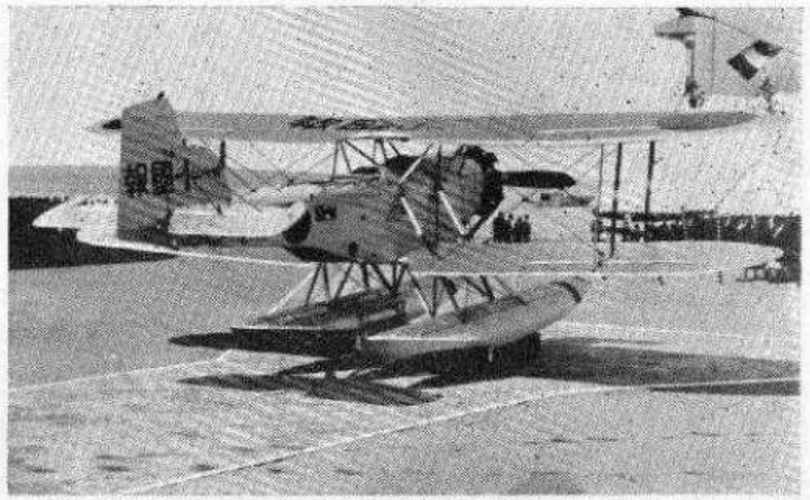
1930. Navy 90 Flying-boat. *All the World's Aircraft*
Three 700 h.p. Japanese-built Hispano-Suiza motors.
Span—98 ft. 5 ins. Top speed—136 m.p.h.



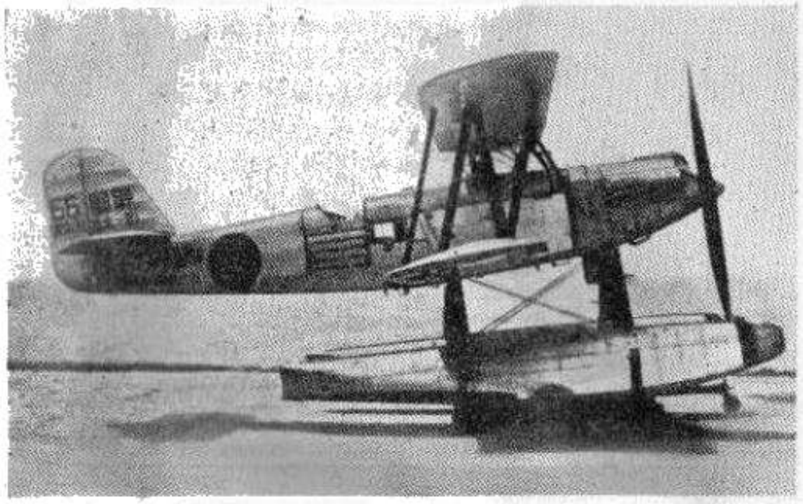
1931. Navy 91-1 Flying-boat. *All the World's Aircraft*
Two 600 h.p. Kawanishi Hiro 91 motors.
Span—77 ft. 7 ins. Top speed—139 m.p.h.



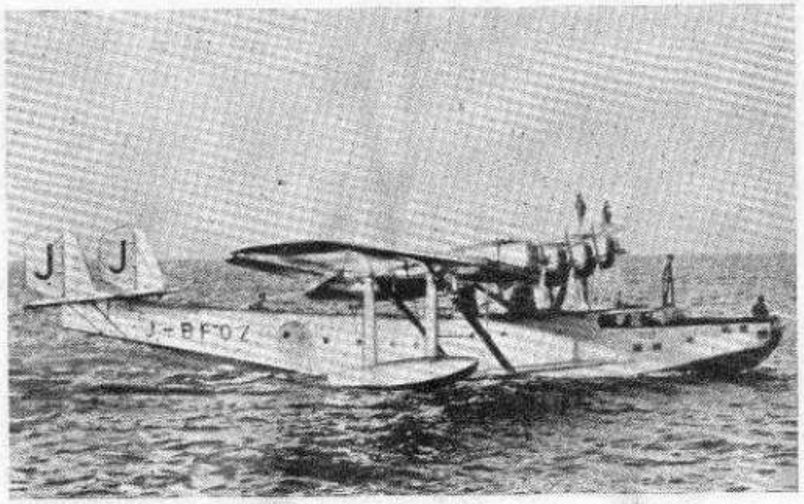
1931. Navy 91-2 Flying-boat. *Black Star*
Two radial motors.
Span—77 ft. 3 ins.



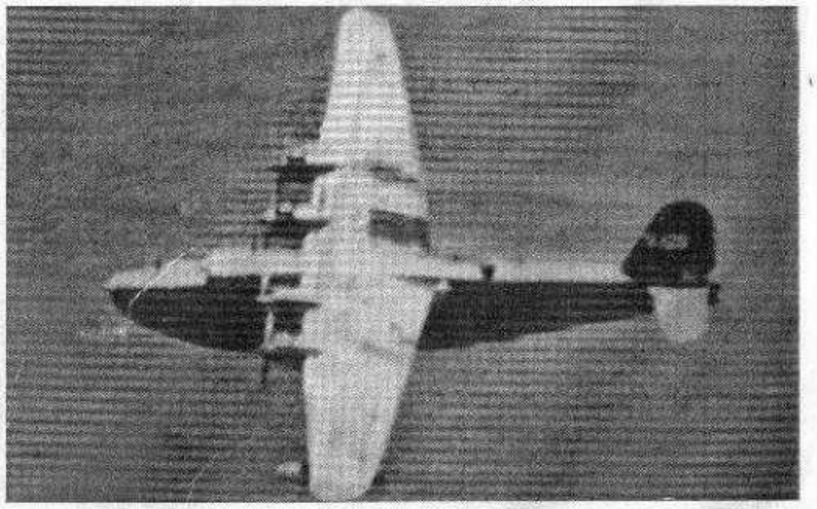
1933. Navy 93 Reconnaissance-floatplane. *All the World's Aircraft*
450 h.p. Nakajima-built *Jupiter* motor.
Span—47 ft. 7 ins.



1934. Navy 94 Reconnaissance-floatplane. ALF.
600 h.p. Kawanishi Hiro 91 motor.
Span—45 ft. 10 ins. Top speed—140 m.p.h.
Also version with Mitsubishi *Zuisei* radial motor.



1937. Transport flying-boat, Navy 97 MAVIS. *British Official*
Four 1,060 h.p. Mitsubishi *Kinsei* motors.
Span—131 ft. 0 in. Top speed—237 m.p.h.
Civil version for Pacific routes shown.



1942. Navy 2 Patrol Flying-boat. EMILY. *U.S. Office of War Information*
Four 1,400h.p. Mitsubishi *Kasei* motors.
Span—124 ft. 7 ins.
Now replacing Mavis type.

TOKYO GASU DENKI

TOKYO GASU DENKI KABUSHIKI KAISHA (Tokyo Gas and Electrical Engineering Co., Ltd.), Tokyo, started building aero-motors in the early 1930's and began the production of aeroplanes in 1933.

The first product of the company was the *Chidori-go*, a small three to four seat cabin equal span biplane, which resembled the British de Havilland Fox Moth but had a T.G.D. seven-cylinder *Jimpu* air-cooled radial motor in place of the Fox Moth's *Gipsy* in-line type. It is not known whether or not more than one of these aeroplanes was built, but one bore the registration J-BBJI.

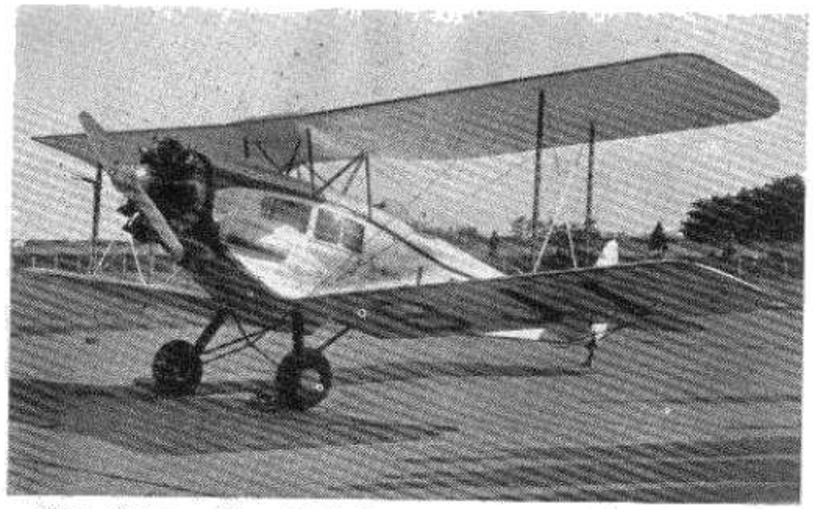
Two years later a modification of this aeroplane was produced, it was generally similar but was of unequal span. This type was called the KR.2 and appeared in two versions, the one shown in the photograph on this page and another with a covered pilot's cockpit. Two aeroplanes of this type were supplied to the Manchuquo Border Police. At least one other was used on the Air Taxi service of the Tokyo Aviation Company.

The best known T.G.D. aeroplane, the *Koken*, was not designed by that company, it was built by the company to the design of the Institute for Aeronautical Research of the Tokyo Imperial University. A large low-wing all-metal cantilever monoplane, it was the aeroplane named "Wind of the Century" which, on 13, 14 and 15 May, 1938, set up a closed circuit flying record by flying non-stop for a total of 7,235·271 miles. The course, flown round 29 times, was Kisarazu—Choshi—Ota—Hiratsuka—Kisarazu, and the crew consisted of first pilot Yuto Huzita, second pilot Fukuziro Takahasi and flight mechanic Kinkiti Sekine.

A small two-motor transport monoplane is the latest known product of this company, it is the TR.1, with a crew of two and accommodation for four passengers. This aeroplane is of all-metal construction and with a total horse-power of 480 has a cruising speed of 155 m.p.h. and a range of 1,120 miles.

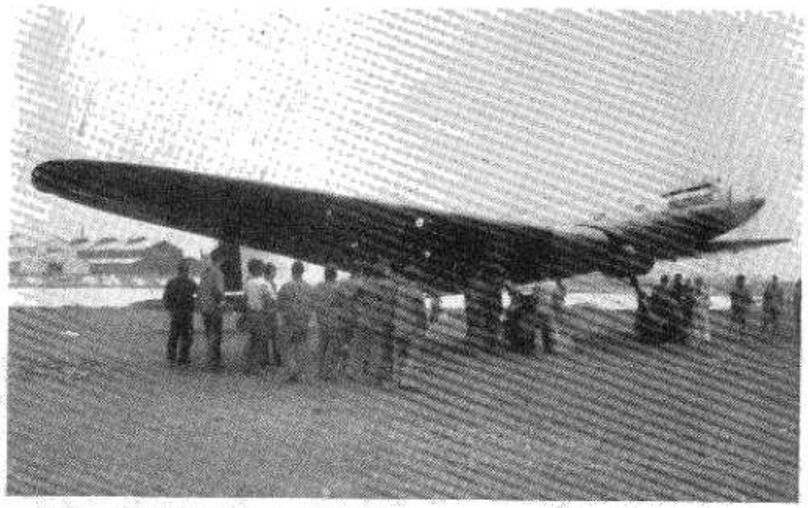
In 1939 the aeroplane and aero-motor sections of the company were separated, and a new company Hitachi Kokuki Kabushiki Kaisha (Hitachi Aircraft Co., Ltd.) was formed to build the airframes. The new company continued to produce the TR.1 and also built a two-seat training sesquiplane called the T.2. This aeroplane had a span of 30 ft. 6 ins., a 180 h.p. T.G.D. *Jimpu* motor and a top speed of 137 m.p.h.

Products of the Tokyo Gasu Denki are referred to elsewhere in this work by the letters T.G.D.

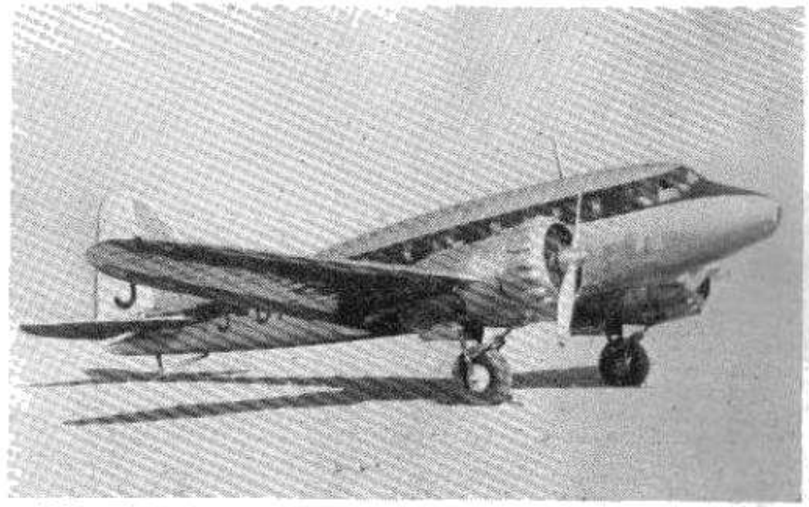


1933. *Chidori-go* (Plover) Light Transport. *All the World's Aircraft*
150 h.p. T.G.D. *Jimpu* motor.
Span—30 ft. 2 ins. Top speed—122 m.p.h.
Also a float version.

1935. KR.2 Light Transport. *All the World's Aircraft*
130 h.p. T.G.D. *Jimpu* motor.
Span—30 ft. 2 ins. Top speed—130 m.p.h
One version has covered cockpit.



1936. *Koken* Long Range Monoplane. *All the World's Aircraft*
800 h.p. Kawasaki motor.
Span—88 ft. 6 ins. Top speed—133 m.p.h.
Named " Wind of the Century ".



1938. TR.1 Light Transport. *All the World's Aircraft*
Two 240 h.p. T.G.D. *Jimpu* motors.
Span—47 ft. 11 ins. Top speed—180 m.p.h.

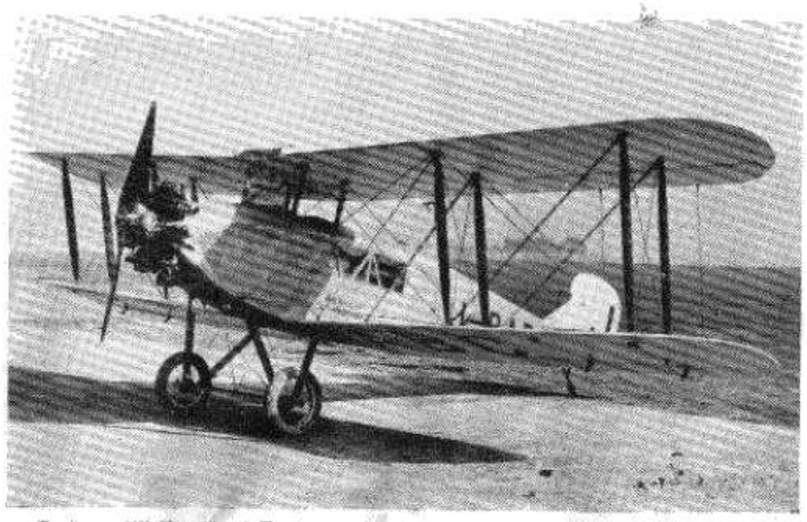
AIBA

TOKYO KOKU KABUSHIKI KAISHA (Tokyo Aviation Co., Ltd.), Tokyo, was established in 1914 by Tamotu Aiba.

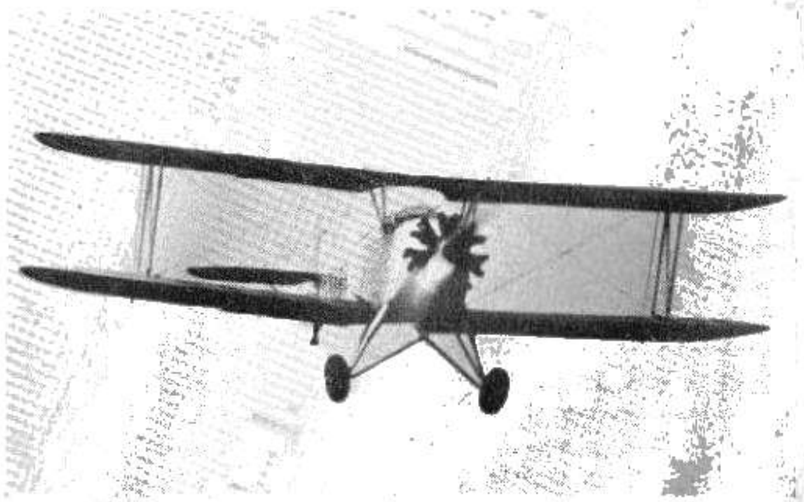
The company has performed much experimental work and produced a number of aeroplane designs, the two best known being the *Tsubame VII* (Swallow) air taxi and the Type 8 trainer, both shown in the accompanying illustrations. *Tsubame VII* biplanes which were built in about 1933 or 1934 were used by the company on its Air Taxi service. This service also employed the Tokyo Gasu Denki KR.2 taxi biplane.

The Tokyo Aviation Co., Ltd. also operated a Government subsidized air service linking Tokyo with Simoda and Shimizu and a fishery patrol service along the Pacific coast of Honshu.

The two-seat training biplanes, based on the Avro 504, and used by the Japanese Student Federation for the flying-training of University Students at Tokyo and Osaka airports were probably built by this company.



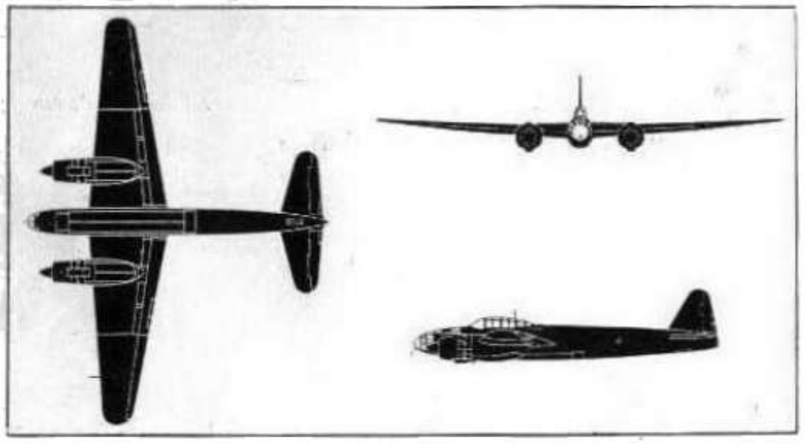
Tsubame VII (Swallow) Taxi aeroplane. *All the World's Aircraft*
130 h.p. T.G.D. *Jimpu* motor.
Span—36 ft. 7 ins. Top speed—95 m.p.h.
Three to four passengers.



Type 8 Trainer. *All the World's Aircraft*
150 h.p. T.G.D. *Jimpu* motor.
Span—29 ft. 6 ins. Top speed—93 m.p.h.

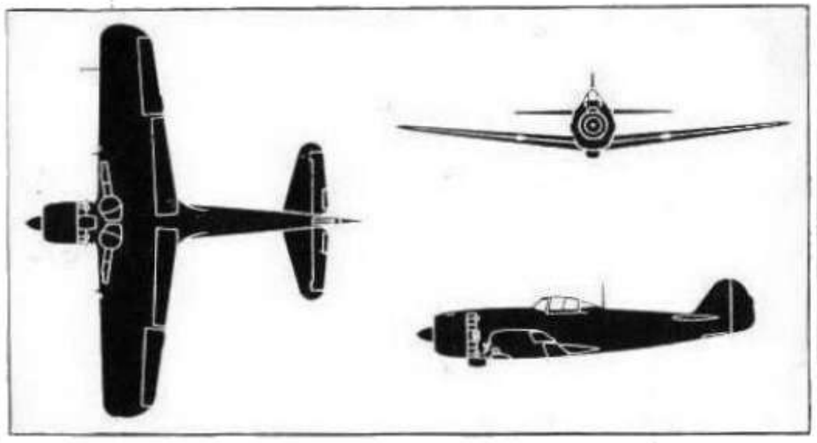
NEW JAPANESE AEROPLANES

As this work goes to press, in May 1945, details of some new Japanese aeroplanes have been released. General arrangement drawings of these aeroplanes are reproduced on these pages. Japan is now concentrating on defensive types, and new Japanese fighter aeroplanes can be expected to appear at short intervals, including jet-propelled aeroplanes. The information available on these new aircraft confirms the opinion that Japanese aeroplanes are of high quality. A new single-float monoplane that cannot yet be illustrated is the Kawanishi *Shiun* (Violet Cloud) Code name Norm. One Mitsubishi *Kasei* Model 24 motor. Span 46 ft. Later models of older types include the Model 4 Dinah with a redesigned nose and tail.



FRANCES

Navy Bomber *Ginko* (Milky Way), Model 1-1, P1Y1.
Navy Night-fighter *Kyokko* (Aurora) or *Hakko* (White Light), Model 1-1, P1Y1-S.
Yokosuka.
Bomber—Two Nakajima *Homare* (Honour) Model 11 motors.
Fighter—Two Mitsubishi *Kasei* (Mars) Model 25 motors.
Span 65 ft. 7 ins., length 49 ft. 2 ins.



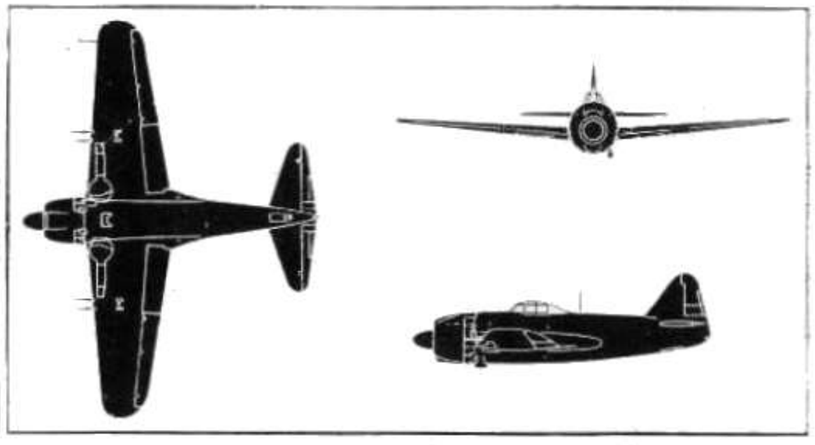
FRANK

Army 4 Fighter, Model 1, Ki 84.

Nakajima.

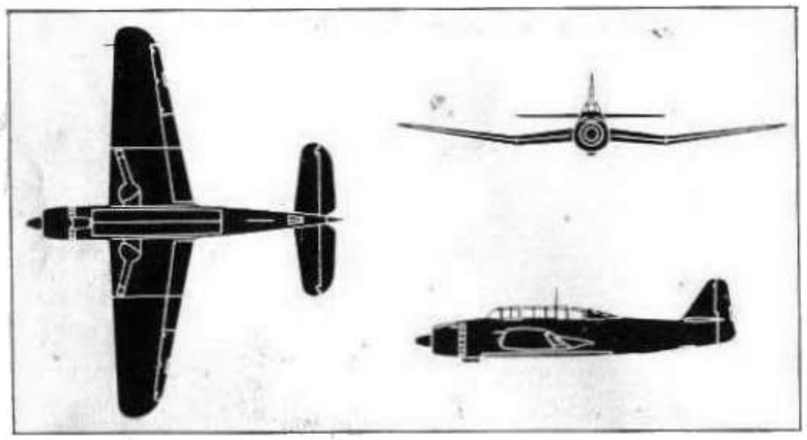
One 2,000 h.p. Nakajima Ha 45 motor.

Span 37 ft 1 in., length 32 ft. 4 ins.



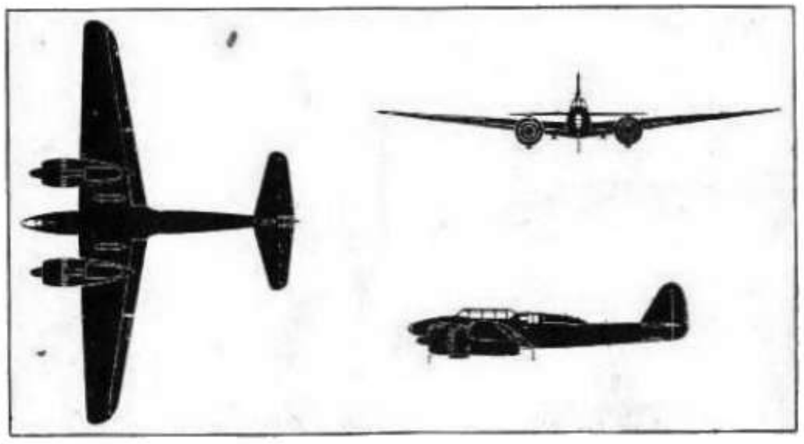
GEORGE

Navy Fighter *Shiden* (Violet Lightning), Model 1-1.
Kawanishi.
One 2,000 h.p. Nakajima *Homare* (Honour) Model 21 motor.
Span 39 ft. 4 ins., length 29 ft. 7 ins.
Landplane version of Rex.



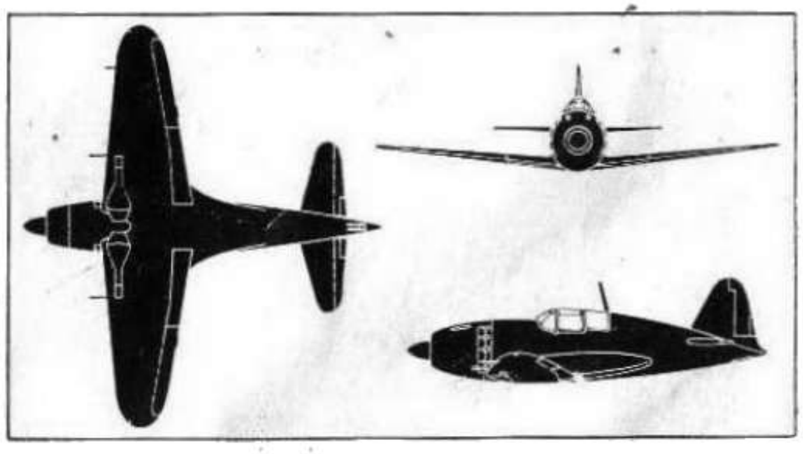
GRACE

Navy Torpedo-bomber *Ryusei* (Shooting Star).
Aichi. B7A
One Nakajima *Homare* (Honour) Model 11 motor.
Span 47 ft. 3 ins., length 37 ft. 7 ins.



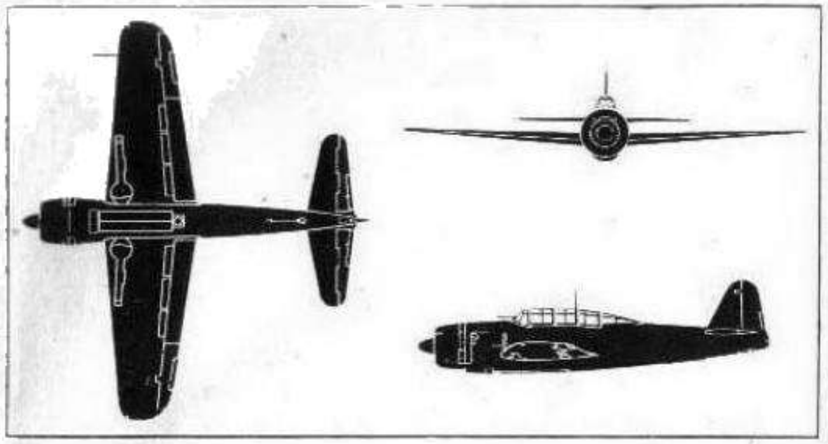
IRVING

Navy 2 Reconnaissance, Model 1-1, J1N1.
Night-fighter *Gekko* (Moonlight), Model 1-1, J1N1-S.
Nakajima.
Two Nakajima *Sakae* (Prosperity) Model 21 motors.
Span 55 ft. 9 ins., length 39 ft. 11 ins.



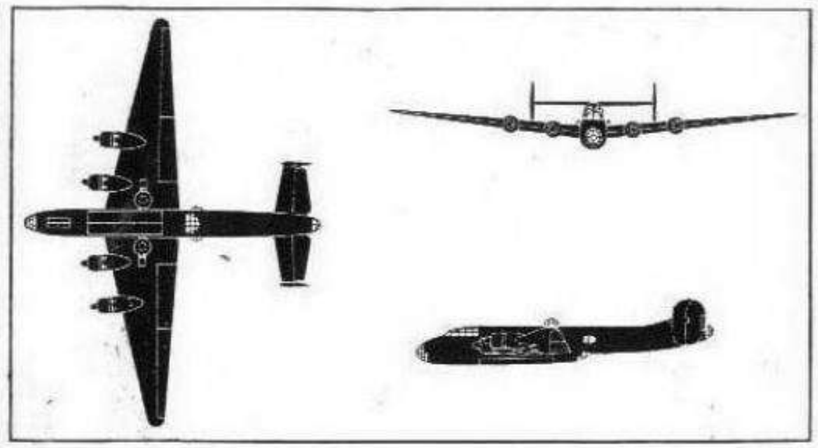
JACK

Navy shore-based Fighter *Raiden* (Thunderbolt), Model 1-1, J2M2.
Mitsubishi.
One Mitsubishi *Kasei* (Mars) Model 23 motor.
Span 35 ft. 5 ins., length 31 ft. 10 ins.



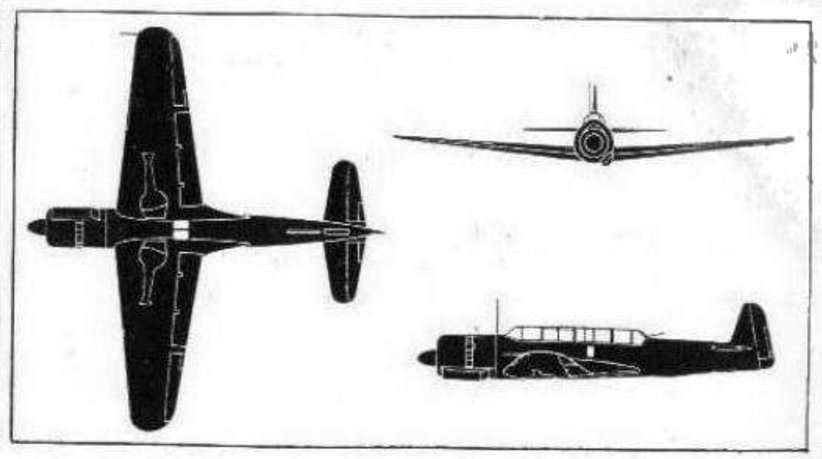
JUDY 3-3

Navy Dive-bomber *Suisei* (Comet), Model 3-3.
Yokosuka. D4Y
One 1,580 h.p. Mitsubishi *Kinsei* (Golden Star) Model 62 motor.
Span 37 ft. 10 ins., length 33 ft. 0 in.
See Page 18-19 or Models with in-line motor.



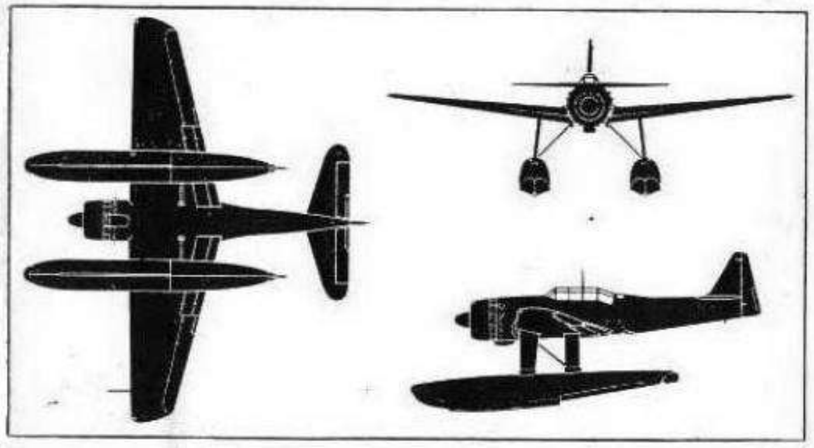
LIZ

Navy 2 Bomber, Model 1-1, G5N1.
Nakajima.
Four Nakajima *Mamoru* (Protector) Model 11 motors or four Mitsubishi *Kasei* (Mars) Model 21 motors.
Span 138 ft. 3 ins., length 101 ft. 9 ins.



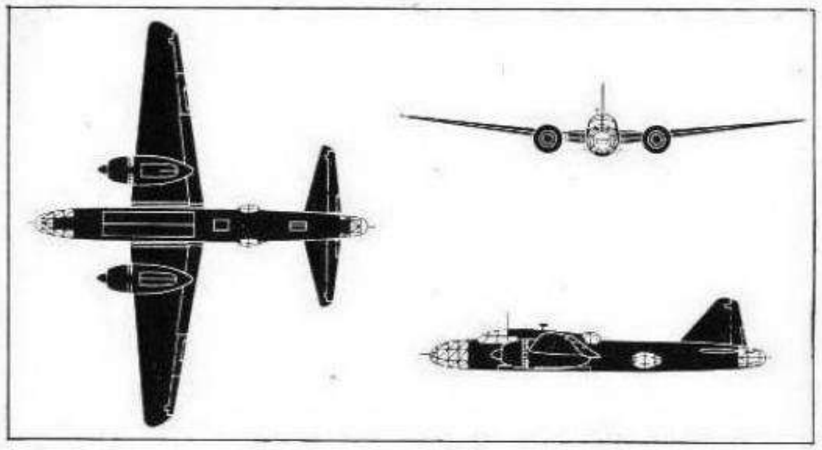
MYRT

Navy Reconnaissance *Saiun* (Painted Cloud).
Nakajima. C6N
One 2,000 h.p. Nakajima *Homare* (Honour) Model 21 motor.
Span 41 ft. 1 in., length 36 ft. 6 ins.
Drawing shows Model 1-2.



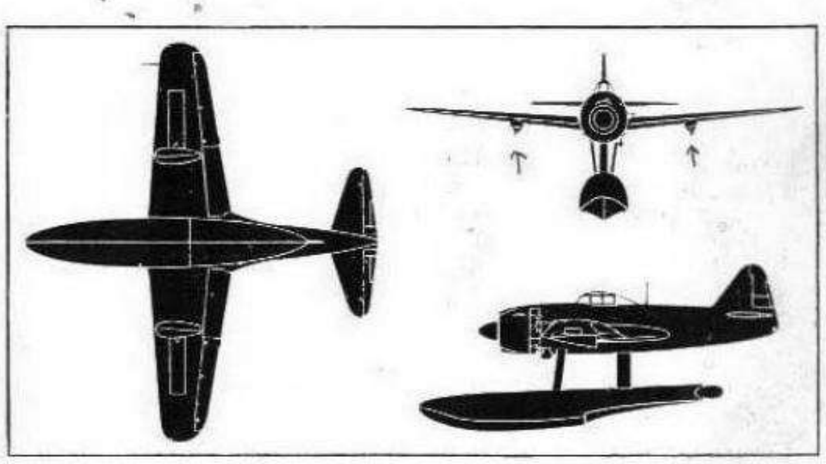
PAUL

Navy Reconnaissance *Zuiun* (Auspicious Cloud), Model 1-1, E16A1.
Aichi.
One Mitsubishi *Kinsei* (Golden Star) Model 54 motor.
Span 42 ft. 0 in., length 35 ft. 7 ins.
Developed from and similar to the Navy Experimental 14 *shown here.*



PEGGY

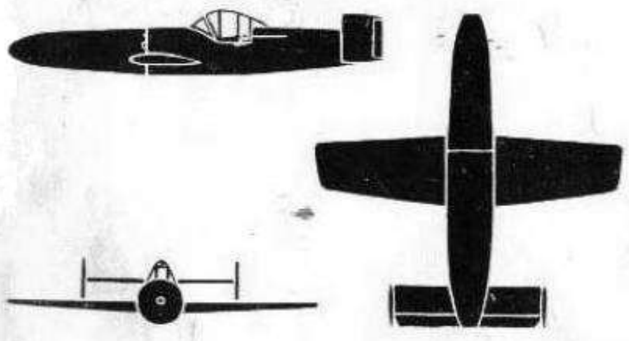
Army Bomber, Model 1. Hiryu
Mitsubishi. Ki-67 Army type 4 Heavy Bomber
Two Mitsubishi Ha 42 motors.
Span 73 ft. 5 ins., length 63 ft. 10 ins.



REX

Navy Fighter *Kyofu* (Mighty Wind) Model 1-1.
Kawanishi. N1K
One 2,000 h.p. Nakajima *Homare* (Honour) Model 21 motor.
Span 39 ft. 4 ins., length 35 ft. 5 ins.

Non retractable Floats!



PILOTED FLYING BOMB

Ohka (Japanese)
Baka (U.S.)
MXY-7

Used in numbers in Okinawa this Japanese piloted flying bomb is launched from under Betty and Peggy bombers.

Rocket propelled and very fast, instant recognition is essential.

Span 16ft. 0in.; Length 19ft. 0in.

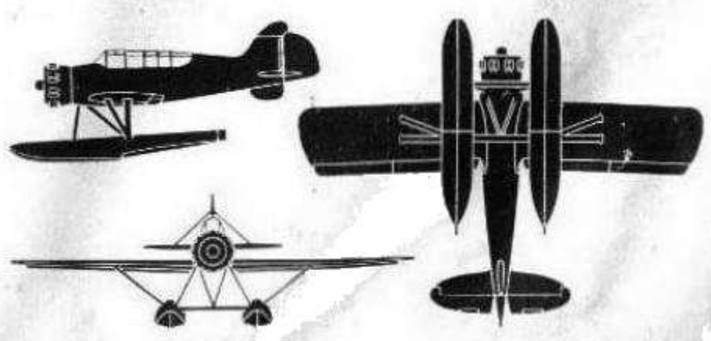
Known as *Baka* (fool) some have been captured intact.

Provisional Silhouette.

SUBMARINE BORNE

The small folding-wing floatplane referred to on Page 38 is now known to be the Yokosuka Navy 0 Glen Model 1-1 shown here.

Span 36 ft. 0in., length 28 ft. 0in.



JAPANESE AERONAUTICAL TERMS

The aeronautical terms on this page, together with their equivalent in Japanese, and shown also in the Japanese ideographs, are included in this work in the hope that they will be of use to those in contact with any Japanese aeroplanes or aeronautical publications printed in Japanese.

A		
Aerial	kūchūsen	空中線
Aerodrome	hikōjō	飛行場
Aeroplane	hikōki	飛行機
Aileron	hojoyoku	補助翼
Air-cooled	kūki reikyaku shiki	空氣冷却式
Aircraft carrier	kōkū bokan	航空母艦
Air gunner	kōkū shashu	航空射手
Airscrew	rasenki	螺旋機
Air speed indicator	taiki sokudo shijiki	對氣速度指示器
Altimeter	kōdokei	高度計
Ambulance	kanja yusōsha	患者輸送車
Anti-aircraft gun	kōshahō	高射砲
Armour	sōkō	裝甲
Army	rikugun	陸軍
B		
Biplane	fukuyō hikōki	複葉飛行機
Bomb	bakudan	爆彈
Bomb aimer	bakugekishu	爆撃手
Bomber	bakugekiki	爆撃機
Bomb sight	bakugeki shōjunki	爆撃照準機
C		
Cannon	taihō	大砲
Carrier-borne (ship-plane)	kanjō hikōki	艦上飛行機
Centre of gravity	jūshin	重心
Cockpit	zasekibō	座席艙
Compass	jishaku	磁石
Crew	jōin	乘員
D		
Danger	kiken	危險
Deck landing hook	kampan kōchaku kagi	甲板 降着鉤
Dive-bomber	kyūkōka bakugekiki	急降下爆撃機
Drag	kōryoku	抗力
E		
Elevator	shōkōda	昇降舵
F		
Factory	kōjō	工場
Fighter	sentōki	戰鬪機
Fin	suichoku anteiban	垂直安定板
Flap (air brake)	kūki seidōki	空氣制動機
Flight (air unit)	hikō shōtai	飛行小隊
Flight	hikō	飛行
Float (of seaplane)	furōto	フロート(飛)
Float seaplane	furōto-shiki suijōki	式水上機
Flying-boat	hikōtei	飛行艇
Formation	hentai	編隊
Fuselage	dōtai	胴體
G		
Gun sight (telescopic)	gankyō shōshaku	眼鏡照尺
H		
Heavy bomber	jūbakugekiki	重爆撃機
Height	kōdo	高度
Horse power	bariki	馬力
L		
Landing	kōchaku	降着
Landing ground	chakurikujō	着陸場
Landing lights	chijō kōchakutō	地上降着燈
Landing speed	kōchaku sokudo	降着速度
Landplane	rikujōki	陸上機
Length	nagasa	長サ
Lift	yōryoku	揚力
Light bomber	keibakugekiki	輕爆撃機
Long range bomber	enkyori bakugekiki	遠距離爆撃機
M		
Machine gun	kikanjū	機關銃
Mainplane	shuyoku	主翼
Manœuvrability	sōjū seinō	操縱性能
Maximum range	saidai shatei	最大射程
Maximum speed	sokuryoku gendo	速力限度
Mid-wing	chūyoku	中翼
Model	kata	型
Monoplane	tan-yō hikōki	單葉飛行機
Motor	kōkū hatsudōki	航空發動機
Motor cowling	hatsudōki-ōi	發動機覆
N		
Navy	kaigun	海軍
O		
Oxygen	sanso	酸素
P		
Parachute	rakkasan	落下傘
Petrol tank	kihatsu-yusō	揮發油槽
Pilot	sōjūsha	操縱者
Port (left)	sagen	左舷
Power loading	maebariki kajū	每馬力荷重
R		
Radial motor	hoshigata hatsudōki	星型發動機
Radio	musen	無線
Range	kōzoku kyori	航續距離
Rate of climb	jōshō sokudo	上昇速度
Reconnaissance	teisatsu	偵察
Rudder	dayoku	舵翼
Rudder bar	tōbō	踏棒
S		
Seaplane	suijōki	水上機
Seaplane tender	suijōki bokan	水上機母艦
Service ceiling	jitsu-yō jōshō gendo	實用上昇限度
Single-float seaplane	tan-furōto-shiki suijōki	單フロート式水上機
Slot	koketsubu	剝缺部
Span	yokuchō	翼長
Squadron	hikō chūtai	飛行中隊
Starboard	ugei	右舷
Streamline	ryūsen	流線
T		
Tailplane	biyoku	尾翼
Tail wheel	bibu sharin	尾部車輪
Take-off (ground)	ririku	離陸
(deck)	rikan	離艦
(water)	risui	離水
Taxi	kassō suru	滑走スル
Throttle	kyūki kaihei kōkan	吸氣開閉桿
Torpedo-bomber	raigekiki	雷撃機
Trainer	renshūki	練習機
Twin-float seaplane	sō-furōto-shiki suijōki	雙フロート式水上機
Two-row radial motor	nijū hoshigata hatsudōki	二重星型發動機
Tyre	rintai	輪胎
U		
Undercarriage	kyaku	脚
V		
V-type motor	V-gata hatsudōki	V型發動機
W		
Water-cooled motor	suireishiki hatsudōki	水冷式發動機
Weight empty	kotei kajū	固定荷重
Wheel	sharin	車輪
Wing (group)	hikō dai tai	飛行大隊

KANA

This table is based on one appearing in Jane's Fighting Ships.

To translate Kana read from right to left in syllables.

	A	E	I	O	U	YA	YO	YU	WA
	ア	エ	イ	オ	ウ	—	—	—	—
B	バ	ベ	ビ	ボ	ブ	ビャ	ビョ	ビュ	—
D	ダ	デ	ヂ	ド	ヅ	ヂャ	ヂョ	ヂュ	—
G	ガ	ゲ	ギ	ゴ	グ	ギャ	ギョ	ギュ	グヮ
H	ハ	ヘ	ヒ	ホ	フ	ヒャ	ヒョ	ヒュ	—
K	カ	ケ	キ	コ	ク	キャ	キョ	キュ	クヮ
M	マ	メ	ミ	モ	ム	ミャ	ミョ	ミュ	—
N	ナ	ネ	ニ	ノ	ヌ	ニャ	ニョ	ニュ	—
P	パ	ペ	ピ	ポ	プ	ピャ	ピョ	ピュ	—
R	ラ	レ	リ	ロ	ル	リャ	リョ	リュ	—
S	サ	セ	シ	ソ	ス	シャ	ショ	シュ	—
T	タ	テ	チ	ト	ツ	チャ	チョ	チュ	—
W	ワ	ヱ	ヰ	ヲ	—	—	—	—	—
Y	ヤ	—	—	ヨ	ユ	—	—	—	—
Z	ザ	ゼ	ジ	ゾ	ズ	ジャ	ジョ	ジュ	—

N ン

NUMERALS

一 二 三 四 五 六 七 八

1 2 3 4 5 6 7 8

九 十 百 千 〇

9 10 100 1,000 0

NAVY MODEL/TYPE SYMBOL

CODE LETTERS

FUNCTION

A Carrier-borne fighters.
B Carrier attack aeroplanes.
C Carrier reconnaissance aeroplanes. + Land-based
D Carrier bombers.
E Reconnaissance floatplanes.
F Observation floatplanes.
G Heavy and medium attack aeroplanes.
H Flying-boats.
J ~~Land fighters.~~ Interceptors
K Training aeroplanes.
M Special aeroplanes.
N Fighter floatplanes.
P Land bombers.
Q ~~Anti-submarine~~ patrol aeroplanes.
R Land reconnaissance aeroplanes.
S Night fighters.
X Gliders

L has been reported as the code letter for Transport aeroplanes; this letter is not in general use in the Japanese language ~~and this report should therefore not be taken as reliable.~~

DESIGNERS

A Aichi.
(D ~~Showa~~ Douglas)
G Tokyo Gasu Denki:= Hitachi
H Hiro Naval Air Arsenal.
K Kawanishi.
M Mitsubishi.
N Nakajima.
P Nippon Hikoki.
S Sasebo Naval Air Arsenal. Si = Showa
W Watanabe= Kyushu (V = Seversky)
Y Yokosuka Naval Air Arsenal.

JAPANESE AERO MOTORS

Japanese aero motors built for the Army are numbered in the same way as Army aeroplanes, that is, motors put into production in 1943 are known as Type 3. Army motors are also known by Ha numbers, Ha being the first letters of hatsudōki, Japanese for motor. Motors built for the Navy are given names and model numbers.

A list of the named motors, together with the name of the manufacturer and a translation of the Japanese names is given here.

Atsuta (Aichi)	Name of a shrine in Aichi Prefecture
Hatakaze (T.G.D.)	Wind which causes flapping of flags
Hikari (Nakajima)	Splendour
Homare (Nakajima)	Honour
Jimpu (T.G.D.)	Squall
Kamikaze (T.G.D.)	Divine Wind
Kasei (Mitsubishi)	Mars
Kinsei (Mitsubishi)	Golden Star
Kotobuki (Nakajima)	Congratulation
Mamoru (Nakajima)	Protector
Miozio (Mitsubishi)	Bright Star
Sakae (Nakajima)	Prosperity
Tempu (T.G.D.)	Our Heavenly Father
Zuisei (Mitsubishi)	Holy Star

BIBLIOGRAPHY

In the preparation of this book much use has been made of : *Jane's All the World's Aircraft*, *Life*, *National Geographic Magazine*, *Time*, and the Official United States Navy Report Covering Combat Operations Up to March 1, 1944.

Kenkyusha's New Japanese-English Dictionary and Lt.-Col. Creswell's Japanese Dictionary of Military Terms have been of great service.