

MITSUBISHI A6M SERIES



PAINT SCHEMES FOR THE MITSUBISHI TYPE ZERO CARRIER FIGHTER 1939 TO 1945

by James Lansdale

Introduction

Conflicting accounts in the literature regarding factory applied paint schemes on the Mitsubishi A6M series Type 0 carrier fighter (Zero) led to a study and examination of existing Zero relics. Historians and scale-model builders frequently cite a variety of publications as legitimate sources for World War II Japanese aircraft paint schemes. The sources cited, including many published in Japan, often quote each other or present unreliable interpretations of color values from monochromatic photographs. Substantiating evidence is seldom presented or documented. The color values of factory applied paint schemes on the Japanese Zero presented in this report have been obtained by the systematic analysis of documented Zero relics in the collections of private individuals, museums, and the National Archives.

Supporting material has also been obtained from World War II intelligence reports of captured Japanese aircraft, field notes of Japanese aircraft wreckage made by Dr. Charles Darby, and a corroborated statement by the chief designer of the Zero, Jiro Horikoshi. The study established two distinctive factory applied color variations of one overall exterior finish on Zeros manufactured from 1939 through the early part of 1943. Also documented are two distinctive factory applied variations of a two-color camouflage scheme introduced on Zeros around March 1943.

Type Zero Carrier Fighter Paint Schemes

The Mitsubishi aircraft company's first Zero paint scheme, herein designated M-01, has been described as a glossy pale olive-gray or "a glossy grey-green." It covered all exterior surfaces to the exclusion of the engine cowling and upper canopy deck aft of the cockpit. In time, the exposed surfaces faded and weathered to "a dove gray color" or a flat "pale gull gray." The cowling and the rear fuselage deck under the canopy were painted a glossy gray-black (Note: A few canopy deck samples examined were reported to have been left in the red primer paint). Author Donald W. Thorpe labeled this scheme "O4" and described the colors as "medium-grey N.9" overall with "black-grey N.7" cowlings (Thorpe:1977, p.32). Jiro Horikoshi, chief designer of the Zero, described the first Zero prototype as being painted "a dimly-shining ash green (hairiyokushoku) except the engine cowling, which was black" (Horikoshi:1970, p.61).



Preserved Mitsubishi relics from two separate Zeros which crashed during the Japanese attack on Pearl Harbor, one at Kaneohe Bay and the other at Fort Kamehameha, were examined. The glossy pale olive-gray of these aircraft was an exact match to Munsell color notation 7.8Y 5.5/2.5. No exact match was found within the Federal Standard (FS) colors key 595 B. However, the color value of these aircraft may be placed within the range of FS-24201 and FS-16350 with the closer match being FS-16350. Weathered pieces examined from the cowling and canopy deck areas of Zero remains in the John Sterling collection were a black-gray color which closely matched the darkness of FS-25042 and the hue of FS-26081. Researcher James I. Long concluded that the canopy deck samples were more of a "black-green" color most like FS-14050.



All parts from the wings, fuselages, and tail surfaces of two Zeros (models 32 and 22) examined had faded and/or oxidized to produce a chalky pale gray similar in appearance to FS-36357 or FS-36495. It was also discovered that oxidized paint samples obtained from Nakajima production Zeros (model 21) mimicked those produced by the Mitsubishi company. The similarity in the appearance of the two weathered schemes influenced many previous investigators to conclude that all Zero finishes had the same chalky-gray color. However, when the

oxidized samples from Mitsubishi produced Zeros (models 32 and 22) were lightly buffed, the pale olive-gray color beneath the oxidation was an exact match to FS-26350. Another oxidized sample, possibly from a Nakajima produced Zero model 21, had a hue between Munsell 5Y 5/2 and 5Y 5/4 or FS-20277. One sample, an access panel in the Darby collection, had an interesting variation. A coating similar to varnish had been applied over the original paint. The overall effect of the sizing was to give a golden cast to the color beneath. It is possible that this clear coat had been applied after 1945 as a preservative by the collector.

A slightly different overall paint scheme, herein designated N-01, was applied by the Nakajima company to its Zero production run. One preserved sample of rudder fabric in the National Archives Collection was obtained from a Nakajima production Zero model 21 (s.n.6544) recovered from the Russell Islands in February 1943. This component may be described as being a glossy "medium gray" color. The gray was matched to Munsell color notation 5 GY 5/1. No exact equivalent was found on the FS colors key, however, it was between FS-16314 and 16251. It is probable that Nakajima did not always over paint the gray doped fabric control surfaces after attaching them to the main aircraft components. Several exterior metal components of Nakajima manufactured Zero model 21s produced prior to March 1943 were most like FS-24201. A weathered and soiled metal sample from a Nakajima A6M2-N float fighter ("Rufe") more closely matched the color of FS-20277. Two different metal skin samples of Nakajima production Zeros, were provided by Marine ace Ken Walsh and Navy veteran Bill Scarborough to researcher and aviation author Robert C. Mikesh. Both samples were found by Mikesh to be an exact match to FS-16160. However, noted aviation artist Roy Grinnell matched the Walsh sample to FS-24201. Oxidized and faded samples of weathered Nakajima relics had the appearance of a chalky gray color similar to FS-36492. When the oxidized Nakajima samples were lightly buffed, the color revealed was more often a matched FS-26350 or FS-24201. Another distinguishing feature of the Nakajima applied finish was the fuselage hinomaru. Nakajima factories applied a 75 mm white outline to the fuselage hinomaru from mid 1942. Samples examined from the cowlings and rear canopy deck of Nakajima produced Zeros were a close match to FS-27038.



According to Dr. Rene J. Francillon, the Imperial Japanese Naval Headquarters issued a directive, dated 3 July 1943, outlining a two-color paint scheme to be applied to Zero fighters (Francillon: 1967, p. 12). The alleged directive specified that the Zeros be painted a "dark green on all upper surfaces and light grey" on all lower surfaces (Francillon, op. cit.). The two-color camouflage schemes applied at the factory by Mitsubishi and Nakajima have herein been designated M-02 and N-02 respectively. Relics from Zeros produced by each company in the two-color scheme evidenced variations in the application and color of the camouflage. The upper surface colors were often an exact match to the one described by Thorpe as "black-green N.1." FS-24077 or FS-24052 closely matched the dark green of the Mitsubishi manufactured samples examined. The upper surface color on Nakajima components matched FS-24094 or 24077. No samples from Zero model 52 engine cowlings were examined and it is presumed that the cowlings colors applied by each company remained unchanged. Contemporary photographs illustrate that the cowlings were either glossy or dull in appearance.

The Mitsubishi factories applied the pale olive-gray color (FS-26350) or gray (FS-36357) to the lower surface areas of their production Zeros. The Nakajima company changed their lower surface color to light medium blue-gray (FS-36307). It should also be noted that the two companies did not demarcate the upper surface color from the lower surface color in the same manner. In scheme M-02, the Mitsubishi company marked the

separation of the two colors along a straight horizontal line aft from the wing root to the tip of the tail cone. Nakajima, utilizing scheme N-02, separated the two colors along a upward slightly curving or slanting line from the wing root to the leading edge of the horizontal stabilizer. The color separation then continued aft and downward from the trailing edge of the stabilizer to the tip of the tail cone. Fuselage hinomaru were outlined with 75 mm white borders by both companies. The upper wing hinomaru were also outlined in white to a measured width of 75 mm or 30 mm. Contrary to some statements in the literature, the more narrow outlining (i.e.30 mm width) of the wing hinomaru was not merely an optical illusion created by their larger diameter when compared to those of the fuselage. Frequently the white outlining to the hinomaru was painted over in the field with a darker color and, as evidenced by many contemporary photographs, the darker over-painting of the white outline is imperceptible.



Different camouflage patterns in various colors were often applied in the field to the original one color overall schemes (M-01 or N-01). A study of field applied variations of Zero camouflage is best accomplished by

studying wartime photographs and noting the particular pattern of dark green color over the original M-01 or N-01 factory finish. As previously stated, Mitsubishi and Nakajima did not introduce their respective two color schemes on their factory lines until the spring of 1943. A simple test for a field application of a darker upper surface color can be done by examining the area of the canopy framework of a Zero in a photograph. If the canopy framework appears not to be camouflaged in the darker shade of the upper surface paint then the scheme in question is most likely to have been field applied.

ADDENDUM:

YOKOSUKA KAIGUN KOKUTAI REPORT NO.0266

The Yokosuka Kaigun Kokutai carried out a series of research experiments testing camouflage schemes for the Zero between November 1941 and February 1942. Report No.0266 "Research on Camouflage for the Type Zero Carrier Fighter" contains information which validates and supplements the foregoing report. A copy of Yokosuka Kaigun Kokutai Report No.0266 was provided to this author by noted Japanese aviation expert and artist Shigeru Nohara. Excerpts of material gleaned from this document are noted to the box on the left.

Color Stated in Report No.0266		FS Equivalent According To:	
Official Color No.	Color Description	Lansdale	Nohara
(Not listed, called <i>ameiro</i> , perhaps J1)	glossy "J3 gray toward amber."	FS-24201 to FS-16350 or FS-10277 to FS-16160 (?)	No comment
J2	blue-gray	FS-26307 or FS-36314	FS-36314
J3	gray	FS-36357	FS-36357
D1	dark black-green	FS-34052 or FS-34084	FS-34036
D2	black-green	FS-34077	FS-34092

On page 3 of Yokosuka Kaigun Kokutai Report No.0266, dated 25 February 1942, appears the statement "Presently used color of the Type Zero carrier fighter is J3 (gray) toward amber with luster." This statement may be a technicians description of a color which varied from olive-gray (FS-14201/16350) and perhaps to gray-browns (FS-10277/16160). It is now possible to state with a higher degree of certainty that the Type Zero carrier fighters in schemes M-01 and N-01 did not leave the production lines in the overall light gray or light blue-gray livery in which they have often been portrayed.

Thorpe No.	Lansdale No.	Color	Description
O.4	M-O1	FS-14201 to FS-16350	Mitsubishi: Overall glossy "light olive -gray" (so-called <i>ameiro</i>)
	N-O1	FS-16160 to FS-10277	Nakajima (?): Overall glossy "light olive/gray - brown" (" <i>ameiro</i> ")
S.1	M-O2	FS-34052 (upper) FS-36357 (lower)	Mitsubishi: Flat "dark black-green upper and flat gray lower" (D1 over J3)
	N-O2	FS-34077 (upper) FS-36307 (lower)	Nakajima: Flat "black-green upper and flat blue-gray lower" (D1 or D2 over J2)

Summary of IJNAF Camouflage Systems

FOR TYPE 0 CARRIER FIGHTERS

*Note: For the following appendixes, delete first digit of coded serial numbers (s/n) in order to obtain the true constructor's number for Mitsubishi built A6M2 model 21s and all models of Nakajima produced A6Ms. In order to obtain the true constructor's number for Mitsubishi produced A6M3 models 32 and 22 and A6M5 model 52s, subtract 3000 from the coded serial number.

Model	S/N	Prod Date	Recov Date	Identity Call No.	Description Comment
12 Shi Proto.	201	3/16/39		J-AM-1	The prototype "was painted a dimly-shining ash green (<i>hairyokushoku</i>) except the engine cowling, which was black."/Jiro Horikoshi:1970, p.61.
21	3277(?)	7/41	12/7/41	B1-151	Fuselage fragment (FS-16350)/Janoff Collection & VMI Museum/IIDA Zero at Kaneohe Bay.
21	5289	8/9/41	12/7/41	AI-154	Rudder fabric & fuselage fragment (FS-16350)/USAF Museum & Pederson Collection/ HIRANO Zero at Fort Kamehameha.
21	5349	10/4/41	2/19/42	B11-124	Rear fuselage (FS-16350)/Darwin Aviation Museum/TOYOSHIMA Zero at Melville Island.
21	3372	10/21/41	11/26/41	V-172	Rudder fabric (FS-16350)/USAF Museum & A.I.2 (g) Report No.2103/INOUE Zero at Luichow Peninsula, China.
21	1575	2/9/42	4/28/42	V-110	Rudder fabric gray (FS-26314)/Albert Makiel document/MAEDA Zero at Port Moresby.
21	4593	2/19/42	7/10/42	D1-108	A.I.2(g) Report No.2103 states Zero, s/n 4593, was "finished in a glossy grey-green"/KOGA Zero at Akutan Island.
32	3035	7/6/42	11/43	2-181	Fuselage fragment (FS-24201)/Hickey Collection/ at Lae, N.G.
32	3148 & 3318	9/11/42 11/29/42	12/91	S-112 Y2-128	Fuselage & wings (FS-26350)/Sterling Collection/ Majuro Island.

APPENDIX

Documentation for paint scheme M-01 applied by Mitsubishi to the A6M series carrier fighter planes, models 21, 32, & 22 from March 1939 through early 1943: glossy pale olive-gray (FS-24201 or FS-16350 (Munsell 7.8Y 5.5/2.5) overall with low gloss gray-black (FS-26081) or black-green (FS-14050) cowling and rear canopy deck.