

THE OFFICIAL MONOGRAM US NAVY & MARINE CORPS AIRCRAFT COLOR GUIDE

Vol 2

1940 — 1949



John M. Elliott Maj. USMC(Ret.)

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The full title of the unit to which an aircraft was assigned was still carried on some nontactical aircraft in 1942 as seen on this Grumman J2F Duck.

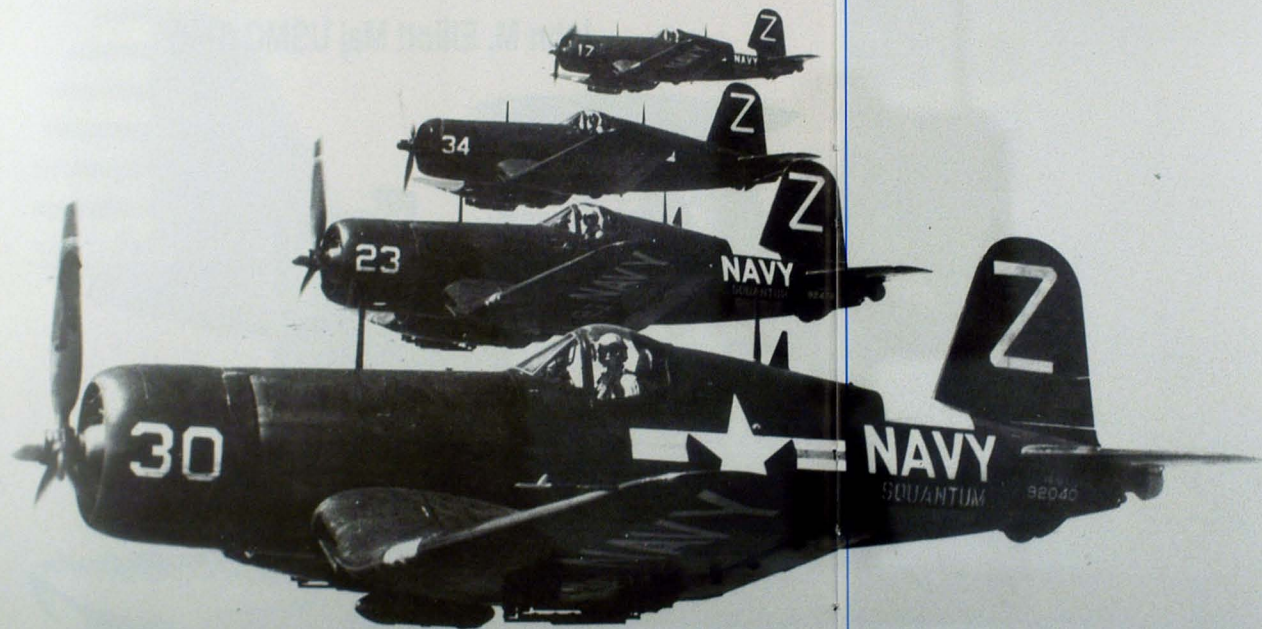
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A flight of Goodyear FG-1D Corsairs with the distinctive Naval Air Reserve markings of NAS Squantum, Massachusetts.



Vought SB2U-1 of Marine Scout Bombing Squadron 131 (VMSB-131) in the overall Light Gray scheme.

FOREWORD

Throughout the history of Navy and Marine Corps aviation, the systems used to mark and paint aircraft have been extremely confusing. The lack of a complete history of the subject has resulted largely from the scattered condition of the reference collections. It has taken Jack Elliott a quarter-century to compile his multi-volume history of this subject. No one familiar with the subject matter and its documentation can be surprised that the project took so long. Volume I covers the years 1911 through 1939. Volume II covers the important ten years from 1940 to 1949 during which expansion and change were rules and not exceptions in the Navy and Marine Corps. The decade witnessed drastic changes in the systems the Navy and Marine Corps had used since the 1920's to mark and paint aircraft. The changes came so fast and were so numerous that their implementation was often left to the discretion of commanding officers and the availability of resources.

This second volume of the Elliott history documents these changes and offers explanations for them. *The Official Monogram US Navy & Marine Corps Aircraft Color Guide, Vol. 2, 1940 to 1949*, fills an important gap in this area of Navy and Marine Corps aviation history.

W. J. Armstrong

William J. Armstrong
Historian
Naval Air Systems Command

The opinion expressed above is the author's personal expression and not necessarily that of the US Navy Department of Defense or the Federal Government.



INTRODUCTION

The war in Europe brought many changes to US Naval aviation. Among these was the change from the familiar brightly painted aircraft to drab wartime camouflage concurrent with a great expansion in number and types of aircraft. Volume II covers these changes in painting and markings applied to US Naval aircraft during World War II and the gradual transition back to more colorful markings, though nonregulation, just prior to the Korean conflict.

With the expansion of Marine Corps aviation just before World War II the old single-digit system of designating squadrons became inadequate. On March 18, 1941, the Major General Commandant recommended a new numbering system for use by the Marine Corps. This was approved by the Chief of Naval Operations on March 26, 1941. Effective July 1, 1941, a new three-digit system was introduced that would take care of all future expansion. This system showed the Wing, Group, and Squadron in the unit designator. The first digit denoted the Wing (1st, 2nd, etc.). Groups were numbered in numerical sequence using two digits, the first being the Wing number to which the Group belonged. Under this system the first Group in the First Marine Aircraft Wing (1st MAW) would be Marine Aircraft Group (MAG) 11. From this it can be seen that there was space in the system for 9 MAGs (11 through 19) in the Wing, although such expansion was never visualized, nor did it ever take place. Each Group could also consist of 9 squadrons. Squadrons were designated in numerical sequence using all three digits. The first two digits designated the Wing/Group, while the third represented the specific Squadron within the Group. Thus, the first squadron number in MAG 11 would carry the designator 111.

1st wing	1st group	1st squadron
1st MAW		
	MAG-11	
		VMF-111

The system covered the 1st Wing and 2nd Wing, while the number 3 at that time was for the four Marine Defense Air Groups that comprised the remainder of Marine Corps aviation in the Fleet Marine Force.

The Second Marine Aircraft Wing produced the following:

2nd wing	1st group	1st squadron
2nd MAW		
	MAG-21	
		VMF-211

Groups within a Wing were to be numbered consecutively and organized as follows:

First Group	VMF
Second Group	VMF
Third Group	VMSB
Fourth Group	VMB
Fifth Group	VMCJ

This transition covered two months during which time separate directives were issued for each command level. The First Marine Aircraft Wing was organized on July 7, 1941; and the Second Marine Aircraft Wing followed on July 10, 1941. Pursuant to Major General Commandant letters 2385.2-4 AD-31-rs and 2385.2-5 AD-31-rs, dated June 28, 1941, the squadrons of Aircraft One and Aircraft Two were redesignated as follows:

AIRCRAFT ONE - to - MAG-11	AIRCRAFT TWO - to - MAG-21
VMF-1 to VMF-111	VMF-2 to VMF-211
VMS-1 to VMSB-131	VMS-2 to VMSB-231
VMB-1 to VMSB-132	VMB-2 to VMSB-232
VMO-1 to VMO-151	VMO-2 to VMJ-252
VMJ-1 to VMJ-152	

However, it was not until July 28, 1941, that the Major General Commandant by message 281440 designated Aircraft One to become MAG-11 and Aircraft Two to become MAG-21. Both changes became effective August 1, 1941.

The theory was good but the application failed almost from the beginning. There were never more than five wings: First, Second, Third, and Fourth being tactical units. The Ninth was a training wing at Marine Corps Air Station, Cherry Point, North Carolina. However, group numbers with their assigned squadrons belonging to the nonexistent wings were utilized for special needs such as MAG-51,

consisting of the night fighters; MAG-61, the medium bomber force of Marine aviation flying PBJs, and MAG-71, the short-lived glider program. The deployment of individual units due to combat requirements soon broke up this wing/group/ squadron numerical organization. The demobilization during 1945-1946 eliminated many units and destroyed the last remnants of the original system. While four wings were retained (1st, 2nd, 3rd operational, and the 4th reserve) few group/squadron relations remained. These, too, were broken up in the years to come due to operational commitments.

Single digit designations were still used for units such as Observation Squadrons (VMO-6) and Carrier Air Service Detachments (CASD-5). These numbers were assigned in numerical sequence for each type squadron as they were commissioned without regard to the wing or group assignment.

In discussing Marine Corps aviation units the wings are always called First, Second, or Third, rather than One, Two, or Three. On the other hand the groups are referred to as Twelve, Sixteen, or Thirty-Three, etc., rather than Twelfth, Sixteenth, Thirty-third, etc. Squadrons are spoken of as though the three digits were in two groups. The first digit is spoken by itself, followed by the next two digits as a unit. For example, 231 would be pronounced two thirty-one. Thus, a wing is spoken of as First Marine Aircraft Wing (1st MAW); a group as Marine Aircraft Group Thirty-One (MAG-31); and a squadron as Marine Fighting Squadron Two-Fourteen (VMF-214). Navy squadrons are referred to as Patrol Squadron Forty (VP-40) or Fighting Squadron Six (VF-6).

Early in World War II it became obvious with the deployment of Navy patrol squadrons that the permanent assignment of squadrons to patrol wings was not possible. The squadron number ceased to have any significance other than as a numerical designation. Patrol Wings were redesignated Fleet Air Wings on November 1, 1943, to allow them to be organized on the Task Force principle which would allow the assignment of any and all types of aircraft necessary to perform a mission.

Reserve squadrons, as such, played no part in the conflict as they were called to active duty or deactivated. However, a number of Naval District squadrons were formed and continued to carry the district assignment letter. The

expansion of new squadron functions forced the creation of new units such as Observation Fighting (VOF), Night Fighting (VF(N)), and Escort Fighting (VGF) for Escort Carrier operations. The Transport Squadron (VR) was also a wartime development.

On March 1, 1943, all assignment letters were dropped, except for Marine Corps squadrons. The squadron designation system was simplified by deleting some of the earlier wartime innovations. Inshore Patrol Squadrons which had carried a Naval District number became Scouting Squadrons (VS); Escort Fighting Squadrons (VGF) became Fighting Squadrons (VF); Escort Scouting Squadrons (VGS) became Composite Squadrons (VC); and Patrol Squadrons (VP) operating land-based aircraft became Bombing Squadrons (VB). Carrier Scouting Squadrons (VS) were changed to VB and VC squadrons. Therefore, it is necessary to know the date of a squadron designation in order to determine exactly what the designation means in the case of VB, VC, or VS squadrons.

The numerical designation of Carrier Air Groups began with the commissioning of Carrier Air Group Nine (CAG-9) on March 9, 1942. Existing air groups retained their carrier names until they were either reformed or disbanded.

On June 29, 1944, a new letter designation was established for the CAGs so that they were brought in line with standardized complements of different carrier types. These designations, some of which had been in use for over a year, showed the carrier type to which the air group was assigned as follows:

CVBG	Large Aircraft Carrier Air Group
CVG	Aircraft Carrier Air Group
CVLG	Light Aircraft Carrier Air Group
CVN	Escort Aircraft Carrier Air Group

Composite squadrons assigned to CVEs were also listed as Air Groups. All these VC units had been decommissioned by November 15, 1945.

On October 1, 1944, all patrol squadrons (VP) and multi-engine land-based bombing squadrons (VB) were redesignated as Patrol Bombing (VPB) squadrons. This was not a change in the system, but rather a consolidation of missions. With the end of the war and the discussion on merg-

ing the armed forces, these squadrons were again redesignated on May 15, 1946, as Patrol Squadrons (VP). This was done to emphasize the primary mission of search and reconnaissance and to avoid any confusion with Army Air Force squadrons employing the same or similar aircraft with a bombing mission.

Since the early days of Naval aviation, squadron titles have been closely related to the letters used to designate aircraft. As a result of the development of new types of aircraft, the designating system was revised on March 11, 1946, by the issue of Aircraft Circular Letter 43-46. The principle heavier-than-air fixed-wing aircraft types were:

VF	fighter
VA	attack
VO	observation
VP	patrol
VR	transport
VU	utility
VT	training

The new helicopter designations were:

HH	air-sea rescue
HO	observation
HT	training
HR	transport
HU	utility

For administrative purposes VP and VR classes could be further identified as four engine landplane, two engine landplane, four engine seaplane, and two engine seaplane, by adding (HL), (ML), (HS), and (MS) respectively to the basic class designation.

It was decided after the end of World War II that a program had to be instituted to retain the vast pool of trained aviation personnel. The Naval Air Reserve program, as it came to be called, was inaugurated on July 1, 1946, with the Headquarters command being established at NAS Glenview, Illinois. This program included Navy and Marine Corps units. The reserve carrier type squadrons were organized into Air Groups the same as in the fleet.

Transport, utility, and support units were also formed. While they flew the same types of aircraft as were assigned fleet squadrons, their aircraft carried distinctive reserve markings to differentiate them from fleet aircraft.

On July 22, 1946, the Navy Department Bulletin No. 46-1543 was issued. It gave the new designations for Navy/Marine Corps squadrons to become effective on September 1, 1946. The designations were:

VF	fighting
VF(N)	night fighting
VA	attack
VP	patrol
VC	composite
	(such as VF & VA aboard a CVE)
VO	observation
VU	utility
VR	transport
VPP	photographic
VH	rescue
VPW	air early warning
VPM	meteorological
VX	development
VCN	night composite
VT	training
VMF	Marine fighting
VMF(N)	Marine night fighting
VMA	Marine attack
VMO	Marine observation
VMR	Marine transport
VMP	Marine photographic

Navy Department Bulletin No. 46-2123, effective November 15, 1946, abolished the designation system which had been in effect since 1937 and in the process made sweeping changes. Carrier squadrons were divided into four categories depending on the type of carrier to which they were assigned. These were Battle Carrier (CVB), Attack Carrier (CV), (CVA 1946-1948), Light Carrier (CVL), and Escort Carrier (CVE). In the CVB and CV categories, groups were numbered using odd numbers starting with

one. VF squadrons used the group number. VB squadrons were redesignated VA and also used the group number. On the other hand VBF (Bomber/Fighter) and VT (Torpedo) squadrons were redesignated VF and VA respectively, and used the next even number greater than the group number. A suffix letter was placed after the squadron number to differentiate between squadrons with the same number but of a different class or group. These letters were:

B	CVBG squadrons
A	CVG squadrons
L	CVLG squadrons
E	CEVG squadrons

Thus, VF-1B was Battle Carrier Fighting Squadron 1 of CVBG-1. If a ship had two or more squadrons of the same type, the second squadron was assigned the next higher even number, i.e., VF-2B. CVL and CVE squadrons were numbered consecutively beginning with number one.

For example, the redesignation of CVG-4 was:

CV Group			
CVG-4	— to —	CVG-1 (CVAG-1)	
VF-4	— to —	VF-1A	
VBF-4	— to —	VF-2A	
VB-4	— to —	VA-1A	
VT-4	— to —	VA-2A	

Thus the VB (Bomber) and VT (Torpedo) squadrons which had been part of Naval aviation practically from the beginning came to an end. Reserve squadrons followed the same system, but beginning with 51.

Observation squadrons were assigned the same number as the Division to which the parent vessel was assigned, with a suffix letter C or B to differentiate between cruiser and battleship observation squadrons, i.e., VO-1C or VO-1B. Reserve squadrons started with 51 and had no letter suffix. No reserve VO squadrons were formed.

Designations for patrol squadrons now showed the type of aircraft being operated by including the letters previously used administratively as part of the short title. These letters were:

HL	heavy land-based aircraft
ML	medium land-based aircraft
MS	medium seaplane aircraft
AM	medium amphibian aircraft

Squadron numbers were assigned in consecutive order beginning with one, while reserve squadrons were numbered starting with 51.

VCN, VPP, VPW, VR, VU, VT, VX, VRF, VRU, VPM, ZP, and all squadrons not otherwise numbered started with the number one and were numbered consecutively in each class.

The demobilization of so many squadrons at the end of World War II resulted in the remaining squadron numbers having no relationship to any system. This was resolved with the new system by having each class start with number one.

However, there was tremendous opportunity for confusion with the existence of fighting, attack, and patrol squadrons having the same number, even though they had a different assignment letter. This also created a complete break in the lineage of the remaining squadrons which had splendid war records. The Marine Corps squadrons were not affected by this change.

Such a complex system was bound to be modified quickly. Chief of Naval Operations letter Op-55R-2B5/jk, dated July 20, 1948, with an effective date of September 1, 1948, simplified the system after it had been in effect for less than two years. Carrier Air Groups now were simply CVGs without regard to their carrier assignments. VF and VA squadrons were assigned two- or three-digit numbers depending on the CVG to which they belonged; the first digit being the same as the group number, while the last digit was the squadron numerical sequence within the group. In the case of two-digit group numbers, the first two numbers of the squadron were the same as the group. All suffix letters were dropped from the system. Patrol squadrons reverted to the simple VP designation, while VPW and VPP squadrons also became VPs. VRF and VRU squadrons all became VRs. The squadron number, rather than a letter added to the squadron designation, now determined the special function of the squadron. Following are examples:

UNIT	MISSION
Carrier Air Groups	
CVG-1 to 19	General attack and defense
CVG-21 to 29	All weather attack and defense
CVG-31 to 39	Air defense and escort
CVG-41 to 49	All weather defense and ASW attack
Fighter Squadrons	
VF (AG # plus) 1, 2, 3, 4	Air attack, escort and defense
VF (AG # plus) 1, 2	All weather intercept and escort
Attack Squadrons	
VA (AG # plus) 4, 5, 6	Surface and ground attack
VA (AG # plus) 3, 4	All weather attack
Composite Squadrons	
VC-1 to 9	All weather attack and defense teams
VC-10, 20, 30, etc.	All weather detection, attack and defense
VC-11 to 19	All weather air warning teams
VC-21 to 39 (less 30)	All weather ASW hunter-killer
Patrol Squadrons	
VP-1 to 29	Air-sea reconnaissance and ASW attack
VP-31 to 39	Amphibious Air-sea reconnaissance
VP-40 to 49	Seaplane Air-sea reconnaissance
VP-50 to 59	Air-sea detection and air defense control
VP-60 to 69	Photographic
Transport Squadrons	
VR-1 to 20	Air logistic support
VR-21 to 30	Administrative air logistic support
VR-31 to 40	Air Ferry logistic support
VR-41 to 50	Logistic aircraft maintenance

Once again there was a complete break in squadron lineage with changes such as VF-18A, which became VF-172; and VP-HL-12, which became VP-29.

Marine Corps squadrons were not affected by this change.

While this was a simple system of designating squadrons, like all the others, it was bound to break down in actual operation. This was especially true in the carrier-based squadrons. Due to training, aircraft availability, and numerous other considerations, it was not possible to retain the Air/Group/Squadron relationship, so that, just as happened in the case of Marine Aircraft Groups, an Air Group no longer consisted of just the squadrons numbered for it.

At no time in the history of US Naval aviation were there as many changes issued for painting of aircraft as there were during the ten years covered in this volume. However, it must be remembered that these changes were what was desired and that there were many aircraft which were not repainted for a variety of reasons. The press of combat requirements, of course, took precedence over such a mundane task as painting. But there were numerous other overriding considerations. In most cases the carrier squadrons and those deployed in the combat area did not have the equipment to conduct an extensive repainting project. It was all they could do to patch up battle damage. Consequently, most of these changes were done by the manufacturers, or by Overhaul and Repair facilities within the US, while the aircraft in the field remained in the same scheme in which they had originally been issued. Replacement aircraft, especially overseas, were drawn from a pool and frequently retained the pool accountability number rather than having a new one applied to conform to squadron systems. This resulted in some strange schemes within a unit. However, they flew just as well and performed their missions as well as factory-fresh aircraft.

With this brief history of the wartime structure affecting Navy/Marine Corps aviation, we are ready to delve into the numerous changes in the overall paint schemes and markings issued by many different commands which were used to identify naval aircraft during this ten year period.

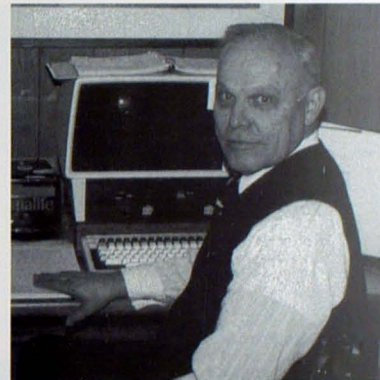
ACKNOWLEDGMENTS

An undertaking as extensive as this volume of technical data (as well as the other volumes in this series), cannot be accomplished by just one person. No matter how thorough the search of the records may be, there remains the inescapable fact that "housecleaning" through the years has destroyed many historically significant directives. Then, too, it must be remembered that good administrative procedures have always dictated that the old document be destroyed when a superseding document is filed. The locating of these missing records is only possible through the assistance of individuals interested in the subject who have retained or found copies for their own use. It is in these personal collections that many significant documents are found. These individuals are deserving of our gratitude for their part in preserving aviation history.

In addition to those mentioned in Volume I, whose support covers all four volumes, I want to thank the following for their assistance in compiling the data for Volume II: Dana Bell, National Air and Space Museum; Roy Grossnick, Aviation Historian, Naval Historical Center; Charles Haberlien, Photo Section, Naval Historical Center; Agnes Hoover, Photo Section, Naval Historical Center; Duane Kasulka; Robert Lawson, Editor, *The Hook*; Lois Lovisolo, Grumman Aerospace Historian; Dave Lucabaugh; Gwen Rich, Archivist, Naval Historical Center; Robert J. Cressman and John Riley, Ships History, Naval Historical Center; Blanch Snyder, OP-511D, Navy Department; and all others who have assisted in this project. Thank You.

JOHN M. ELLIOTT
MAJOR USMC (RET)

Major Elliott spent his early years in Santa Barbara, California, where his interest in naval aviation was initiated by the frequent stops of Navy and Marine Corps aircraft on cross-country flights as well as visits by the USS Lexington, USS Saratoga, and other capitol ships with their float pieces. Realizing a long time desire, he enlisted in the US Marine Corps in 1942 for four years. Upon completion of boot camp he was assigned to the aviation ordnance field where he was to serve for twenty-four years. During this time he served in dive bomber and fighter squadrons, O&R facilities and taught in aviation technical schools



rising to Master Sergeant. As an officer he served in fighter and attack squadrons and as the Group, Wing and Air Station Ordnance Officer in the US and overseas. During this time he saw naval aviation grow from single Cal. 30s in the rear seat of SBDs to a nuclear delivery capability.

Upon retirement he went to the Smithsonian Institution as Chief, Collections Branch, National Armed Forces Museum Advisory Board. With the demise of the concept for a national military museum he became the Contract Administrator for the Smithsonian. During these years he became well known to those restoring naval aircraft, model builders and other museums for his knowledge on the painting and marking of US naval aircraft.

After eighteen years at the Institution he has returned to the field of naval aviation as assistant historian under CNO (Air Warfare).

SECTION 1

AIRCRAFT COLORING AND PROTECTIVE COATING

CHAPTER 1 1940-1949

As seen in Volume I, by January of 1940 Naval aircraft had become probably the most colorful military aircraft of the day. The upper surface of the upper wing on tactical aircraft was Orange Yellow, with a chevron in the section color; while all metal surfaces were Light Gray with fabric surfaces being finished with Aluminum dope. Cowls were brightly painted to show both the section the aircraft was assigned to and its position within its section. Section leaders were designated by a color band in the appropriate section color around the aft fuselage. Tails were color coded to designate the parent aircraft carrier to which they were assigned. Cruiser and battleship assignment was shown by a system of colored stripes on the horizontal and vertical tail surfaces, while stripes and checks in various colors and combinations designated the patrol aircraft wings. Special staff, air group commander, utility and marine corps aircraft all carried their own colorful and distinctive paint schemes. Such a system was soon to change.

The development of a suitable camouflage system for naval aircraft continued to be a problem. A letter from the Naval Research Laboratory dated January 12, 1940, recommended, based on their studies, that four colors be used for camouflaging aircraft. The recommended colors were Aluminum, Dark Green, Dark Gray, and Black.

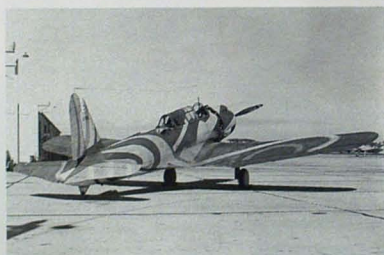
On January 15, 1940, Commander Aircraft, Scouting Force directed that two PBVs in each Patrol Wing were to be camouflaged in accordance with the "Tentative Requirements for Application of Camouflage to Fleet Aircraft," dated December 19, 1939. In addition, one PBV from Patrol Wing Two was to be painted in the night variation.



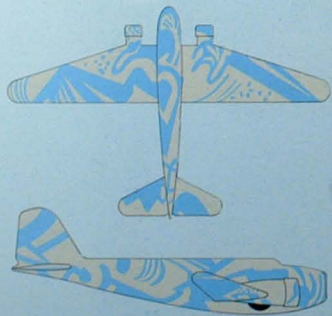
This Grumman TBF-1 Avenger carries the thirteen alternate Red and White horizontal stripes on the rudder as directed by Commander in Chief Pacific, on December 23, 1941.



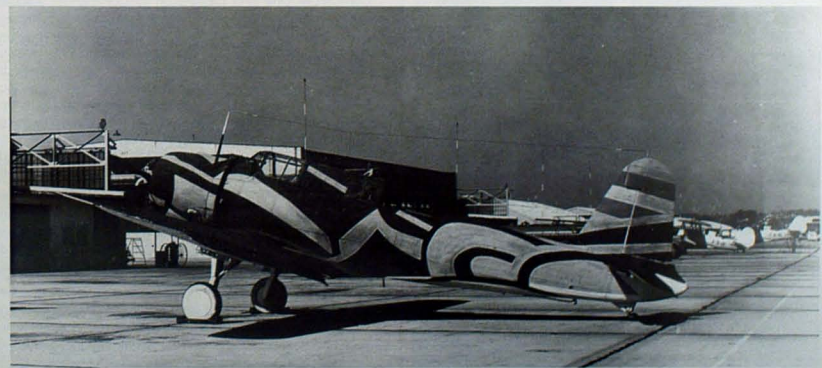
Patent 2,190,691 was issued on February 20, 1940, to Mr. McClelland Barclay for the camouflage of aircraft. Such camouflage was to cause the size and shape of the aircraft to become indistinguishable. Drawings were included which illustrated the concept rather than showing specific designs. A bold, dominating design covering the greater portion of the aircraft was first painted on its surface area. These designs were generally trapezoidal in shape and placed at an oblique angle relative to the airplane surfaces, with their vanishing point being other than the vanishing point of the aircraft structure. The color used was to make the lines of the design more distinct and apparent than the silhouette or outline of the aircraft. This was intended to confuse the perspective of the aircraft surface as to size and shape. Other unbroken lines of the design continued from one surface to another, such as wing to fuselage. Structures such as engine cowl and nacelles were to be broken up with designs to disguise their actual shape. In addition, designs having the identical forms were to be painted in close proximity to cause confusion as to the actual location of these bodies. This is shown in the side view drawing where an engine cowl and nacelle have been painted on the side of the fuselage.

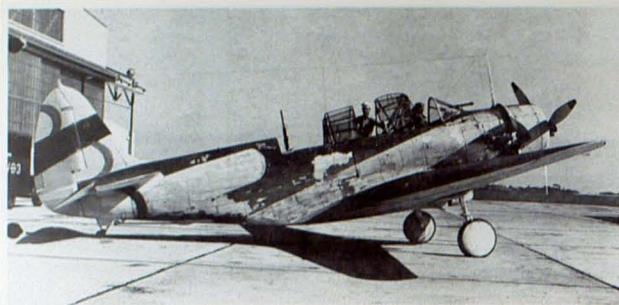


SIDE AND BOTTOM SIDE AND BOTTOM VIEWS
AS DEPICTED IN THE BARCLAY PATENT



Practically from the beginning of naval aviation there has been an attempt to camouflage aircraft. In the course of these experiments numerous concepts have been tried. One of the most flamboyant was that proposed by McClelland Barclay. The principles of the Barclay camouflage concept was applied to the F2A-2, SB2U-2 and BT-1 as shown in these examples which illustrate the limitless possibilities of geometric designs which could be applied.





All distinguishing unit and service markings were eliminated during this test of the Barclay camouflage.

Normally, with the aircraft in level flight, a fairly well-defined line of demarcation exists between the brightly illuminated upper surfaces and the shadowy under surfaces. To eliminate this the colors and tones used in the designs were varied in accordance to the amount of light striking the surface. A light and brilliant combination of colors, such as bright blue and white, were the two tones specified for the undersurfaces of the airplanes. The upper surfaces were painted with darker colors, such as deep blue and dark gray, that reflected less light than the under surfaces. The side surfaces, which received an intermediate amount of light, were painted in neutral shades of blue and gray. This blending of colors reflected a uniform amount of light so that lines by which an observer could determine the actual airplane silhouette were eliminated. Because of this the observer had only a confusing and misleading design arrangement to use as a basis for determining the shape and movement of the airplane.

Commander Carrier Division One (ComCarDiv One), based at NAS San Diego, was given the project of evaluating this paint scheme. Two Brewster F2A-2, two Northrop BT-1, two Vought SB2U-1 and two Douglas TBD-1 as well as a Vought O3U-3 from the Utility Unit were assigned to the project. Different camouflage schemes were applied with temporary nonspecular water-based paint. No identifying markings nor national aircraft insignia were carried on these Saratoga Air Group aircraft while operating from NAS North Island or the carrier.

Tests were conducted over several weeks and were evaluated by a Camouflage Board of experienced naval aviators. These tests included air-to-air combat under varying weather and lighting conditions, as well as drills with the anti-aircraft batteries aboard the Saratoga. In all tests camouflaged and uncamouflaged aircraft operated together. As was to be expected the garishly camouflaged aircraft showed up better than the noncamouflaged. However, the nonspecular painted aircraft did not reflect the sun as did the brightly painted fleet aircraft, and against dark backgrounds such as hills and water, the camouflage paint was not only less visible but was more difficult to range on. In air-to-air evaluations, the camouflage failed to provide any deception within the moderate to close range of 300 yards (274.32 m).

On the matter of the relative values of the colors and designs being tested, the board repeated the old story of

these values being dependent upon the background. At extreme ranges the colors disappeared and the aircraft was recognizable by its outline. The Barclay designs provided little concealment over mottled backgrounds because of the speed of the aircraft in relation to the background. Against a solid background, the camouflage aircraft tended to be easy to spot. If one color blended with the background it made the other stand out more.

The colors used were criticized also. Most were considered too dark or too light. The normal aluminized lacquer on the uncamouflaged control aircraft proved to be nearly the correct shade. The one universally accepted fact was that flat or nonspecular paint was essential regardless of the color. Other colors suggested for further evaluation were Gray, Silver Gray, Blue and Green.

The final observation of the board was that "pending the development of a camouflage design which gives optimum results, all naval aircraft assigned to military duties be painted a solid, nonreflecting light gray; the only contrasting colors to be employed being the national insignia and necessary lettering and identification numbers."

The board's recommendations were endorsed by ComCarDiv One and passed on to Commander Aircraft Battle Force (ComAirBatFor), Vice Admiral William F. Halsey Jr. As the test had shown that no one system was suitable under all conditions of light and background, Halsey believed that the best approach was to have a variety of schemes available, each being designed for a specific mission. Summing up his evaluation of the Barclay scheme he noted that the camouflage board's findings only bore out the experience with previous camouflage schemes. Which was that the navy needed to paint its aircraft in nonspecular paints to eliminate flashes and eliminate the bright colors that drew attention to aircraft in flight.

Commenting that "carrier aircraft and others operating over the water should be camouflaged fundamentally for concealment," He concurred with the findings of the board that the time had come to reduce the visibility of naval aircraft. Along these lines Halsey recommended:

1. the discontinuance of yellow on the upper surface of wings of carrier aircraft,
2. elimination of section markings, to be replaced by a small geometric shape visible only at close range,

Is it any wonder that these garishly painted aircraft showed up better than those finished in the normal scheme?



3. toning down the national aircraft insignia with mottled aluminum paint,
4. utilizing the war experience of the belligerents to determine the best size for squadron airplane numbers,
5. the discontinuance of colored tails to identify carrier air groups, suggesting the adoption of a small square, diamond, or other shape of the same colors as presently used to be painted on the vertical stabilizer,
6. discontinue the upper wing surface chevron or reducing it in size to be visible at 100 yards (274.32 m),
7. elimination of squadron insignia,
8. that all aircraft be finished in nonspecular aluminum corresponding to the shade of aluminum lacquer currently in use.

Based on all the camouflage tests, including the Barclay scheme, Halsey recommended camouflaging all carrier-based aircraft with nonspecular aluminum undersurfaces and nonspecular aluminum, mottled with dull Sea Green upper surfaces. Aircraft to be used in night operations should have the undersurfaces finished in nonspecular Black.

All of these recommendations were forwarded to Admiral James O. Richardson, Commander in Chief, U.S. Fleet (CinCUS). In addition to the basic color scheme he considered the problem of recognition and meritorious markings. The easy solution would be to abolish them all. However, he did not think this to be either desirable or necessary. The national aircraft insignia had to be retained. Squadron insignia and Gunner "E"s possessed a moral value, while the remaining markings possessed a tactical value and it was thought could not be abandoned without adversely affecting tactical efficiency.

Admiral Richardson's report to the Bureau of Aeronautics summarized the matters as follows:

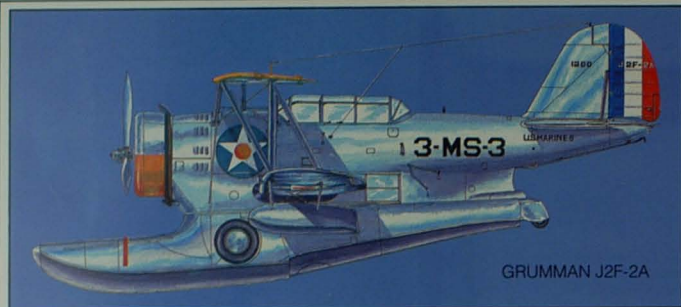
- (a) All paint used on aircraft should be non-specular and all aircraft parts and fittings should be dulled so as not to reflect light.
- (b) Painting should be uniform rather than composed of large areas of contrasting shapes and colors.
- (c) All ship-based aircraft should be painted light gray and all patrol planes should be painted the same except that surfaces seen from above should be blue gray. The

topside colors of all aircraft should be altered if future recommendation indicates the desirability.

(d) Squadron insignia and gunner E's may be retained but should be reduced in size to 3 inches (7.63 cm) maximum for squadron insignia and 3 inches (7.63 cm) for gunner E's. All other markings should be retained and, except for national insignia, should be no larger than necessary to serve their purpose within a range of five hundred yards (457.20 m).

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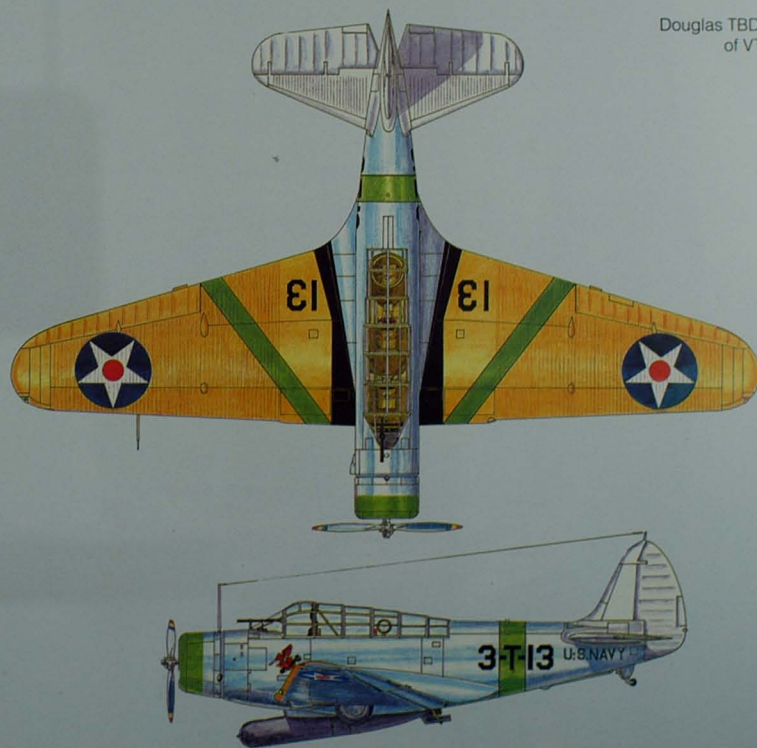
GRUMMAN J2F-2A



Opposite Top: Marine Scouting Squadron Three was the only Marine Corps squadron to participate in the neutrality patrol with the national aircraft insignia on the forward part of their aircraft as shown on the Grumman J2F-2A. Opposite Left Center: Martin PB2M Mars clearly shows the Orange Yellow being carried around the leading edge and aft on the under surface. Red warning stripes on the hull are to alert small boat crews of the propeller danger area. Opposite Right Center: These OS2Us of VO-3 assigned to the USS MISSISSIPPI (BB-41) are temporarily based ashore on wheels rather than the single float. Opposite Lower Left: A Naval Aircraft Factory N3N-3 primary trainer in Orange Yellow overall except for the gear struts. Opposite Lower Right: A Curtiss SNC-1, two-seat, advanced trainer, Orange Yellow was applied on the upper surface of both wings and their leading edge. Right: This Sikorsky JRS-1 of VJ-1 shows the black bottom of the wingtip floats and hull up to the normal load water line. Below: This TBD-1 of Torpedo Squadron Three (VT-3) shows the brilliant paint scheme for US Navy aircraft prior to December 1940.



Douglas TBD-1
of VT-3





Opposite Top: Note that on this PBY the Orange Yellow stops just above the leading edge of the wing on a structural joint. Opposite: Martin PBM-1 assigned to VP-56. The chevron and lower half of the cowls are White in accordance with the marking system about to be phased out. The Orange Yellow on the wing wraps around the leading edge except where deicer boots are installed. Above: A Lockheed R5O-3 assigned to the Chief of the Bureau of Aeronautics is identified by the dark blue tails and engine nacelles. Right: The Curtiss XSB2C-1 is a good example of the prewar paint scheme of Light Gray metal surfaces, Aluminum dope on fabric surfaces with Orange Yellow on the upper surface of the wings. Below: The flight line at NAS Miami in 1942 illustrates the variety of markings being applied to training and former combat aircraft by the Training Command.





Left: A Consolidated PBY-5, Catalina, being washed following a patrol over the Atlantic. Bottom: Squadron leader of Fighting Squadron Five (VF-5) flying a Grumman F3F-3. Note how the Orange Yellow of the upper wing is carried around the leading edge to eliminate any aerodynamic problem.

"Propeller tips should continue to be painted with warning colors, since these constitute an asset to safety and are not bright with the propeller in motion."

He also concurred with the proposal to deliver SBD-2 airplanes without markings, except the national aircraft insignia, since an amount of testing would have to be done to determine suitable sizes of markings. The final decision on the sizes should follow coordinated consideration by the Bureau of Aeronautics and Commander Aircraft Battle Force, which should be done as quickly as possible. The upper surfaces, however, should be light gray instead of dark green.

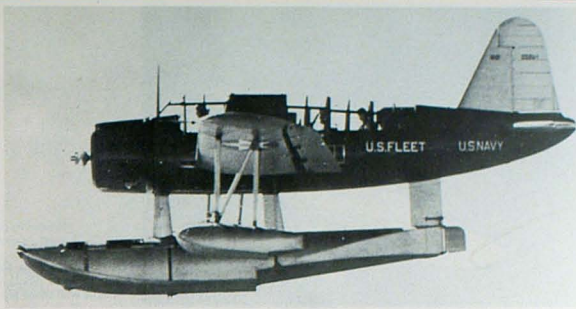
CinCUS requested that the policy outlined "above be followed, except where delay is caused thereby, in all future

deliveries of aircraft and that suitable paint be supplied for applying these policies to the painting of all aircraft now in service or delivered prior to application of the changes."

It is not known exactly what colors were used in these tests. However, this appears to be the basis for the three tone paint scheme which was adopted three years later and also the bases of the Keith Ferris' camouflage scheme of the 70s with a canopy painted on the under surface of the fuselage.

The Navy Aircraft Factory conducted camouflage tests using O3U and SU type aircraft painted in accordance with the December 19, instructions. The first report, dated February 12, 1940, concluded that the nonspecular dark green gave good day sea camouflage and was superior to both the dark gray and dark blue. Both the nonspecular

Right: Vought OS2U-1 with a dark blue fuselage assigned to the Commander, U.S. Fleet. Below: A quick local camouflage was used on aircraft of Patrol Wing Ten prior to its evacuation from the Philippines. The colors used can not be determined.



aluminum and pale blue used for the day sky camouflage gave the wings a translucent appearance, but did not add to concealment.

Additional tests were conducted to evaluate modified versions of the day sky camouflage. The results of these tests were reported to the Chief of the Bureau of Aeronautics on April 22, 1940. After trying various combinations of the recommended colors and locations for the division between sea and sky camouflage, it was determined that the nonspecular pale gray gave the best deception and translucency on the underside of the wings where the light did not cause direct reflection. It was also concluded that a darker shade of color would be required on the fuselage and tail surfaces since these were the surfaces where all the light was reflected. The dark green shades used for the

day sea camouflage would then be varied to meet local conditions. This paint scheme as applied to SU-1, Serial Number 9073, shown in the accompanying drawing.

The Commander Aircraft, Scouting Force on May 13, 1940, directed that any aircraft on which camouflage had been applied was prohibited from participating in the Neutrality Patrol.

As expected, reports received from the Patrol Wings confirmed the need for modifications of the colors used in the different locales. Opinions on the effectiveness of the camouflage used and its merits differed from unit to unit. For example, Patrol Squadron Eleven on June 4, 1940, reported that the sea camouflage was too green for the San Diego area. It was their belief that patrol planes that were to operate in the Pacific should be camouflaged with





Left: Vought SB2U-1 assigned to Scouting Squadron One (VS-1) in the overall Light Gray scheme with White Markings.

blue-gray rather than green-gray colors. Patrol Squadron Twelve, also based in San Diego, reporting during the same month, praised the nonspecular finish and commented that a camouflaged PBY was practically indiscernible at a distance of 5 miles (8.05 km), while the standard finished aircraft was easily seen. No comment was made about colors in this letter.

Two SOC aircraft from the USS MARYLAND were also camouflaged in accordance with the tentative camouflage directive. A report submitted on June 25, 1940, by Commander Battleships, Battle Force, cited the most important observations from units of the Battle Force on these aircraft. The comments varied from the statement that against a clear blue sky background the camouflaged aircraft were more clearly visible, to the observation from above with the sea as a background, that the camouflage was very effective. Once again it was shown that the greatest problem was in the sky camouflage since the aircraft still appeared as a black silhouette. The lack of reflection was commented on by practically all those reporting as the greatest factor in not being able to detect the aircraft.

Additional tests were conducted by VT-5 onboard the USS YORKTOWN using TBD-1 aircraft. Following the basic instructions in the tentative camouflage directives and the three colors recommended by the Naval Research Laboratory, three aircraft were painted as follows, with all vertical and underneath surfaces of nonspecular aluminum:

- Aircraft 1 — top surfaces solid dark green.
- Aircraft 2 — top surfaces dark green, slightly mottled with nonspecular aluminum.
- Aircraft 3 — top surfaces dark green, heavily mottled with nonspecular aluminum.

The red tails were lightly sprayed with nonspecular aluminum, which dulled the red yet still allowed identification at close range. U.S. NAVY and squadron identification on the fuselage were treated in the same manner. All other identification, including the national aircraft insignia, were covered with camouflage paint.



Left: SBDs, F4Fs, and TBDs in the overall Light Gray scheme aboard the USS SARATOGA (CV-3) being turned up prior to takeoff early in 1941.



Right: F2A Brewster Buffalo of Scouting Squadron 201 (VS-201). Below: The end of the colorful paint schemes is shown on the F2A-2 of VF-3. Squadron insignia such as the Felix the Cat were soon to be eliminated on aircraft.

During later tests the dark green was replaced with dark gray, which in turn was replaced by black. The variations between aircraft remained the same throughout the tests.

On July 6, 1940, Commander Aircraft, Battle Force, submitted his report on the tests conducted in the San Diego and Hawaiian areas. As in previous tests, it was reported that the nonspecular aluminum apparently did not represent any distinct advantage over the standard aluminum painting used on Naval aircraft. With either one the aircraft

was seen as a silhouette at any appreciable altitude.

When compared with other aircraft of the squadron, the sea camouflage reduced the visibility of the camouflaged aircraft as much as 80 percent over sea areas. Dark green provided the best concealment followed by dark gray and black, with slightly decreased effectiveness in that order. All reports stressed the absence of bright colors as one of the highest contributory causes to the low visibility of the aircraft.





Left: A Curtiss SBC-4 overall Light Gray was assigned to the Headquarters of the Second Marine Aircraft Wing (MAW-2). Below: This Douglas SBD-3 of Scouting Squadron 3 (VS-3) was painted Blue Green on top and sides and Light Gray on undersurfaces with the lettering in White as shown in this September 30, 1941 photo.

Commander Patrol Wing FOUR at NAS Seattle, Washington, reported on July 19, 1940, that while the standard dark green camouflage blended well with the local terrain a "blue steel" color had proved to be more effective under the normal conditions in that area.

As the war in Europe expanded, all US Naval aircraft converted from their colorful markings to wartime camouflage. On December 30, 1940, the Bureau of Aeronautics issued instructions to all commands concerning the camouflage of Fleet aircraft. All ship-based type aircraft, including those that might not actually be operated aboard ship, were to be painted nonspecular light gray. Patrol aircraft were to be painted the same light gray, except for surfaces that could be viewed from above, which were to be painted Blue Gray. The exact shade of Blue Gray was not specified. In fact no directive has ever been located that specifically identified this color. New aircraft were to be painted in this manner except in cases where delay in delivery might result. The nonspecular material supplied for these conversions was a lacquer base which could be applied directly over the metal finish or doped fabric.

Because joint operations were becoming more common, a compatible coloring across the Allied command was desirable. In the standardization process a set of colors was developed in late 1941. With just a few inevitable excep-

tions these colors were then used by all branches of the military in the US and Great Britain. Towards this end, on January 7, 1941, the color names True Blue, Lemon Yellow, and Willow Green were changed respectively to Light Blue, Light Yellow, and Light Green. The colors were not changed, just the names as they applied to the porcelain enamel masters then in effect. However, this does not necessarily mean that the Light Blue, Light Green, and Light Yellow colors mentioned in previous joint directives were the same shades referenced in this directive.

On February 26, 1941, the Bureau of Aeronautics expanded on the nonspecular painting instructions to include amphibian type aircraft not based aboard ship. These aircraft were to be painted the same as previously specified for patrol planes, which was nonspecular Light Gray, except for surfaces seen from above, which were to be painted nonspecular Blue Gray.

While the February 26, 1941, letter from the Bureau of Aeronautics directed that patrol aircraft were to be painted nonspecular Light Gray, except surfaces seen from above, it did not specify where the dividing line was to be. To standardize the painting of all PBV and PB2Y-2S, Commander Aircraft, Scouting Force, Pacific Fleet, issued instructions on May 7, 1941, that the dividing line should be



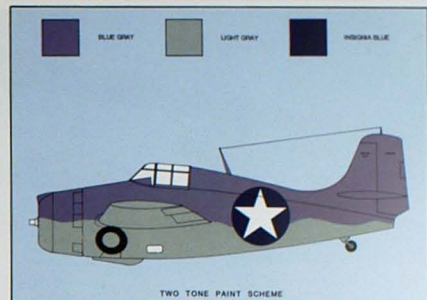
thechine. This required the under portion of the hull after-section to be painted Blue Gray.

The Fleet Aircraft Tactical Unit was instructed to conduct tests on a temporary night camouflage paint for use on Naval aircraft. Several paints were tested with the criteria being ease of removal and that there be no effect on the permanent finish or camouflage effectiveness. A report submitted on June 30, 1941, indicated that none of the paints tested satisfactorily fulfilled the first two requirements. Also, the paints finally adopted had to be nonspecular and the entire aircraft, not just the lower surfaces, had to be painted in such a manner as to eliminate any reflection from searchlight beams or moonlight.

There have been numerous references to Navy aircraft being painted green. A diligent search has failed to locate any official correspondence to substantiate this. With all the various colors that were being tried it is possible that there were some aircraft that had been painted green. One piece of corroborating documentation has been found in one of the broken Japanese messages sent from the Philippine area. A diplomatic message dated August 2, 1941, stated, "...I have heard that among the naval planes there are those which have been observed to be painted a light green. Though I am making additional secret investigations that is all for the time being."

The Blue Gray painting instructions were further modified on August 20, 1941, when Commander Aircraft, Battle Force, directed that all carrier-based aircraft in Aircraft, Battle Force, be painted nonspecular Light Gray except for those surfaces seen from above, which were to be painted nonspecular Blue Gray. A definite line of demarcation between the Light Gray under surface and Blue Gray upper surface was to be avoided by feathering in the two colors. Aircraft such as the TBD-1, which had wings that folded so as to expose the undersurfaces to visibility from above, were to have those surfaces painted Blue Gray. These instructions covering the Blue Gray and Light Gray color scheme were further expanded on October 13, 1941, to include all fleet aircraft. The Bureau of Aeronautics on December 26, 1941, ordered the color scheme to be used on all shore-based aircraft except training models assigned to training centers and reserve bases.

In order to eliminate any confusion over the numerous instructions relating to the Blue Gray paint scheme, the Bureau of Aeronautics issued a consolidated directive on



Above: Aircraft received from the Army could retain their original paint scheme at the discretion of the commanding officer if the repainting would cause an excessive increase to the workload.



Left: A Hall PH-3 operated by the Coast Guard showing the two tone paint scheme applied to one of the few biplanes to be so painted.

February 6, 1942, which canceled all previous directives and clarified policy. All fleet- and shore-based aircraft would be painted in the two-tone camouflage scheme of Blue Gray and Light Gray. Primary and advanced training aircraft assigned to or intended for assignment to training centers or reserve bases would be painted in accordance with SR-15d, *Specification for the Protection of Naval Aircraft and Aircraft Parts* which was in the process of being issued. Obsolete aircraft and then current combat types used for training purposes could be painted either in the standard or nonspecular finish with camouflage markings at the discretion of the Commanding Officer of the station to which they were assigned.

Because the mission of the Training Command was so different from that of the Fleet Squadrons, it was only logical to continue the practice of painting such aircraft in accordance to instructions peculiar to the training requirements. NAS Pensacola, Local Process Specification No. 8-42, dated March 12, 1942, specified that all aircraft operating from Pensacola and outlying fields would be

painted in accordance with the Bureau of Aeronautics letter dated February 6, 1942. Special painting as authorized by this letter was to be applied to aircraft in the various squadrons as follows:

- VN1D8 — Overall Orange Yellow.
- VN2D8 — Two-tone camouflage.
- VN3D8 — Upper surface of wing(s) glossy Orange Yellow. Remainder of aircraft glossy Aircraft Gray.
- VN4D8 — PBV-1s and newer models two-tone camouflage. Obsolete types remain in old paint scheme.
- VN5D8 — Primary seaplanes overall Orange Yellow, except floats which were glossy Aircraft Gray. OS2Us two-tone camouflage.

Transport and VM Unit — two-tone camouflage.

SR-15d was issued March 26, 1942, with an effective date of April 24, 1942, and specified the painting of Primary Training, Advanced Training and Utility aircraft.



Left: Grumman TBF in the two tone paint scheme of Blue Gray and Light Gray between May 1942 and January 1943.



Right: The underside of this Grumman TBF shows the Sea Blue carried over the leading edge of the wing to insure that no white is visible from above. Below: A Vought SB2U-2 of Scouting Squadron 9 (VS-9) in the two tone scheme about to catch the arresting cable aboard a carrier in October 1942. Note the fiddle bridge in the foreground to raise the cable off the deck to assist the aircraft's tail hook to catch the arresting cable.

Primary Training aircraft were to be painted overall glossy Orange Yellow, except the landing gear or floats which were to be finished glossy Aircraft Gray.

Advanced Training aircraft were to have the upper surface of the wing and aileron (upper wing and ailerons only in case of biplanes) finished glossy Orange Yellow. This color was to extend around the leading edge of the wing and extend aft on the lower surface approximately five percent of the chord, with the colors to be blended in such a manner as not to form a ridge or other aerodynamic protrusion. The remaining external surfaces were to be painted glossy Aircraft Gray.

Utility types, unless otherwise specified, were to be finished similar to service types in the two tone scheme.

Cockpits of service aircraft, other than flying boats, were to be finished in a dull dark green to match the Army-Navy Color Standard. Generally, other personnel spaces were to be finished in semigloss pastel green or blue. No exact shades were specified, but were subject to approval of the Bureau of Aeronautics in each case. Cargo space and all

structural spaces were to be finished either with tinted Zinc Chromate primer, or similar to other interior spaces at the discretion of the inspector at the manufacturer's facility. Tinted Zinc Chromate primer varied in color from yellow to dark green.

The question of camouflaging lighter-than-air aircraft had been under investigation since 1933. On July 27, 1942, a report was submitted by the Naval Research Laboratory concerning a matte Blue Gray paint identified as Blimp Blue. Two L Class airships, one blue and the other the standard aluminum finish, had been flown together and observed end on and broadside at selected ranges.

U.S. MARINES

U.S. NAVY
TYPICAL SERVICE BRANCH LETTERING

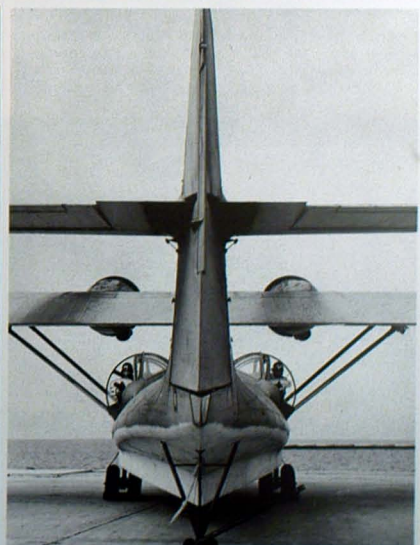
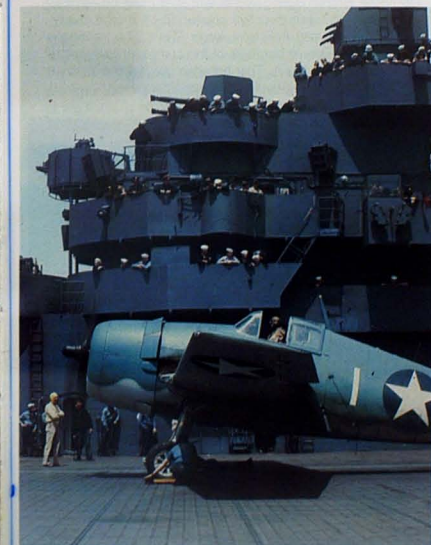




Right: An early production Vought F4U-1 Corsair photographed during the summer of 1942. Note that this aircraft has the older braced canopy which was later replaced with a blown hood and higher seat for improved forward visibility. Below: A Consolidated PBV-5 at NAS Pensacola in 1943. While this airplane is painted in the basic camouflage, as used in the Fleet, the upper wing surface has been painted Orange Yellow for better visibility in the event of a forced landing during a training flight. This was not an uncommon practice in the Training Command. Bottom Left: A VF-5 Grumman F6F-3 prior to launch from the deck of the USS YORKTOWN (CV-10) in May 1943. Bottom Right: This stern view of a PBV-5 illustrates the uneven line dividing the White and Intermediate Blue and how White was not to be applied above a point where it could be seen from above.



Top: A good example of how the two tone paint scheme faded under the tropical sun. Note the unpainted patches on the fin and roughly applied aircraft number on this Henderson Field, Guadalcanal, based Marine Corps SBD. Middle Left: Vought OS2Us in two tone paint scheme with Red and White striped tails and national aircraft insignia in all six locations. Above: These OS2U-2s at NAS Corpus Christi, Texas, in June 1942, are painted in the two tone scheme but the wings have an Orange Yellow upper surface. Left: Grumman F4F-4P aboard the USS RANGER (CV-4) during the invasion of North Africa. Note that most of the landing gear is painted with Interior Green used on internal structural components while the wheel wells and oleo are painted White to blend with adjacent surfaces.





Left: Vought F4U-1D Corsair in three tone camouflage. The centerline fuel tank is painted in two colors in an attempt to conform to the basic camouflage. A definite color is apparent in this photo from the Sea Blue of the upper fuselage and the Insignia Blue of the national aircraft insignia. Bottom: A new Grumman F6F-3, Hellcat, shown over Long Island, New York during the summer of 1943. The new national insignia, shown on this Hellcat, was in force barely three months before it was changed.

Depending on the lighting conditions and angle to the viewer, sometimes one and sometimes the other would be the most visible. The reduction in visibility achieved by the blue paint, under certain conditions, appeared to be due largely to it being a matte finish rather than because of its color. As a result of these tests camouflage was not applied to lighter-than-air aircraft.

Patrol squadrons operating in the North Atlantic found that under hazy conditions the standard two-tone camouflage was not satisfactory for their operations against submarines. It was requested by Commander Patrol Wings Atlantic that Patrol Wing SEVEN operating in the Newfoundland/Greenland/Iceland area be authorized to paint their aircraft overall glossy White. This request was approved on September 13, 1942.

Commander in Chief, United States Fleet letter FF1/F39-5, dated October 30, 1942, specified the Blue Gray color on the upper surfaces of Naval aircraft to be Munsell color 5.5PB 2.6/3.3. It has not been determined if this is actually

the color that was applied. It is believed that it was an interim color under consideration.

On December 21, 1942, the Chief of the Bureau of Aeronautics sent a letter to the Manager, Naval Aircraft Factory, concerning the proper shade of Zinc Chromate to use. It had been agreed by the Army Air Force to adopt the Navy cockpit green as the standard color for tinted Zinc Chromate primer. It was also agreed to change the name of this color to Interior Green.

SR-2C, *Specification for Exterior Colors, Insignia and Marking of Naval Aircraft* dated January 5, 1943, directed that aircraft be painted with the new basic camouflage scheme. This was the most elaborate camouflage used on US Naval aircraft during World War II. It must be remembered that the basic directive applied to all aircraft, everything from a small F4F to a large PB4Y. The variations used were extensive because of the complexities involved in properly applying it. This scheme utilized the general principle of Counter-Shading/Counter-Shadowing.



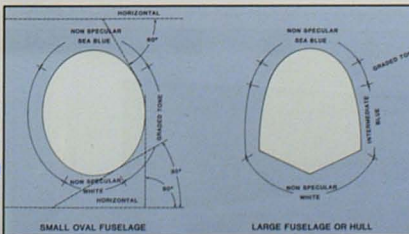
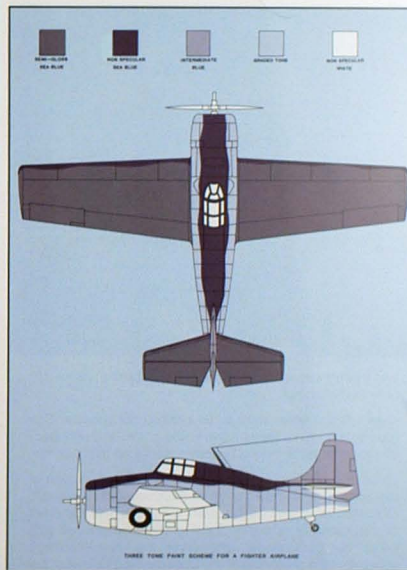
Right: A Vought OS2U-3, Kingfisher, shown in standard three-color camouflage.



When a round object is seen from the side with the light coming from above (the most common way of seeing an aircraft), the shaded bottom blends gradually into the lighter upper portion. Counter-Shading is accomplished by painting this object dark at the top and light at the bottom and then gradually blending the two together. The rounded surface appears to have lost its form and is a flat medium gray when lighted from above.

The effect of the shadows cast by the horizontal airfoils on the fuselage can be minimized by lightening the color of the areas where these shadows normally fell. This is the principle of Counter-Shadowing.

This camouflage scheme required the use of semigloss Sea Blue, nonspecular Sea Blue, Intermediate Blue and nonspecular Insignia White. All horizontal airfoil surfaces seen from above were finished in semigloss Sea Blue. The slight shine of these surfaces tended to match the changing shine of the sea. Care had to be taken not to apply this semigloss to the rounded surfaces of the fuselage, the hull, or the leading edges of airfoils where it would cause glare. Nonspecular Sea Blue was applied over the top portion of the fuselage and around the leading edge of the airfoils extending approximately 5 percent aft on the top surface. All horizontal airfoil surfaces viewed from below were painted nonspecular Insignia White. Aircraft with wings that folded so as to expose the lower surfaces to visibility from above had these surfaces finished in Intermediate Blue. Vertical surfaces of the fin and rudder assembly were finished with Intermediate Blue. The sides of the fuselage were graduated from the nonspecular Sea Blue at the top to the nonspecular Insignia White at the bottom so that



there was no noticeable line of demarcation between the colors. The tone on these curved surfaces where they approached the vertical was approximately Intermediate Blue. Care had to be taken not to let the white move up the side beyond a line the tangent of which was 30° from the horizontal because of glare. Engine nacelles were treated the same as the fuselage.

Areas of the fuselage normally in the shadows cast by the horizontal airfoils were Counter-Shadowed with nonspecular Insignia White at the airfoil root which was gradually darkened in tone until the color was the same as the adjacent fuselage area. In no case could pure nonspecular Insignia White extend beyond lines tangent to the leading



Left: Curtiss SB2C-3 Helldiver in the three-tone paint scheme. Note the transition from Sea Blue—Intermediate Blue—Insignia White on the forward fuselage. Middle Left: This Grumman F6F shows how an airplane, viewed from below, should appear to be White with the edges shading into Intermediate Blue. Middle Right: Curtiss SB2C carries a large identification number on the cowl which is only a sequential number not a unit identification number.



and trailing edges of the airfoil at its root which, were 15° from the horizontal.

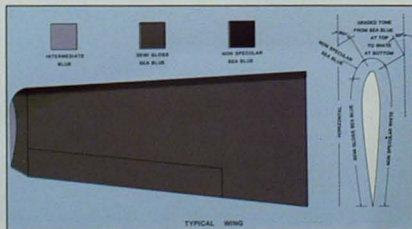
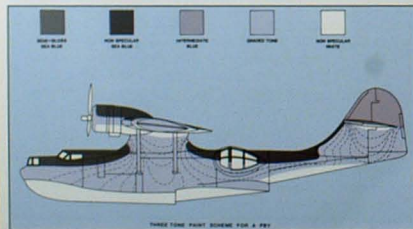
Camouflaged floats were to be painted nonspecular Sea Blue on the top surfaces down to the chine, and nonspecular Insignia White on the bottom surfaces up to the chine.

This basic scheme could be modified at the discretion of the Force Commander for other than ship-based aircraft. Obsolete aircraft, then current combat types and other aircraft used for operation training could be painted with either the camouflage scheme or the noncamouflage scheme at the discretion of the Commanding Officer of the



station to which these aircraft were assigned.

The basic noncamouflage scheme of glossy Orange Yellow on the upper surface of the wings, extending around the leading edge and back on the under surface approximately five percent of the chord, with the remainder of the aircraft painted glossy Aircraft Gray, remained in effect. Retractable landing gear, either wheel or float, was painted to match adjacent surfaces when retracted. Fixed landing gear, either wheel or float, was painted glossy Aircraft Gray or Orange Yellow to match the remainder of the aircraft. Noncamouflaged float struts were painted to match the floats.



Right: This Vought F4U-1D clearly shows the Intermediate Blue tail color. The necessity of walking on the painted wing surface soon wore the paint off, as can be seen on this training squadron aircraft. A practice bomb rack for miniature bombs is carried on the fuselage center station.

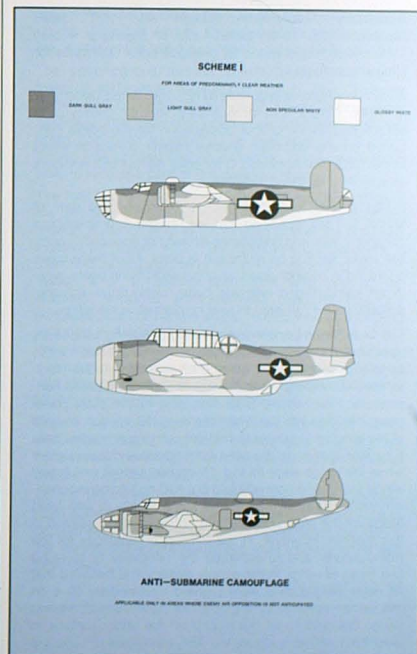
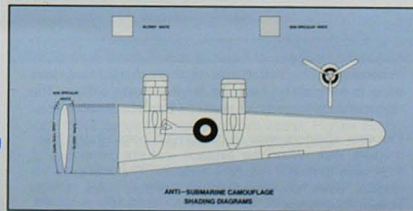


A Bureau of Aeronautics letter dated January 30, 1943, made the following colors obsolete: Dark Blue, Blue Gray, and Light Gray. This is the only reference that has been found which indicates the termination of special staff aircraft painting. It also left the decision of whether or not to repaint training aircraft received in the Army Air Force colors up to the Commanding Officer of the unit receiving them.

Investigation and testing of camouflage schemes for aircraft involved in antisubmarine operations showed that the standard three-tone camouflage scheme was not suitable. On July 19, 1943, Commander Aircraft, Atlantic (COMAIR-LANT), sent a message to all aircraft units under his control specifying two new antisubmarine warfare paint schemes.

Scheme I was for use in areas where the prevailing weather was clear or clear with broken clouds. This, in general, meant the southern United States seaboard, the Gulf, Caribbean and South American areas. The topside was to be painted nonspecular Dark Gull Gray. The sides were to be painted nonspecular Light Gull Gray, while the bottom was painted glossy Insignia White. The leading edges of airfoils, engine cowl openings, reduction gear housing, inside of the engine nose cowl ring, propeller hub and propeller blades out to the diameter of the cowl ring were to be painted nonspecular White. As was done in the three-tone scheme, areas of the fuselage, hull and engine nacelles that were under horizontal airfoils were to be whitened to lighten the shadow areas.

Scheme II was for use in areas where the prevailing weather was overcast or heavily clouded. This, in general, meant the middle and northern United States seaboard and the North Atlantic areas. In this scheme the topside was to be nonspecular Gray. The sides were to be nonspecular White and the bottom glossy Insignia White. All other areas



to be as described in Scheme I. In both schemes there was to be no hard line or abrupt change in tone.

This message authorized all Fleet Air Wings (new title for Patrol Wings) and Commanding Officers of escort carriers to paint aircraft under their command depending on their geographic location. However, this authority was granted for aircraft employed in antisubmarine operations only when attack by enemy aircraft was not probable.



Left: Curtiss SO3C-3 on wheels with the under surface of the folding wings painted Blue instead of white. No attempt has been made to blend the colors at the wing hinge line.

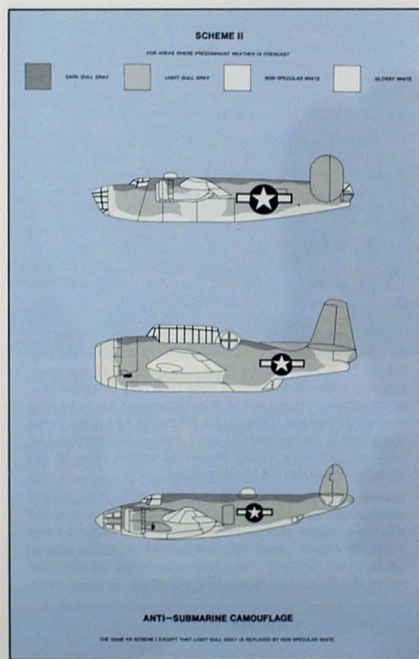
Army-Navy Aeronautical Bulletin No. 157, dated September 28, 1943, *Colors: List of Standard Aircraft Camouflage*, superseded all previous color standards for Navy camouflage colors.

Army-Navy Aeronautical Bulletin No. 166, dated December 4, 1943, *Colors: List of Standard Aircraft Glossy*, was established as the official designation for the colors contained on the porcelain enamel master panels in effect since 1933. See Appendix G for color names and numbers as specified by these bulletins.

SR-2d, dated December 1943, with an effective date of March 5, 1944, specified that land-based and amphibian transport, utility and ambulance aircraft not operated in combat areas, were to be aluminum in color. All of these types operating in combat areas, plus transport flying boats, were to be camouflaged with the basic camouflage scheme. Ambulance aircraft were to bear no distinctive markings.

The instructions concerning painting of folding wings was specified in more detail. Aircraft having wings that fold so as to expose the under surface to view from above, such as the F4U, were to have the visible surfaces painted non-specular Intermediate Blue. The Blue of the outer panel being blended into the White of the center section inboard of the wing fold in order to prevent carrying any white onto a surface that could be seen from above and cause glare when the wings were folded. Of course aircraft which had wings that would normally fold but had no folding mechanism installed, as in the case of some FGs built with fixed wings for the Marine Corps, did not have to be painted in this manner. However, in the interest of simplicity for the manufacturer and to eliminate the necessity of stocking two types of wings in the supply system, it is believed that all outer wing panels were painted Intermediate Blue on the under surface by the manufacturer. Aircraft having wings that fold so as not to expose the under surface to view from above, such as the TBF, continued to have the entire under surface painted white.

Camouflaged floats were now to be painted Intermediate Blue on top surfaces down to the chine. Nonspecular White was to be used on bottom surfaces up to the chine, except on those portions that extended beyond the wings or fuselage and were consequently visible from above. This exposed portion of the float was to be painted nonspecular Sea Blue. Noncamouflaged floats could now be painted Aluminum, Aircraft Gray or Orange Yellow

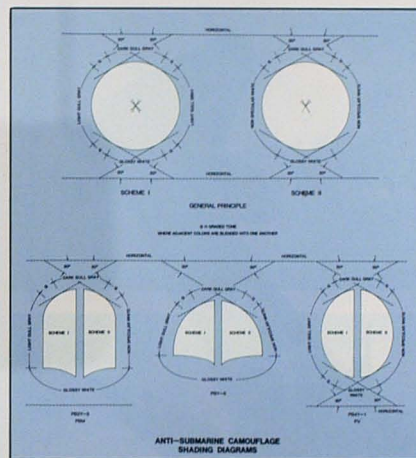


depending on the aircraft mission. Camouflaged float struts were to be painted nonspecular Intermediate Blue. The upper ends of large struts could be Counter-Shadowed.

Propeller spinners were to be painted nonspecular Intermediate Blue. When the airplane was not camouflaged, they were to match adjacent surfaces. The interior of the engine cowl on camouflaged aircraft was to be nonspecular Black.



Right: General Motors TBM-1C clearly shows the Counter-Shadowing to help eliminate the shadow caused by the horizontal stabilizer and the wing. Note the treatment of the radar fairing on the wing as though it was an engine nacelle. This aircraft is assigned to NAS Patuxent River for technical testing.



The basic noncamouflage paint scheme was now an overall aluminum color.

UHF and VHF rod-type antennas could be painted in Orange Yellow at the discretion of the Commanding Officer. Other types of antennas were to be finished in accordance with the camouflage scheme of adjacent parts of the airplane.

Amendment 1, to SR-2d, dated March 13, 1944, made numerous changes to the basic instructions. Aircraft painted in the standard three-tone camouflage were now to be overall glossy finish. Wherever semigloss or nonspecular paint had been specified in the basic instructions, these same colors were to be glossy. This change to the glossy finish was made to improve the aerodynamic characteristics as well as make upkeep easier. Fighter aircraft were now to be painted overall glossy Sea Blue.

While there are numerous records that document the official exterior painting requirements in detail, the painting of the interior is difficult to document with the vague wording of

SR-15. With this in mind, I have written the following based on the Grumman Aircraft Engineering Corporation Report No. 2040B on the TBF-1 and TBM-1, dated March 15, 1944.

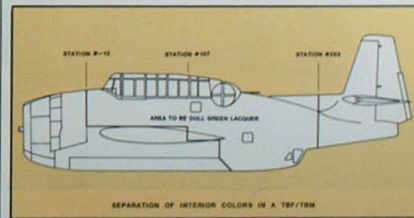
The specifications for the TBM-1 required all interior fuselage surfaces to receive one coat of Zinc Chromate primer and one coat of dull green primer during detail assembly. After assembly, when all abraded and scratched areas had been touched up, a final coat of dull green primer was applied overall, exception those areas which were to receive a coat of dull green lacquer.

The fore and aft cockpits are identified as that portion of the airplane interior extending from the aft side of the firewall at Station #12 to the forward side of the bulkhead located at Station #107. The bomber's compartment is identified as that portion of the interior extending aft from Station #107 to Station #263. This area and all the brackets, supports, reinforcements used for structural purposes, control handle shafts, containers, and flooring included in the section were to have a final coat of dull green lacquer. The metal interior of the canopy, windshield, gun turret, pilot and gunner seats were also to be finished with dull green lacquer. The instrument panels were to have two finish coats of black enamel.

Interior surfaces such as bellcranks, push-pull tubes, removable fittings, and other components that received considerable handling in service were to receive two final coats of nonspecular Light Gray.

On the TBM-1 the interior of the engine cowl and forward surface of the firewall and engine structures were to be finished with dull green primer. However, on the TBF-1, the firewall and engine structures were to be finished with Light Gray.

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Left: Goodyear FG-1 Corsair showing the blending of glossy and nonspecular Sea Blue with the White at the leading edge of the stub wing. Nonspecular Blue covers the entire outboard section of the under wing surface. **Below:** The interior of the dive flaps was painted Insignia Red as a warning to ground crews working around the aircraft while the flaps were being operated.

Right: A typical interpretation of the three tone painting instructions. The Intermediate Blue vertical surfaces are clearly evident on this Canadian Car and Foundry Ltd. SBW-3 on a training flight.



Below: On multiengine airplanes, such as the Marine Corps PB-1s, the engine nacelles were treated the same as the fuselage. The forward portion of the radar fairing was a plastic composition and left in its natural finish. **Middle Right:** A Curtiss SO3C Seamew aboard the light cruiser USS DENVER (CL-58) in January 1943. The turned up wing tips were an unusual feature on this aircraft. Note that in this case the turned up tips were painted White as are the front of the wing floats. Note the hook on the forward bottom of the float to engage a net used in underway recovery of the airplane. **Bottom Left:** A Martin JM-1, Marauder, being used for target towing in its overall Orange Yellow scheme. The red target sleeve is shown being stretched out. This photograph was taken in December 1943 at NAS Norfolk. **Bottom Right:** The Pratt & Read LNE-1 primary training glider used in the short-lived Marine Corps glider program.





Left: Consolidated PB4Y-1 over the English coast in ASW Scheme II during July/August 1943.
 Middle Left: Airplanes such as this Avenger with a large rather straight sided fuselage were predominately Intermediate Blue.
 Middle Right: While the break between the Blue and White follows the same basic pattern, each airplane is slightly different because of the freehand painting used. The inconsistency of the colors used for aircraft identification numbers is interesting. Bottom: The dark fuselage side in line with the wing, on these Douglas SBD-5s, does not conform to either ASW Scheme I or II.



Right: A Martin JM-1 Marauder being used to tow a gunnery target is being rigged for target towing duties in December 1943. Below: A Curtiss SB2C Helldiver of Bombing Squadron 8 (VB-8) in December 1943. The general light appearance from the front in the three-tone camouflage is readily apparent in this view. Bottom: A Consolidated PB4Y-1 over the English countryside en route to the Bay of Biscay patrol July/August 1943, painted in the ASW Scheme II. The codes B-3 and C are unknown.





Left: Martin PBM-3 Mariner over Rio de Janeiro December 1943, painted in the ASW Scheme I. Note how much darker the White appears in the national aircraft insignia than the Light Gray of the fuselage. Bottom: Martin PBM-3 Mariners at NAS Norfolk, circa 1944-45. It should be noted that those airplanes painted in the White ASW scheme are Blue Gray on all surfaces viewed from above.

Concluding these detailed instructions, the directive states that other personnel spaces were to be finished in pastel green lacquer providing a semigloss light or pastel green finish as required by SR-15c. However, it doesn't say where the personnel space being referred to is, since all such spaces had already been finished in dull green.

The color name Insignia Red was changed to Bright Red on March 24, 1944, with the publication of *Army-Navy Aeronautical Bulletin No. 157a*. It also listed the nearest equivalent color in the current system to the colors which had been superseded.

In the early days of Naval aviation pigmented dopes were considered to be inferior to enamel because they lacked the necessary covering quality, were difficult to brush out, and did not have as much taunting ability as clear dope. Therefore, it was not authorized for use on Naval aircraft. All finished coats were to be enamel. Gradually this changed through the years until SR-70d, Navy

Aeronautical Specification for Application of Protective Coatings to Fabric Surfaces of Aircraft, Amendment 3, dated April 15, 1944, which stated that "under no circumstances will enamel be used as the top coat in lieu of pigmented dope."

SR-2e, dated June 26, 1944, with an effective date of October 7, 1944, spelled out for the first time the color schemes for use on all types of aircraft. All carrier-based aircraft were now to be painted glossy Sea Blue overall. No mention was made for similar shore-based aircraft. Because of this, many combat-type aircraft continued to carry the basic nonspecular camouflage scheme throughout the war. This was a more common practice with the dive and torpedo bombers than with fighter aircraft which had been specifically mentioned in an earlier directive.

Only three months after being put into effect, the basic three-tone nonspecular camouflage scheme was again changed. It reverted to the semigloss and nonspecular



Right: A General Motors FM-2 Wildcat being catapulted from a CVE in the Atlantic on an Antisubmarine Warfare mission during WW II. Note the predominant white areas in this ASW paint scheme. Bottom: A General Motors FM-2 Wildcat in the basic camouflage board the USS CHARGER (CVE-30) in May 1944.



style originally specified, except that the semigloss Sea Blue on the upper surface of the wings was carried around the leading edge and extended back on the under surface approximately five percent of the chord where it was then blended with the nonspecular White. Nonspecular Sea Blue shading was used on the leading edge. Droppable fuel tanks were painted to match adjacent surfaces of the aircraft.

Aircraft with wings that fold up, as in the case of the F4U, were to be painted Intermediate Blue on the undersurface, as before. However, aircraft with wings that folded against the fuselage, like the F6F and TBF/TBM, with the under-surface inboard were to have the under surface painted nonspecular White.

Patrol, Patrol Bombing and Observation aircraft, whether landplane, seaplane or amphibian remained in the basic nonspecular scheme.

Aircraft assigned to antisubmarine warfare were to be painted in the ASW Gray and White schemes. Scheme II was modified to be the same as Scheme I with the excep-

tion of the Light Gull Gray which was replaced by nonspecular White.

Land Transport aircraft, designed as such, were to be aluminum. Landplanes of other types which had been converted to transports could be finished aluminum.

Seaplane Transports, designed as such, were to be overall glossy Sea Blue. Seaplanes of other types which had been converted to transports could be finished overall glossy Sea Blue.

Landplanes and amphibians in the Utility class were to be aluminum. Utility seaplanes on the other hand were overall glossy Sea Blue.

Target Towing and Primary Trainers were Orange Yellow. Advanced landplane trainers were aluminum. Advanced seaplane trainers were overall glossy Sea Blue. Combat-type aircraft, both landplane and seaplane, used for training purposes, were to be finished in accordance with their type. Target drones were painted glossy Insignia Red.

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Left: ASW Scheme II applied to a Wildcat aboard a CVE. Middle Left: Lockheed PV-1 painted in the ASW Scheme II. Middle Right: As can be seen on the PB4Y-1 the Dark Gull Gray was applied to a very small portion of the fuselage top. Bottom: This SB2C well illustrates the gradual change on the forward fuselage from Insignia White to Intermediate Blue. The outer wing panels are nonspecular Sea Blue because they fold up over the fuselage.



Right: A Lockheed PV-1 Marine Corps night fighter at Bougainville, Solomon Islands. "Eight Ball" is an individual aircraft marking, not a squadron insignia. The three crew member names on the nose under "In Memory" is unusual. Middle Left: A typical Douglas R4D procured under Army contract and painted Olive Drab above and neutral Gray beneath. Middle Right: A Curtiss R5C-1 painted in the Olive Drab and neutral Gray camouflage scheme. Both of these transports were painted in accordance with the same directives. Bottom: Overall Sea Blue Curtiss SB2C-1As of VMSB-454 in June 1944. Note that there is no unit designation, only a sequential number for all airplanes within Marine Aircraft Group 41.





Left: A Consolidated PB4Y-2, in August 1942, with the three tone camouflage showing the engine nacelles painted in the same manner as the fuselage. The White on the fuselage produces Counter-Shadowing. D67 code is unknown. **Middle Left:** Note how the under portion of the engine nacelle on this PBJ-1J is painted to blend with the under wing surface and provide Counter-Shadowing. **Middle Right:** A Piper AE-1 obtained from the Army in New Guinea and operated for a short period by the US Marine Corps. USMC was applied to the tail but all other painting and markings including the aircraft serial number remained Army markings. **Bottom:** Goodyear FG-1D painted overall Sea Blue with no markings other than those assigned by the pool.



Right: A North American SNJ-3 trainer in the Sea Blue painted scheme not yet assigned to a unit. **Middle Left:** A Grumman F6F-5N painted Sea Blue. The White landing gear fairings appear to have been used at NAS Quonset Point to provide better visibility to the ground crew when directing the aircraft into the flight line at night. This much White is unusual for a night fighter. Note the distortion in the national aircraft insignia where it is painted over the radar fairing. **Middle Right:** A North American SNJ trainer with natural metal finish except for the anti-glare panel in front of the pilot. **Bottom:** A Martin JM-1 painted overall Orange Yellow for use in towing targets. These airplanes were also used as high speed transports in forward areas and made an unusual sight in their bright colors.





Left: Sikorsky HNS-1 aboard the USS ANTETAM (CV-36) in May 1945. These aircraft were obtained from the Army and retained the Army camouflage painting. Bottom: Navy type markings were applied to these OY-1 which remained in the Army camouflage at Okinawa in 1945.

Helicopters were mentioned for the first time in the directive and were to be finished in the basic nonspecular camouflage. There were no additional instructions to explain how to paint these peculiarly configured aircraft.

Nonspecular Sea Blue was required in the areas necessary to protect the pilot's eyes from sun glare on all aircraft painted glossy Sea Blue or aluminum.

Propeller spinners were once again to be painted nonspecular Intermediate Blue, or when the airplane was noncamouflaged, to match adjacent surfaces.

SR-15e, with an effective date of October 10, 1944, expanded the instructions for interior finishes. Interior surfaces of the cockpit above the level of the bottom of the instrument panel were to be painted Instrument Black. Interior surfaces below this line were to be painted with the standard Interior Green.

Personnel spaces, other than cockpits, were to be painted Interior Green. This could be modified upon Bureau of Aeronautics approval for special color schemes for personnel spaces on large transports.

The baggage compartment interior, bomb bays and structural spaces on which more than one coat of Zinc Chromate was applied were to have the second and any subsequent coats tinted with ten liquid ounces of black enamel, plus four ounces of aluminum pigment paste added to each gallon of Zinc Chromate. The color resulting from this mixture varied and was not required to match any color standard.

Amendment No. 1, to SR-2e, dated December 30, 1944, modified the painting of land-based Patrol and Patrol Bombing aircraft. These aircraft were now to be painted so that the upper and lower surfaces of the wings and all horizontal tail surfaces were semigloss Sea Blue. All other tail surfaces and the entire fuselage were to be painted

Right: Consolidated PB4Y-2 Privateer in the basic three tone scheme. The significance of X51 is undetermined. Middle Left: This OY-1 operated with the 5th Marine Division at Sasabo, Japan in October 1945. It is an unusual combination of markings. The basic paint scheme is Army. The normal Navy markings appear on the tail while U.S. ARMY MODEL L-5E-1VW AND AIR FORCE SERIAL NUMBER 44017659 are still displayed below the windshield. Middle Right: A Douglas SBD-5 was used as a weather plane in April 1945 with a bare metal finish and Aluminum doped fabric surfaces. Bottom: The Consolidated RV-3 transport assigned to the Commandant of the Marine Corps as a staff transport. This bare metal finished aircraft is shown as it looked in May 1946, at MCAS Miramar, California.





Left: A Grumman F7F-2D, Tigercat, of VU-4 which served as a drone controller. The drone pilot sat in the second seat to fly the drone F6F-5K (see p. 57 top).

nonspecular Sea Blue, Patrol and Patrol Bombing seaplanes and amphibians remained in the basic nonspecular camouflage.

Amendment 2, with an effective date of March 10, 1945, required that propeller hubs and domes be painted nonspecular Black, except for the Antisubmarine Warfare Camouflage scheme, in which case the hubs and domes were to be nonspecular White.

Amendment 4, with an effective date of May 6, 1946, changed the color scheme for Target Towing aircraft, making them the most colorful Naval aircraft since December 1940.

After the end of the war the emphasis was placed on safety rather than on concealment. To this end instructions were issued for the high visibility painting of target towing aircraft.

Single-engine aircraft regularly assigned this mission were to have the top and bottom of all airfoils painted glossy Orange Yellow. Included were wings, vertical fin, horizontal stabilizer and elevators. The fuselage and cowlings, as well as a wing walkway on both sides of the fuselage extending 18 inches (45.72 cm) outboard on topside of the wings only was to be glossy Sea Blue. The rudder and 36 inch (91.44 cm) wide bands around the wings were to be glossy Insignia Red. These bands were to be parallel to the thrust line at one-third the distance outboard from the fuselage to wing tip. Multi-engine aircraft regularly assigned this mission were to have the top and bottom of all airfoil sections of the wings, vertical fin, horizontal stabilizer and elevators painted glossy Orange Yellow. The fuselage, engine nacelles and cowlings, except those portions included within topside of the wing platform, were to be glossy Sea Blue. Wing walkways on both sides of the



Among the most colorful aircraft of the period was the Douglas JD-1 configured as a target towing aircraft.



Right: A Naval Aircraft Factory N3N-3 in overall Orange Yellow paint scheme of the primary trainer. Bottom: This Curtiss R5C-1 transport of VMR-153 was photographed in 1949.

fuselage, extending 18 inches (45.72 cm) outboard, on the topside of the wings only, were to be painted glossy Sea Blue. These walkways could be eliminated from aircraft where the crew did not walk on the wing to enter the aircraft. When applied, they extended from extreme leading edge to trailing edge of the wing. The rudder(s) and three foot (91.44 cm) wide bands around the wing were to be glossy Insignia Red. These bands were to be parallel to the thrust line and midway between the national aircraft insignia and outboard nacelle. In the event of insufficient space for the red wing band between the insignia and nacelle, the band was to be located adjacent to the nacelle. The national aircraft insignia could overlap the band, but the band could not cover or alter the insignia size or location.

Once an idea is conceived and set aside, it is often taken up again under different circumstances. Such was the case of camouflage by artificial illumination. To counter the

U-boat menace a project was undertaken to illuminate only the frontal view of an attacking aircraft. Using this concept it was possible for a TBF to approach to within 3,000 yards (3,000.4 m) undetected. Whereas, an unilluminated TBF could be spotted at twelve miles (19.31 km). Plans were made to equip a torpedo squadron for duty in the Atlantic using this technique, but the plans were never carried out. By the time the concept had been developed as a practical camouflage, its value had been eliminated by the use of search radar. The project was closed out with the end of World War II.

Army-Navy Aeronautical Bulletin No. 157b, dated August 20, 1946, specified that Interior Green was intended as the standard color of the product resulting from tinting Zinc Chromate as directed by SR-15e.

SR-2f, with an effective date of January 2, 1947, made a major change in the external painting of Naval aircraft. All





Marine Observation Squadron 6 (VMO-6) painted their Consolidated OY-1 in the field camouflage.

fighters, attack, patrol, observation, seaplane transport and utility seaplanes, as well as all types of rotary wing aircraft were to be painted glossy Sea Blue overall. The term seaplane included flying boats, amphibian, and convertibles as well as those with float type landing gear. Land-based transport and utility aircraft were to be aluminum finish overall. External auxiliary fuel tanks on Sea Blue aircraft were also to have their exterior surface painted glossy Sea Blue.

Marine Corps land-based observation planes were to be finished in the land camouflage as follows: All horizontal airfoil surfaces viewed from above were finished in nonspecular Olive Drab. All horizontal airfoil surfaces viewed from below were finished in nonspecular Light Gull Gray. The Olive Drab of the upper surfaces of horizontal airfoils was to be carried around the leading edge and extended aft on the bottom surface approximately five percent of the wing chord, blending into the Light Gull Gray. The vertical

fin and rudder assembly was to be Olive Drab. The curved surfaces of the fuselage, between the Olive Drab of the upper surfaces and the Light Gull Gray of the lower surfaces, were to be a blend of the two over the intervening area in such a manner as to achieve a gradual transition without noticeable demarcation between the colors.

The overall glossy Insignia Red scheme for drone aircraft was modified to have the upper surface of the wings finished glossy Insignia White for those normally controlled from ground stations.

A nonspecular paint was to be applied to necessary areas of the aircraft in order to protect pilots from sun glare. This paint, on aircraft with the top side finished in a glossy color, was to be approximately the same shade as the topside finish. Nonspecular Medium Green was to be used on aluminum colored aircraft.



This Sikorsky HO3S-1 assigned to HMX-1 at MCAS Quantico was one of the earliest helicopters in the Marine Corps assigned to develop the concept of vertical envelopment and aerial resupply.

Right: A Grumman FBF-1, Bearcat with the double 00s denoting the Commander of Carrier Air Group 1; Middle Left: The insignia carried on the P2V Neptune when it established the long distance flight of 11,235 miles (18080.49 km) without refueling in September 1946. Middle Right: "The Truculent Turtle" in the overall glossy Sea Blue paint scheme carried when it made the record breaking flight. Bottom: A Grumman F7F-3P.





Left: In April 1947, this Sea Blue Convair OY-1 Sentinel (ex-USAAF L-5E) was assigned to NAS Moffett Field. While the aircraft had just been repainted it still carried the Air Force legend on the forward fuselage. Middle: This side view of a Marine Corps McDonnell FH-1 Phantom. Bottom: Photographed in October 1973 at the site of the old Bradley Air Museum, this North American FJ-1 shows how original aircraft finishes can weather. Compare this view with the one opposite.



Right: A fine shot of a Grumman F6F-5K Hellcat used as a drone in its overall Insignia Red paint. Below: This North American FJ-1 Fury, shown here at the 1948 National Air Races held in Cleveland, Ohio, was piloted by Lt. H.G. Nickel.



Spinners were painted to match adjacent surfaces, except on those aircraft painted in the land camouflage scheme, in which case they were to be painted Olive Drab. This requirement, of course, did not apply to carrier-based aircraft on which the spinners were color-coded to signify individual squadrons, as explained in Section 3. Propeller hubs and domes were to be painted Flat Black. In actual practice, however, hubs and domes were often left in their natural finish because of the difficulty involved in keeping them painted.

Amendment No. 3 to SR-2f, dated May 1, 1948, specified that except for the tips, the main rotor blades of helicopters were to be painted glossy Sea Blue. Glossy individual identification stripes were to be painted on both sides from the tip to two inches (5.08 cm) from the tip. One blade to be Insignia White, another Insignia Red, and the remaining blade to be Light Green. The glossy Orange Yellow warning stripe was to be painted inboard of these markings

on both sides of the blades from two inches (5.08 cm) from the tip to eight inches (20.3 cm) from the tip.

The paint scheme originally specified for Target Towing aircraft was now to be applied to Drone Control aircraft, as well.

Exterior color on experimental aircraft, with the exception of seaplanes, and the color requirements of SR-2, no longer applied to military aircraft used for research projects. The color for such aircraft was subject to Bureau of Aeronautics approval in each case.

The interior of engine cowling was now to be painted Interior Green.

SR-2g, dated February 1, 1949, specified that Search and Rescue, as well as Hospital aircraft, were to be painted in the color scheme prescribed for their type and were to be identified by means of lettering and markings.



SECTION 2

NATIONAL AIRCRAFT INSIGNIA

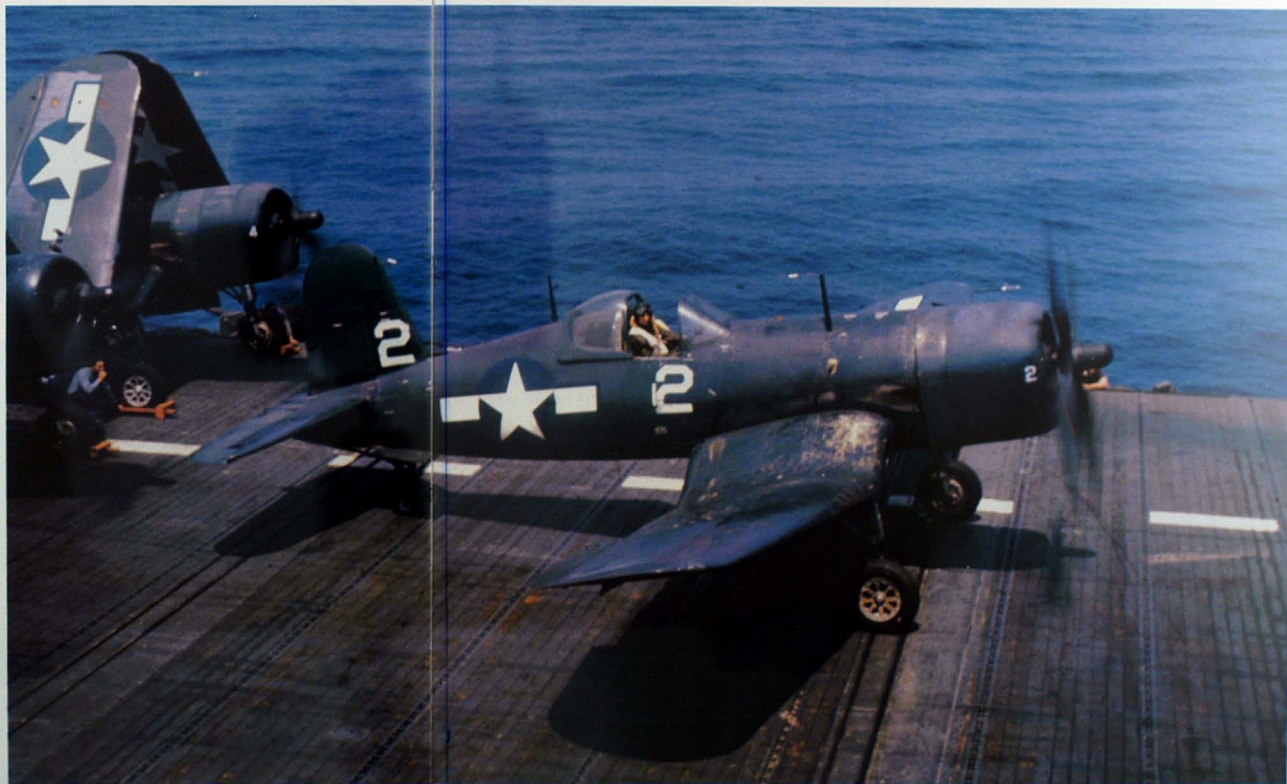
CHAPTER 2 1940-1949

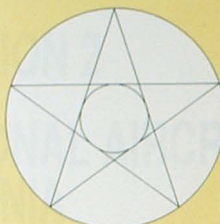
During the 1940-1949 ten-year period the national aircraft insignia changed its colors, shape and location. Prior to World War II the national aircraft insignia consisted of a blue circle around a white five-pointed star having a red circle in the center. When correctly drawn the red circle is tangent to the edges of the pentagon formed in drawing the star as shown in the example on page 60. Four of these insignia were applied to the wings of all US naval aircraft. One was located at each tip on the upper surface of the upper wing and under surface of the lower wing. In the case of a monoplane, it was applied to both upper and lower surfaces in all four positions.

The earlier use of vertical red, white and blue rudder stripes had been discontinued in the late 30s, except on airships, and as an optional marking on Staff aircraft and those operated by the US Marine Corps. These stripes were no longer considered to be a part of the national aircraft insignia.

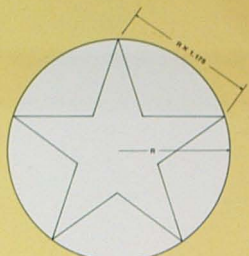
There have been numerous methods described for accurately laying out the five-pointed star of the national aircraft insignia. The procedure described in the 1939 Aviation Machinist Mate 2c Training Manual was as follows: Multiply the radius of the blue circle by the constant 1.175. This will give the length of the chord that can be used for plotting the five equally spaced points on the circumference. The problem is solved decimally to obtain accuracy. The answer must then be converted to inches and fractions of an inch so that it can be applied to the circle by use of an ordinary rule. For example, using a circle with a radius of 30 inches — 30 inches (76.20 cm) \times 1.175 = 35.25 inches or 35 1/4 inches (89.54 cm) for the distance between each star point on the circumference of the blue circle.

Right: A graphic view of a Vought F4U-4 of VF-82 aboard CV-15 shows to advantage its camouflage and placement of the individual aircraft number.





SHAPE OF NATIONAL AIRCRAFT INSIGNIA



NATIONAL AIRCRAFT INSIGNIA PLOTTED MATHEMATICALLY

As the possibility of the United States becoming involved in World War II increased, it became necessary to fully and easily identify US aircraft. In place of previously issued general directives on size and location, specific dimensions for each type aircraft were developed to insure maximum visibility and standardization of this marking.

Appendix A of NAS San Diego, California, Local Process Specification No. 128, dated March 8, 1940, specified sizes and locations for the national aircraft insignia on aircraft going through their overhaul facility as follows:

Model	Wing	Circle Size	From tip of wing to center of star	From leading edge of aileron to center of star
BG-1	Upper	42" (106.68 cm)	55" (139.70 cm)	1" (2.54 cm)
	Lower	42" (106.68 cm)	48" (121.92 cm)	1" (2.54 cm)
BT-1	Upper	54" (137.16 cm)	79" (200.66 cm)	4" (10.16 cm)
	Lower	50" (127.00 cm)	70 1/2" (179.07 cm)	1" (2.54 cm)
F2A-1	Upper	46" (116.84 cm)	74" (187.96 cm)	3 3/4" (9.14 cm)
	Lower	46" (116.84 cm)	75" (190.50 cm)	5" (12.70 cm)
F2F-1	Upper	40" (101.60 cm)	43" (109.22 cm)	2 1/2" (6.35 cm)
	Lower	40" (101.60 cm)	41 1/2" (105.41 cm)	6" (15.24 cm)
F3F-1	Upper	40" (101.60 cm)	48" (121.92 cm)	2 1/2" (6.35 cm)
	Lower	40" (101.60 cm)	43" (109.22 cm)	7 1/2" (19.05 cm)
J2F-1	Upper	54" (137.16 cm)	70" (177.80 cm)	1" (2.54 cm)
	Lower	54" (137.16 cm)	90" (228.60 cm)	1" (2.54 cm)
PBY-1	Upper	60" (152.40 cm)	141" (358.14 cm)	1" (2.54 cm)
	Lower	60" (152.40 cm)	from wing tip float well	
	Lower	60" (152.40 cm)	64 3/4" (164.46 cm)	1" (2.54 cm)
	Lower	60" (152.40 cm)	from wing tip float well	
P2Y-1	Upper	60" (152.40 cm)	132" (335.28 cm)	1" (2.54 cm)
	Lower	60" (152.40 cm)	132" (335.28 cm)	1" (2.54 cm)
SBC-3	Upper	42" (106.68 cm)	53 1/2" (135.89 cm)	1" (2.54 cm)
	Lower	42" (106.68 cm)	45" (114.30 cm)	1" (2.54 cm)
SB2U-1	Upper	60" (152.40 cm)	82" (208.28 cm)	2" (5.08 cm)
	Lower	60" (152.40 cm)	82" (208.28 cm)	2" (5.08 cm)
SU-1	Upper	42" (106.68 cm)	65" (165.10 cm)	1" (2.54 cm)
	Lower	42" (106.68 cm)	57" (144.78 cm)	1" (2.54 cm)
SOC-1	Upper	40" (101.60 cm)	60" (152.40 cm)	centered on fabric
	Lower	32" (81.28 cm)	73 3/4" (187.32 cm)	2" (5.08 cm)
	Lower	32" (81.28 cm)	from butt edge	from trailing edge
SOC-3	Upper	40" (101.60 cm)	50" (127.00 cm)	1" (2.54 cm)
	Lower	32" (81.28 cm)	73 3/4" (187.32 cm)	2" (5.08 cm)
	Lower	32" (81.28 cm)	from butt edge	from trailing edge
SOC-3	Upper	40" (101.60 cm)	42" (106.68 cm)	centered on fabric
	Lower	32" (81.28 cm)	73 3/4" (187.32 cm)	2" (5.08 cm)
	Lower	32" (81.28 cm)	from butt edge	from trailing edge
SON			Same as for SOC models	

To aid in their identification, Technical Order No. 6-40, dated March 19, 1940, authorized additional insignia to specific types of aircraft flying on the neutrality patrol. This was the first time the national aircraft insignia was placed on the fuselage. These insignia were to be located on each side of the forward part of the fuselage. Locations were as follows:

BG-1: Center a 24 inch (60.96 cm) star insignia on the engine accessory cowl as far forward as possible.

SOC-1, -2, -3, SON-1: Center a 24 inch (60.96 cm) star insignia on the accessory cowl with the upper circumference about 5 inches (12.70 cm) below the top of the cowl.

SBU-1, -2: Locate a 24 inch (60.96 cm) star insignia on the engine cowl so that the after edge is tangent to the after edge of the side cowl and the center is equidistant from the upper and lower edges of each side panel of the cowl.

SB2U-1, -2: Locate a 24 inch (60.96 cm) star insignia on the engine cowl so that its center is 24 inches (60.96 cm) aft of the forward edge of the cowl panel, and 14 inches (35.56 cm) below the upper edge of the side panel of the cowl.

F2F-1, F3F-1, -2, -3: Locate a 24 inch (60.96 cm) star insignia on the fuselage between the two cabane wires between stations 2 and 4. The center of the insignia to be 11 3/4 inches (29.84 cm) aft of station 2, and 12 1/4 inches (31.11 cm) below a line joining the lower ends of the cabane struts.

J2F-1, -2, -3, -4: Center a 36 inch (91.44 cm) star insignia in line with the vertical cabane strut, with the lower edge of the star approximately 23 inches (58.42 cm) above the step, adjacent to the upper edge of the wheel well.

PBY-1, -2, -3, -4: Locate a 36 inch (91.44 cm) star insignia so that its lower circumference is approximately 4 inches (10.16 cm) above the mooring platform, between the turret and windshield, with the after circumference tangent to the outer edge of the reinforcement at the pilot's ventilator.

P2Y-2, -3: Locate a 36 inch (91.44 cm) star insignia so that its lower circumference is 3 inches (7.62 cm) above the chine edge and its after edge is approximately 1 inch (2.54 cm) forward of the forward edge of the bow step.

Right: Vought SBU-1s of VS-42 assigned to the USS RANGER (CV-4) operating with the neutrality patrol, carry the national aircraft insignia in the newly authorized location on the engine cowl. Bottom: This SB2U-2 of VS-72 assigned to the USS WASP (CV-7) also participated in neutrality patrol duties. The tail is in Black. Note the external fuel tank fitted for additional flight range.



If the insignia was located on the engine or accessory cowl, it was permissible for the star to project into squadron nose markings, provided a contrasting border was also applied at the intersection.

VMS-3 at St. Thomas, Virgin Islands, operated the only Marine Corps aircraft authorized to have these additional insignia.

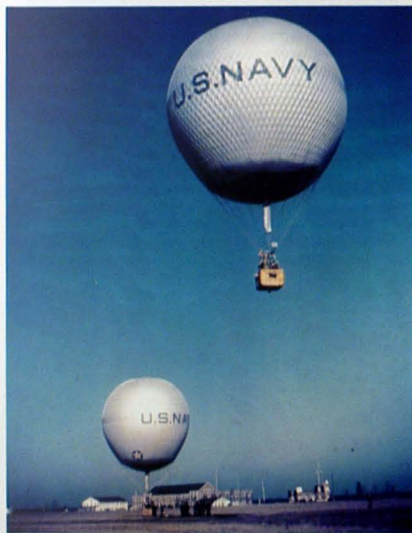
SR-2b, Specification for Naval Aircraft Insignia and Marking, dated October 8, 1940, with an effective date of December 14, 1940, further amplified the location of the four insignia which were to be placed on the wings of each aircraft. One was to be located inboard from each wing tip, on both the upper surface of the upper wing and on the under surface of the lower wing for biplanes. In the case of monoplanes, the insignia were to be on the top and bottom

surfaces of the wings. On landplanes and float seaplanes, the center of the insignia was to be located inboard from the wing tip a distance equal to the chord length of the wing, except for the lower surface of the lower wing of seaplanes, where the insignia was to be located inboard of the wing tip floats, as near as practicable to the aforementioned location. The circumscribed circle was still to be tangent to the forward edge of the aileron. On patrol planes the location was to be in general accord with the above, but was to be dictated by the size and type of wing. The diameter of the circumscribed circle was to be equal to the distance between the leading edge of the aileron and the leading edge of the wing, provided this distance was not in excess of 60 inches (152.40 cm). In this case the diameter was to be 60 inches (152.40 cm). The size of the insignia on patrol planes was to be compatible with the size and type of aircraft.





Left: Nonrigid airships carried a national aircraft insignia on the centerline of the envelope, both top and bottom, as well as the Red, White and Blue stripes on the moveable control surfaces.



Above: Free balloons carried the national aircraft insignia in two locations 45° apart in a vertical plane.

The conversion from the period of bright and colorfully painted aircraft to the dull and drab wartime finishes for the purpose of concealment also affected the national aircraft insignias. Bureau of Aeronautics letter Aer-E-25-HY (010282), dated February 26, 1941, set forth the

nonspecular painting to be used on Naval aircraft. It also reduced the number of insignia on the wings from four to two. One was to be located inboard from the left wing tip on the upper surface of the upper wing, and one inboard of the right wing tip on the under surface of the lower wing for biplanes. The same positioning on the top and under surface of the wings also applied to monoplanes. The circumscribed circle was to be tangent to the forward edge of the aileron. The center of the wing insignia was positioned as before. One insignia was to be located on each side of the fuselage between the trailing edge of the wing and the leading edge of the horizontal stabilizer, but aft of the squadron identification markings. On patrol type aircraft one insignia was to be located on the bow forward of the squadron number. The insignia on the wing was not to exceed 60 inches (152.40 cm) in diameter. The diameter of the circumscribed circle on the fuselage was to be as large as possible, but not to exceed 24 inches (60.96 cm). The insignia on patrol plane wings was to be at least 48 inches (121.92 cm) in diameter, but not more than 60 inches (152.40 cm). On the bow it was to be 24 inches (60.96 cm) in diameter. These insignia were to be applied using nonspecular pigmented lacquers. Nonspecular dope was allowed on fabric surfaces. The optional use of the vertical red, white, and blue rudder stripes was terminated.

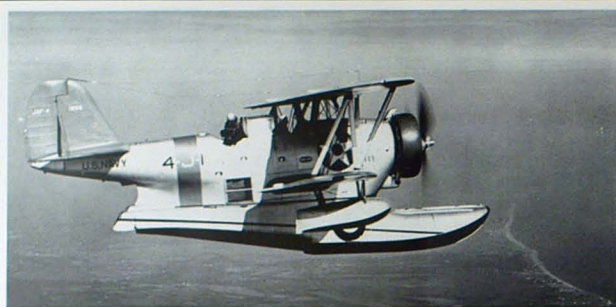
The necessity of rapid and positive identification was vital after the United States entered the war. Commander in Chief, Pacific, message 230307, dated December 23, 1941, stated that all Army and Navy aircraft in the Hawaiian area were being marked with large insignia on both upper and lower wing tips, as well as both sides of the fuselage. Red and white horizontal stripes on each side of the rudder were also specified. However, the number of stripes was not specified, which of course lead to many variations.

On January 2, 1942, NAS San Diego, California, Local Process Specification was modified to reflect this increase in size and location, as well as the horizontal rudder stripes. The insignia was to be located inboard from the tip of the wing the distance shown in the following chart. However, the center of the insignia was now to be 1/2 of the distance from the leading edge (minus deicer width if present) to the trailing edge including aileron, flap or other moveable surface.

continued on p. 65

Right: A Marine Corps F2A-3 Brewster Buffalo at MCAS Ewa, Hawaii, in the two tone paint scheme, with rudder stripes and national aircraft insignia in all six positions. Middle Left: The national aircraft insignia has been placed so high on the hull that the insignia Blue is lost in the dark antiplane panel. This brilliantly painted airplane of YJ-4 is equipped to tow targets as can be seen by the wind driven propeller, on the top of the hull aft of the wing, used to drive the tow reel. Middle Right: The Red center of the wing insignia has been washed out in the photo of this PBV carrying the short-lived Red and White rudder stripes. Bottom: The forward location of the national aircraft insignia may have been dictated by the large legend for the American Aviation Mission to South America on this Marine Corps Grumman J2F-5. It was not part of the neutrality patrol.

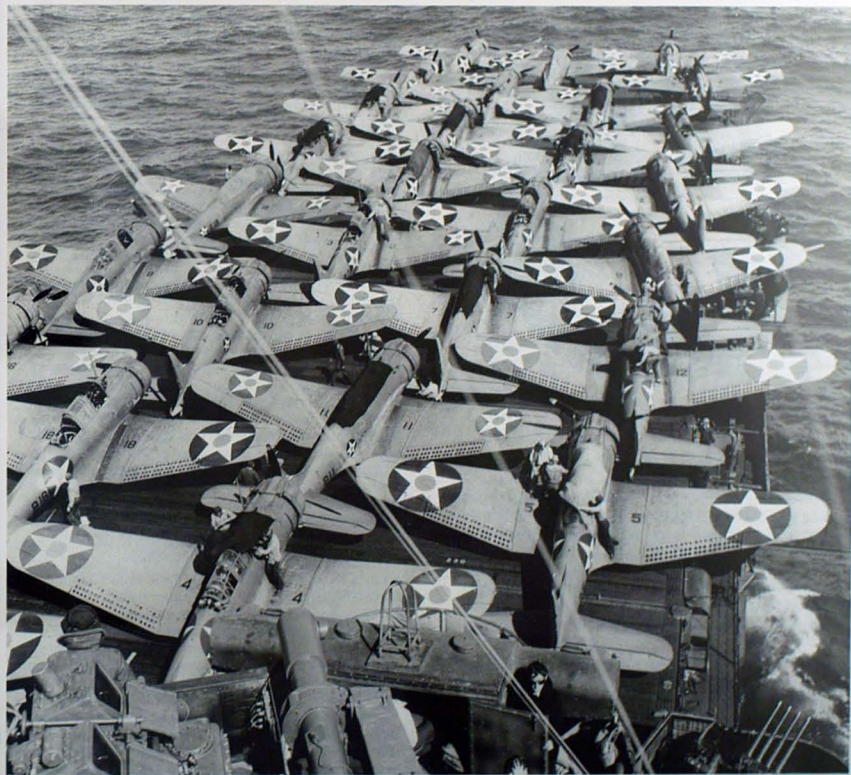




Left: A broad interpretation of the flying boat instructions concerning the national aircraft insignia has been applied to this Grumman J2F-4 of VJ-4. Middle Left: Douglas TBDs and Grumman F4Fs of VT-6 and VF-6 on the flight deck of the USS ENTERPRISE (CV-6) in April 1942. While the instructions specified alternate Red and White horizontal stripes on the rudder it did not specify how many. Note the greatly oversized insignia on the F4F. Middle Right: The national aircraft insignia on this SBD-1 is painted right into the wing slots and fills the space from the leading edge of the aileron cutout to the edge of the Orange Yellow. Bottom: A SBD-3 in two tone paint scheme with national aircraft insignia in all six locations.

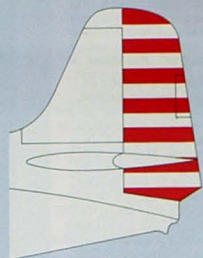


Right: The February 26, 1941, directive specified insignia on the upper left and lower right wing surfaces, as well as both sides of the fuselage. Markings were to be White on the overall Gray scheme for least visibility. Below: This flight deck scene of SBDs and F4Fs on the USS ENTERPRISE (CV-6) clearly shows the confusion caused by the numerous conflicting directives being issued by various commands.





AUGUST 19, 1919 TO MAY 6, 1942



RUDDER STRIPES REQUIRED
DECEMBER 28, 1941 TO MAY 6, 1943

WING

Model	Wing	Circle Size	From tip of wing to center of star
F2A-1, -2, -3	Upper	65" (165.10 cm)	59" (149.86 cm)
	Lower	63" (160.02 cm)	48" (121.92 cm)
F4F-3, -3A	Upper	70" (177.80 cm)	55" (139.70 cm)
	Lower	70" (177.80 cm)	52" (132.08 cm)
F3F-1, -2, -3	Upper	60" (152.40 cm)	55" (139.70 cm)
	Lower	46" (116.84 cm)	50" (127.00 cm)
J2F-1, -2, -3, -4	Upper	69" (175.26 cm)	69" (175.26 cm)
	Lower	67" (170.18 cm)	94" (238.76 cm)
JRF	Upper	66" (167.64 cm)	65" (165.10 cm)
	Lower	66" (165.10 cm)	60" (152.40 cm)
OS2U-1, -2, -3	Upper	82" (208.28 cm)	64" (162.56 cm)
	Lower	78" (198.12 cm)	68" (172.72 cm)
PBY-1, -2, -3	Upper	138" (350.52 cm)	144" (365.76 cm)
			tip of wing, float down
	Lower	136" (345.44 cm)	90" (228.60 cm)
			edge of float well
PB2Y	Upper	150" (381.00 cm)	92" (233.68 cm)
			tip of wing, float down
	Lower	144" (365.76 cm)	96" (243.84 cm)
			edge of float well
SBD-1, -2, -3	Upper	72" (182.88 cm)	52" (132.08 cm)
	Lower	71" (180.34 cm)	51" (129.54 cm)
SBC-3, -4	Upper	60" (152.40 cm)	66" (167.64 cm)
	Lower	53" (134.62 cm)	45" (114.30 cm)
SB2U-1, -2, -3	Upper	78" (198.12 cm)	64" (162.56 cm)
	Lower	76" (193.04 cm)	65" (165.10 cm)
SOC-1, -2, -3	Upper	57" (144.78 cm)	62" (157.48 cm)
	Lower	53" (134.62 cm)	91" (231.14 cm)
			from butt of wing
TBD-1	Upper	79" (200.66 cm)	82" (208.28 cm)
	Lower	76" (193.04 cm)	81" (205.74 cm)

If dimensions were not given, the following general rules were to apply: The center of the star shall be inboard from wing tip approximately 1/3 of the distance from the wing tip to the fuselage. The diameter of the circle will be equal to the full chord of the wing including the aileron. On seaplanes the insignia shall be located on the underside of the wing inboard of the wing tip float.*

FUSELAGE

Model	Circle Size	Location
F2A-1, -2, -3	43" (109.22 cm)	62" (157.48 cm) from trailing edge of horizontal stabilizer
F4F-3, -3A	58" (147.32 cm)	53" (134.62 cm) from center of "Lift" hole
F3F-1, -2, -3	40" (101.60 cm)	56" (142.24 cm) from edge of horizontal stabilizer
J2F-1, -2, -3, -4	55" (139.70 cm)	52" (132.08 cm) from edge of "Step" plate
JRF	43" (109.22 cm)	45" (114.30 cm) from edge of wheel well
OS2U-1, -2, -3	39" (99.06 cm)	Centered on fuselage to just miss lower rear corner of windscreen
PBY-1, -2, -3, -4	53" (134.62 cm)	Centered between pilot's cabin and bottom of hull (chine), circumference to just clear propeller guard strip on side of fuselage
PB2Y	65" (165.10 cm)	70" (177.80 cm) from rear edge of aft window of bow gunner's compartment and
		34" (86.36 cm) below (glass) edge of pilot's window
SBD-1, -2, -3	50" (127.00 cm)	119" (302.26 cm) from trailing edge of horizontal stabilizer
SOC-1, -2, -3 (SOC also)	43" (109.22 cm)	70" (177.80 cm) from rudder hinge pin
TBD-1	54" (137.16 cm)	62" (157.48 cm) from center of "Lift" hole

All fuselage insignia were to be centrally located, top to bottom, on the fuselage side.

A good example of the confusion caused by directives being issued by numerous commands is the Bureau of Aeronautics letter Aer-E-2571-BP/001085, dated January 5, 1942. This letter required that the national aircraft insignia be placed on the upper surface of the upper wing and the under surface of the lower wing, on both right and left wings. These four insignia were to be the maximum diameter possible without overflowing into the aileron and placed inboard from the wing tip approximately 1/3 of the distance from wing tip to fuselage. A national aircraft insignia 24 inches (60.96 cm) in diameter was to be placed on each side of the fuselage as previously directed by the Bureau of Aeronautics. Where this size could not be applied in accordance with existing instructions, the point

Right: This SBD-4 at MCAS Cherry Point in July 1943 still carried oversized insignia in six positions on its three tone camouflage.



of application was to be moved forward on the fuselage as necessary. Horizontal striping of the rudder was specified. The location of these stripes was to be determined by dividing the distance between the highest and lowest points on the rudder into thirteen equal parts. There were to be seven red and six white stripes. Balanced portions of the rudder which extended into the fin were to be finished in the same color as the fin surfaces. The national aircraft insignia and rudder stripes were to be a nonspecular finish. While these instructions were applicable to all aircraft operating with or intended for delivery to the Fleet, as well as all spares, they did not apply to primary or advanced training planes assigned to or intended for assignment to training centers or reserve bases.

Bureau of Aeronautics letter Aer-E-2571-MVS (012076), dated February 6, 1942, further amplified the location of the wing insignia. It stated that the insignia must not overflow into the ailerons, flaps or deicer boots when installed. In the case of the lower wing of seaplanes the insignia was to be located inboard of the wing tip float as near as practicable to the specified location. An insignia was to be located on each side of the fuselage, aft of the squadron identification, between the trailing edge of the wing and the leading edge of the horizontal stabilizer. On patrol type aircraft an insignia was to be located on each side of the bow forward of the squadron number. The insignia on the sides of the fuselage were to be maximum diameter possible, not to exceed 65 inches (165.10 cm), and be located to obtain both maximum size and maximum visibility. With all these conflicting directives it is no wonder that so many photos during this time show the national aircraft insignia in various locations and sizes.

Because of the possibility in the heat of battle of confusing the red circle in the national aircraft insignia for the red rising sun of Japan, Secretary of the Navy (SECNAV) dispatch 062230 (dispatch logged in a communication center at 22:30 hours [10:30 p.m.] on May 6) transmitted ALNAV 97 (Navy dispatch number 97 intended for all Navy units), dated May 6, 1942, directed the removal of the red circle in the white star and the horizontal red and white stripes on the rudder. The painting on the rudder was to conform to the general camouflage scheme. These instructions also applied to the Training Command. For the

MAY 6, 1942 TO JUNE 28, 1943



first time the national aircraft insignia was not composed of the traditional American colors — red, white, and blue. In accordance with ALNAV 97, the red and white stripes on the rudders and elevators of lighter-than-air aircraft were also removed.

This same information was sent to the field by (SECNAV) in ALNAV 98 dispatch 071758, dated May 7, 1942, which further stated that a uniform system of markings had been adopted for all United States military aircraft. It appears from a review of the Army records, that this change was primarily a Navy program with Army concurrence.

NAS San Juan, Puerto Rico, Local Process Specification No. 4-42, dated July 28, 1942, is the earliest directive located which mentions standard sizes for the national aircraft insignia. It identifies the wing insignia as falling into six basic sizes: 40, 45, 50, 55, 60 or 105 inches (101.60 cm, 114.30 cm, 127.00 cm, 139.70 cm, 152.40 cm or 266.70 cm) in diameter. The fuselage insignias fell into six basic sizes: 35, 40, 45, 50, 55 and 60 inches (88.90 cm,



Right: Grumman F4F-3 in the two tone paint scheme of Blue Gray and Light Gray with oversized insignia. The significance of the two numbers is undetermined. Bottom: Tail stripes were eliminated on nonrigid airships, but the requirement for two national aircraft insignia without the red center remained.

101.60 cm, 114.30 cm, 127.00 cm, 139.70 cm and 152.40 cm) in diameter.

WING

Model	Wing	Circle Size	From tip of wing to center of star
J2F-1, -2, -3, -4, -5	Upper	50" (127.00 cm)	70" (177.80 cm)
	Lower	50" (127.00 cm)	90" (228.60 cm)
JRF	Upper	55" (139.70 cm)	86" (218.44 cm)
	Lower	45" (114.30 cm)	60" (152.40 cm)
OS2U-1, -2, -3, & OS2N-1	Upper	60" (152.40 cm)	65" (165.10 cm)
	Lower	55" (139.70 cm)	94" (238.76 cm)
PBY-1, -2, -3, -4, -5, -6A	Upper	105" (266.70 cm)	180" (457.20 cm)
	Lower	105" (266.70 cm)	128" (325.12 cm)
			edge of float well
SOC-1, -2, -3, & SON-1	Upper	45" (114.30 cm)	65" (165.10 cm)
	Lower	40" (101.60 cm)	95" (241.30 cm)

FUSELAGE

Model	Circle Size	Location
J2F-1, -2, -3, -4, -5	55" (139.70 cm)	52" (132.08 cm) from edge of "bleep" plate
JRF	45" (114.30 cm)	45" (114.30 cm) from forward edge of wheel well
OS2U-1, -2, -3, & OS2N-1	40" (101.60 cm)	Centered on fuselage to just miss lower rear corner of cabin enclosure
PBY-1, -2, -3, -4, -5, -6A	50" (127.00 cm)	Centered between pilot's cabin and bottom of hull (chine) circumference to just clear propeller guard side of fuselage
strip on		
SOC-1, -2, -3, & SON-1	40" (101.60 cm)	70" (177.80 cm) from rudder hinge pin

To further point out the confusion caused by the numerous instructions, consider the sizes of the insignias specified to be applied to PBY and PBY-5A aircraft by the NAS Quonset Point, Rhode Island, Local Process Specification No. 3-43, dated August 19, 1942. This specification was issued in order to clarify the instructions in the Bureau of Aeronautics letter of February 6, 1942. The insignia on the upper surface of the wing was to be 9 feet 4 inches (284.48 cm) in diameter, with the center located 17 feet (518.16 cm) inboard from the wing tip float. The insignia on the lower surface of the wing was to be 8 feet 6 inches (259.08 cm) in diameter with the center located 17 feet (518.16 cm) inboard from the wing tip float. The insignia on the bow was to be 4 feet (121.92 cm) in diameter with the center located 28 inches (71.12 cm) forward of the plating at Station No. 2 and 27 1/2 inches (69.85 cm) above the chine. The top point of the star was to be located directly below the vertical brace on the cockpit enclosure.

In preparation for Operation Torch, the Allied invasion of French North Africa, an amendment to Operation Memorandum No. 9, dated September 25, 1942, was published by Allied Force Headquarters. It directed that all American aircraft participating in the invasion display a yellow circle around the national aircraft insignia on each side of the fuselage and on both lower wing surfaces. Since this memorandum was concerned with air-ground recognition no mention was made of the insignia on the upper wing sur-

Right: Curtiss SOC dropping a message during Operation Torch. The yellow around the wing insignia is just visible behind the wingtip float. Bottom Left: This SNJ, used as a photo plane in the New Hebrides, has an oversize insignia which is unusually far forward on the fuselage. Bottom Right: Grumman F4F aboard the USS RANGER (CV-4) checking their guns prior to the invasion of French North Africa during Operation Torch. Because the yellow circle around the national aircraft insignia was designed as a recognition symbol to ground troops, there was no requirement for it to be on the upper wing surface.



face. However, it is apparent from photos that some aircraft, both Army and Navy, were so marked on the upper surfaces. This was a short-lived marking for Naval aircraft since they all returned to the United States after the invasion. But it was continued in use in North Africa and Europe by the Army Air Force.

SR-2c, dated January 5, 1943, with an effective date of February 1, 1943, once again changed the number of insignia to be placed on the wings of aircraft. The insignia were to be nonpeculiar for camouflaged aircraft and glossy for noncamouflaged aircraft. The directive instructed that two insignia were to be placed on the wings. One was to be located on the upper surface of the left wing and the other on the under surface of the right wing. On biplanes, one insignia was to be placed on the upper surface of the upper left wing, and the other on the under surface of the lower right wing. The circumscribed circle was to be tangent to the aileron cutout. The center of the insignia was to be located inboard from each wingtip a distance equal to approximately 1/3 the distance from the wing tip to fuselage, except in the case of the lower wing of seaplanes and flying boats. On these aircraft the insignia was to be located inboard of the wing tip float as near as practicable to the above location consistent with the size and type of wing. Where the distance between the leading edge of the wing and the aileron cutout was not large enough to accommodate the minimum size specified, the wing

YELLOW BORDER FOR OPERATION TORCH





insignia was to be moved inboard a sufficient distance to allow the minimum size to be applied. All aircraft were to have one insignia applied on each side of the fuselage approximately midway between the trailing edge of the wing and the leading edge of the horizontal stabilizer. These insignia could be moved forward or aft to avoid covering transparent material or other obstructions, except that the extreme forward edge of the insignia could not be located closer than 35 inches (88.90 cm) away from the trailing edge of the wing. When the projection of the fuselage between the trailing edge of the wing and the leading edge of the horizontal stabilizer was not large enough to accommodate the minimum size specified, the fuselage insignia could be placed elsewhere on the fuselage in such locations as to permit their being readily seen from the sides. On patrol type aircraft, the insignia was to be located near the bow in lieu of the above location.

The diameter of the circumscribed circle was to be one of nine standard sized forms, 20 to 60 inches (50.80 cm to 152.40 cm), increasing in 5 inch (12.70 cm) increments. The wing insignia was to be that standard size coming nearest to being equal to, but not exceeding, 90 percent of the distance between the leading edge of the wing and the aileron cutout. In no case could they be greater than 60 inches (152.40 cm), nor less than 30 inches (76.20 cm) in diameter. The fuselage insignia was to be that standard size coming nearest to being, but not exceeding, 75 percent of the vertical dimension of the projection of the fuselage side at the point of application. In no case could they be greater than 50 inches (127.00 cm) nor less than 20 inches (50.80 cm) in diameter.

Nonrigid airships were to carry two insignia each 5 feet (152.40 cm) in diameter, one on top of the envelope and the other on the bottom. These insignia were to be centered on a fore and aft axial line with the top insignia at the greatest diameter of the envelope. The bottom insignia was to be on the axial line 3 feet (91.44 cm) back of a point midway between the front of the car and the tip of the bow of the envelope. Placement of the national aircraft insignia on free and kite balloons remained the same as specified in the early 1920's, even though kite balloons had not been used since the early 1930's.

Army-Navy Aeronautical Specification AN-I-9, *Insignia*;

National Star (For Airplane Exterior), dated March 1, 1943, with an effective date of September 1, 1943, authorized for the first time in the Navy since World War I, the use of decalcomanias for the national aircraft insignia. They were available in the gloss or specularly to match that of adjacent surfaces. The colors conformed to the Army-Navy Aeronautical Color Standards for glossy and camouflage paints.

ALNAV 12, dispatch 282005, dated June 28, 1943, specified the second major change to the national aircraft insignia since the United States entered the war. The insignia was modified to be a five-pointed white star inside an Insignia Blue circumscribed circle. An Insignia White rectangle, one radius of the blue circle in length and one-half radius of the blue circle in width, projected on each side of the star. The top edges of the rectangle were placed to form a straight line with the top edges of the two star points beneath the top star point. An Insignia Red border one-eighth radius of the blue circle in width outlined the entire design. The insignia was to be applied so that in the normal flight attitude of the airplane one point of the star pointed upward, perpendicular to the line of flight on vertical surfaces, and forward, parallel to the line of flight on horizontal surfaces. A gray color, obtained by mixing one part of Insignia White with one part of Light Gray, replaced the Insignia White, only on upper wing surfaces that were finished semigloss Sea Blue. The insignia on the wings were to have a blue circle diameter 75 percent of the distance between the leading edge of the wing and the aileron cutout. It could not be greater than 60 inches (152.40 cm), nor less than 30 inches (76.20 cm) in diameter. The size of the fuselage insignia remained unchanged. It should be noted that the red border around the blue circle was not considered in determining the size. The size always refers to the blue circumscribed circle as used in the original version of the insignia.

These instructions were also issued in Army-Navy Aeronautical Specification AN-I-9a, dated June 29, 1943, which specified an effective date of September 1, 1943.

The red border on the insignia was unpopular with many in the combat area, especially in the Pacific, where it was felt that it could cause confusion with the Japanese Hinomaru. This was the subject of considerable dispatch and letter traffic objections which resulted in many aircraft not being

Right: A Vought F4U-1 in the three-tone paint scheme with the short-lived red surround to the national aircraft insignia. Below: The three-tone camouflage together with the new national aircraft insignia presented a very harmonious balance between the aesthetic and the functional. Masking tape was often used to seal the fuselage gas tank access panel as pilots complained about fumes infiltrating the cockpit. Very often, if it was not well secured, this tape would tear off in flight, as shown here.



painted with the new insignia. On July 31, 1943, Commander, Third Fleet (COM3rdFLT) message 300224 to all ships and bases in the South Pacific Area directed "... AS AN IMMEDIATE EXPEDIENT TO PREVENT UNCERTAINTY OF IDENTIFICATION AND PENDING FURTHER DECISION ELIMINATE RED BORDER ON SOPAC PLANES."

This became official for all aviation with the issue of Army-Navy Aeronautical Specification AN-I-9b, dated August 14,

1943. Effective upon issue, the national aircraft insignia acquired an Insignia Blue border, one-eighth radius of the blue circle, in lieu of the Insignia Red border specified by AN-I-9a. Therefore, the change was made before the required completion date for adding the red border. The standard sizes remained in effect except for night fighters. On these aircraft the circle was to be 25 inches (63.50 cm) in diameter on both the wings and fuselage. On patrol seaplanes, the insignia was to be applied to each side of the bow, in such position that it would be completely visible





Left: This F4U-1 Corsair photographed at Espiritito Santo, New Hebrides, shows how quickly the paint can fade in tropical climates.

when the aircraft was waterborne in normal load condition. The fuselage insignia could extend over doors and emergency exits, but not over windows or such openings used during combat which would change the insignia pattern.

Right: A restored Goodyear FG-1D photographed at Ottawa, Ontario, Canada in August 1971 shows a faithful representation of the national aircraft insignia. Below: These Grumman JRF-5 Goose vividly show how the red border was so prominent against the blues of the three-tone camouflage. Note the propeller warning stripes which have been applied above and below the insignia. Opposite: With engines running these F4U-4s of VF-82 and VBF-82 present an impressive picture of naval power in June 1946. Aircraft number 20 is shown here about to launch off the deck of CV-15.



JULY 31, 1943 TO JANUARY 14, 1947





The issue of SR-2e, dated June 26, 1944, changed the location of the insignia on the bottom of nonrigid airships to as close to half of the horizontal distance from the bow of the envelope to the forward edge of the car as practicable.

NAS Alameda, California, Local Process Specification No. 81, dated January 2, 1945, is the earliest known directive that authorized deleting the Insignia Blue in the national aircraft insignia when it was applied on a glossy Sea Blue background. This practice had been in effect prior to this

Right: One national aircraft insignia is located on the centerline of the envelope forward of the control car on this first nonrigid to arrive in South America for patrol duty in October 1943. Below: While this Sea Blue VMF(N)-533 Grumman F6F-3N night fighter has the unit identification, F(N) 16, painted in Black, the national aircraft insignia remains full-size in brilliant White.



Below: The large numbers on the engine nacelle of this Grumman F7F-3 are the last three digits of the aircraft's serial number 80462. The Tigercat was one of the Navy's last propeller-driven fighters.



FOR USE ON SEA BLUE AIRCRAFT
AFTER JANUARY 14, 1947



Amendment 1, to AN-I-9b, dated June 10, 1946, effective Navy-wide on issue, finally deleted the requirement for the Insignia Blue circumscribed circle and the Insignia Blue border when the insignia was applied on a Sea Blue, Dark Blue or Black background.

Amendment 2, to AN-I-9b, dated January 14, 1947, effective on issue, further modified the national aircraft insignia with the addition of an Insignia Red horizontal stripe centered in the white rectangles at each end of the insignia. The width of the red stripe to be one-sixth the radius of the blue circle. Once again the national aircraft insignia contained red, white, and blue. This insignia was also applied to all nonrigid airships and free balloons.

Army-Navy Aeronautical Specification AN-I-9c, dated August 14, 1947, effective on issue, deleted the special 25 inch (63.50 cm) size insignia for use on night fighters. The

Below: A North American FJ-1 during testing at the Naval Air Test Center, Patuxent River, Maryland. The red nose was both decorative and functional in alerting ground crew to stay clear when the engine is running.



Right: This Grumman A-7F-3P assigned to VMF-354 shows the seldom seen "A" prefix to the aircraft model designation to show it is a second line combat aircraft.

Below: A Grumman F8F-1 Bearcat is shown following a successful carrier landing. The Bearcat served as a high performance trainer following withdrawal from front line service.





Left: The remains of a scrapped Consolidated PB5A at Squantum Naval Air Station showing the new postwar national aircraft insignia in relation to the former insignia and its location on the hull. Below: Highly polished natural aluminum marks this Grumman XF9F-2 shown here at the firm's Calverton, Long Island, New York field in 1948. This second prototype of the Panther exemplifies the design's clean and functional lines. Opposite above: Due to the peculiar shape of the helicopter, there were few directives which specified the location of the national aircraft insignia. This Sikorsky HO3S-1 or HMX-1 carries it in four locations.



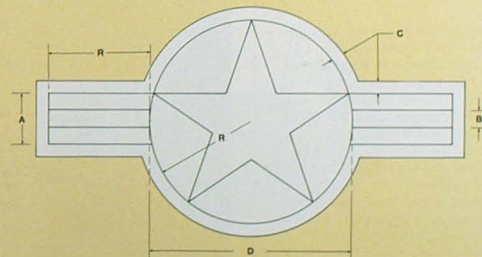
Light Gray previously authorized for use in the national aircraft insignia when applied to the upper wing surfaces of aircraft painted semigloss Sea Blue was now to be used on aircraft painted in the low visibility camouflage color scheme. Insignia on the wings was reduced to a maximum diameter of 50 inches (127.00 cm). This was soon modified, though, with the issue of Amendment 1, to AN-I-9c, dated February 4, 1948, which changed the size back to 60 inches (152.40 cm) on the wings.

Amendment 3, to SR-2f, dated May 1, 1948, required the national aircraft insignia to be applied to the wings and

fuselage of all Naval aircraft with the exception of experimental models. However, the insignia was not to be applied on the wings of research aircraft when the application would interfere with the aerodynamics of the aircraft.

Amendment 2, to AN-I-9c, dated June 25, 1948, moved the insignia to the rear of the hull on flying boats, the same as on other aircraft. When the fuselage or hull section of any aircraft was not large enough to accommodate the minimum size specified, the insignia was to be placed on such other parts of the fuselage or hull as would permit it to be readily seen from the side and obtain suitable visibility.

DIMENSIONS FOR NATIONAL AIRCRAFT INSIGNIA



DIMENSIONS FOR NATIONAL AIRCRAFT INSIGNIA					
D	R	A	B	C	
10.00" (25.40 cm)	5.00" (12.70 cm)	2.50" (6.35 cm)	0.83" (2.12 cm)	0.63" (1.59 cm)	
20.00" (50.80 cm)	10.00" (25.40 cm)	5.00" (12.70 cm)	1.66" (4.23 cm)	1.25" (3.18 cm)	
25.00" (63.50 cm)	12.50" (31.75 cm)	6.25" (15.88 cm)	2.08" (5.29 cm)	1.56" (3.97 cm)	
30.00" (76.20 cm)	15.00" (38.10 cm)	7.50" (19.05 cm)	2.50" (6.35 cm)	1.88" (4.76 cm)	
35.00" (88.90 cm)	17.50" (44.45 cm)	8.75" (22.22 cm)	2.92" (7.41 cm)	2.19" (5.56 cm)	
40.00" (101.60 cm)	20.00" (50.80 cm)	10.00" (25.40 cm)	3.33" (8.47 cm)	2.50" (6.35 cm)	
45.00" (114.30 cm)	22.50" (57.15 cm)	11.25" (28.58 cm)	3.75" (9.25 cm)	2.81" (7.14 cm)	
50.00" (127.00 cm)	25.00" (63.50 cm)	12.50" (31.75 cm)	4.17" (10.58 cm)	3.13" (7.94 cm)	
55.00" (139.70 cm)	27.50" (69.85 cm)	13.75" (34.92 cm)	4.58" (11.64 cm)	3.44" (8.73 cm)	
60.00" (152.40 cm)	30.00" (76.20 cm)	15.00" (38.10 cm)	5.00" (12.70 cm)	3.75" (9.53 cm)	

SECTION 3

IDENTIFICATION AND RECOGNITION MARKINGS

CHAPTER 3 1940-1949

The period from 1940 to 1949 began with the aircraft being painted in the familiar colorful paint schemes and recognition markings associated with the US Navy/Marine Corps aircraft of the 1920's and 1930's. During the war these identification markings were replaced with several styles, each style depending on the camouflage system used. After the end of World War II there was a gradual change back to colorful markings. Generally, these were not authorized and, in fact, were in most cases in direct violation of the official directives. However, these "violations" were overlooked in the interest of unit pride and spirit. Being nonregulation there were as many colorful markings as there were squadrons, and these individual unit markings also changed frequently making a complete record impossible.

In addition to the colorful treatment of the wings, fuselage and tail assembly, and the national aircraft insignias covered in Sections I and II of Volume 1, the following markings were being used at the beginning of this period. The position of the aircraft in the squadron formation was shown by the color of the chevron on the upper surface of the wing in addition to the color and amount of the cowl painted in a section color. Section leaders were distinguished by a band of the appropriate section color around the rear fuselage. Squadron carrier assignment was denoted by the color of the empennage, while patrol aircraft and those assigned to battleships and cruisers were identified by a system of horizontal stripes on the tail surfaces to denote their squadron. U.S. NAVY and U.S. MARINES, as applicable, was applied on each side of the fuselage midway between the top and bottom longerons and parallel to the line of flight. The last letter was to be

Right: A beautifully restored Grumman Wildcat photographed at Grumman's Calverton, Long Island, New York's facility in May 1968. The aircraft's identification number, painted across the vertical tailplane, is not according to wartime regulations, but is to denote it's civilian ownership.





Left: Grumman biplanes were among the most colorful aircraft in naval aviation. This F3F-2 was assigned to the commanding officer of VMF-2. The squadron flew these aircraft until just a few weeks before being sent to Wake Island in F4Fs. When the squadron was reconstituted after the loss of Wake, the squadron insignia was modified to include the outline of Wake Island around the diving lion. The island formed the popular "V" for victory. Below: A Grumman F3F-3 of VF-5 in all its glorious colors — Light Gray metal surfaces, Aluminum doped fabric with Orange Yellow on the upper surface of the upper wing. A Red cowl, fuselage band and tail mark this airplane as being the commanding officer's aboard the USS YORKTOWN (CV-5).

located approximately 12 inches (30.48 cm) forward of the rudder hinge. These letters were to be appropriate in size to the aircraft, but in no case were they to be less than 4 inches (10.16 cm) in height. A series of three characters of appropriate size and on the same center line as the U.S. NAVY or U.S. MARINES identified the squadron, type and individual aircraft number. The model designation was applied to both sides of the rudder, near the top, in characters 3 inches (7.62 cm) high. The aircraft serial number was applied, near the top, on both sides of the fin in numerals of the same size and style.

In the case of nonrigid airships, two national aircraft insignia five feet (152.40 cm) in diameter were applied to the envelope. One was on top, centered on the fore and aft

centerline at the widest point of the envelope. The other was to be on the bottom centerline three feet (91.44 cm) back of a point midway between the front of the car and the bow of the envelope.

The class letter and number designating each airship, together with U.S. NAVY, was painted in blue characters 54 inches (137.16 cm) high on each side of the envelope centered above the car. The wording was to read from the rear forward on the right side and forward to the rear on the left side. A third identification group was placed under the bow ten feet 6 inches (320.04 cm) forward of the national aircraft insignia.

The building letter and number of the car was applied in blue characters 3 inches (7.62 cm) high on each side of

the car about midpoint of its length and level with the top longitudinal member.

The building letter and number of the envelope was applied in blue characters 3 inches (7.62 cm) high on the bottom just aft of the national aircraft insignia. The top of the characters was to be towards the bow. In the event the color of the envelope was such that the blue characters were not readily distinguishable, they were to have a white outline 1 inch (2.54 cm) wide around each character.

Building letters and numbers were applied on both sides of all control surfaces and stabilizers. These characters were blue and 3 inches (7.62 cm) high. On the elevators and rudders these characters were applied on the white band so that their top edge was 3 inches (7.62 cm) from the in-board edge or the top as applicable. On the fins or stabilizers the letters and numbers were painted in direct line with the letters and numbers on the control surfaces and 6 inches (15.24 cm) forward of the hinge line. On the horizontal surfaces, both top and bottom, the characters were placed with their bottom edge outboard. While on the vertical surfaces they were to read from the rear forward on the right side and forward to the rear on the left side.

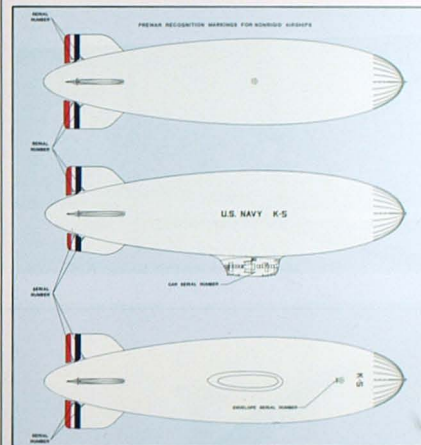
On March 6, 1940, the Chief of the Bureau of Aeronautics authorized VF-3 to paint an additional chevron on the under surface of their Brewster F2A-1 aircraft as requested. This is the only known authorized use of a chevron on the under surface of the wing.

Appendix A to the NAS San Diego Local Process Specification No. 128, dated March 8, 1940, specified the size and location for Model Designation, Bureau Number, and Service Identification (U.S. NAVY). The national aircraft insignia dimensions, specified in this directive, have been covered in Section 2. The following is probably as good a set of location dimensions as can be compiled for this period.

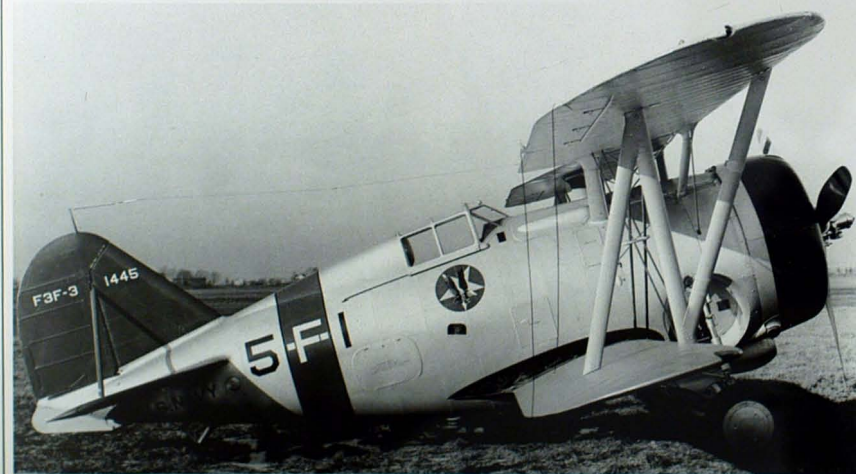
Model	Size of Letters			Location to Center of Numerals	
	High	Wide	Stroke	of Rudder	
BQ-1	6" (15.24 cm)	4 1/2" (11.43 cm)	1" (2.54 cm)	12" (30.48 cm) forward of rudder hinge and midway between top and bottom longitudinal	-2 -3
BT-1	6" (15.24 cm)	4 1/2" (11.43 cm)	1" (2.54 cm)	14" (35.56 cm) forward of rudder hinge, 4" (10.16 cm) below stabilizer root and parallel to longitudinal axis of aircraft	-2 -3



Right: Along with the U.S. NAVY and airship designation note the American flag flying from the stern. This was a carry over from the rigid airships which were operated as a ship of the fleet.



F2A-1	4"	10.16 cm	3"	(7.62 cm)	9/16" (1.42 cm)	13 1/2" (34.29 cm) forward of stabilizer leading edge 1 1/2" (3.81 cm) below center longitudinal seam and parallel to longitudinal axis of aircraft
F2F-1	4"	10.16 cm	3"	(7.62 cm)	3/4" (1.90 cm)	11 1/2" (29.21 cm) forward of rudder hinge and midway between top and bottom stringers
F3F-1	4"	10.16 cm	3"	(7.62 cm)	3/4" (1.90 cm)	11 1/2" (29.21 cm) forward of rudder hinge and midway between top and bottom longitudinal stringers
J2F-1	6"	15.24 cm	4 1/2"	(11.43 cm)	1" (2.54 cm)	12" (30.48 cm) forward of rudder hinge and midway between top and bottom longitudinal stringers
PEY-1	10 1/4"	26.03 cm	8"	(20.32 cm)	2" (5.08 cm)	12 1/4" (31.11 cm) forward of rudder hinge, 39" (99.06 cm) below stabilizer at rudder parallel to longitudinal axis of aircraft
P2Y-1	10"	25.40 cm	7 1/2"	(19.05 cm)	1 5/8" (4.12 cm)	47" (119.38 cm) forward of trailing edge of hull and midway between keel and top of hull and parallel to longitudinal axis of aircraft





Left: Many squadrons were issued an obsolescent airplane for utility purposes. In this case it is a Curtiss SBC-3 of VMF-2. A normal squadron complement was eighteen airplanes and the utility plane, if assigned, either had a higher side number or none at all. **Middle Left and Right:** The leader of the second section of VF-4, the Red Rippers, well illustrates the colorful markings of the period. **Bottom:** The Red Rippers were redesignated VF-41 when assigned to the new USS RANGER (CV-4).



Right: A Curtiss SBC-4 assigned to the First Marine Aircraft Wing (1st MAW) Headquarters as their number two aircraft. **Middle Left and Right:** The lack of the second numeral in the squadron designation was due to the pending change in squadron number. The manufacturer intentionally left space for the second digit when the change was made. **Bottom:** At the end of the era of colorful airplanes this SBD-1 of VMB-2 well illustrates how the chevron was applied in the case of a monoplane. The aircraft number now appears on each wing between the chevron and the fuselage.





Left: This Beech GB-1 is identified as being assigned to the U.S. Naval Attache in Mexico City. Bottom Left: The distinctive Marine Corps insignia and vertical Red, White, and Blue rudder stripes were soon to be eliminated in the change to overall Gray airplanes. Bottom Right: San Diego, Quantico, and Port au Prince had Base Air Detachments 1, 2, and 3 which were the base operating unit providing major overhaul, ordnance support and other such functions. M.B. stands for Marine Barracks which was the base name at this time. Opposite: In an effort to fully identify them as American aircraft, VP-21 painted the American flag on their aircraft prior to hostilities in the Pacific. Opposite Bottom: Consolidated PB2Y-2 Coronado of VP-13. The section color is Red and the tail stripe is True Blue. The Black stripe the length of the fuselage is a walkway for use in servicing the airplane.

SBC-3	6'	(15.24 cm)	4 1/2"	(11.43 cm)	1"	(2.54 cm)	19"	(48.26 cm)	forward of rudder hinge and midway between top and bottom longitudinal stringers
SBC-4	6'	(15.24 cm)	4 1/2"	(11.43 cm)	1"	(2.54 cm)	9"	(22.86 cm)	forward of rudder hinge and midway between top and bottom longitudinal stringers
SB2U-1	6'	(15.24 cm)	4 1/2"	(11.43 cm)	1 1/4"	(3.17 cm)	12"	(30.48 cm)	forward of rudder hinge line, centrally located between top and bottom longons parallel to longitudinal axis of aircraft
SOC-1	6'	(15.24 cm)	4 1/2"	(11.43 cm)	1"	(2.54 cm)	12"	(30.48 cm)	forward of rudder hinge, midway between top and bottom longons and parallel to longitudinal axis of aircraft
SU-1	6'	(15.24 cm)	4 1/2"	(11.43 cm)	1"	(2.54 cm)	15 1/2"	(39.37 cm)	forward of rudder hinge, midway between top and bottom longon
TBD-1	9'	(22.86 cm)	6 3/4"	(17.14 cm)	1 1/2"	(3.81 cm)	13"	(33.02 cm)	forward of rudder hinge, 5" (12.70 cm) down from stabilizer root parallel to longitudinal axis of aircraft

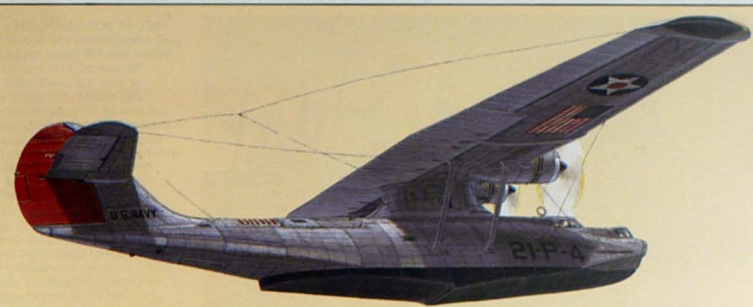
MODEL DESIGNATION

Model	Size of Letters		Stroke	Location to Center of Numeral
	High	Wide		
BG-1	3" (7.62 cm)	2 1/4" (5.71 cm)	1/2" (1.27 cm)	16 1/2" (41.91 cm) from top of rudder
BT-1	3" (7.62 cm)	2 1/4" (5.71 cm)	1/2" (1.27 cm)	21 1/8" (53.65 cm) from top of rudder
F2A-1	3" (7.62 cm)	2 1/4" (5.71 cm)	1/2" (1.27 cm)	25" (63.50 cm) from top of rudder
F2F-1	3" (7.62 cm)	2 1/4" (5.71 cm)	1/2" (1.27 cm)	16 1/4" (41.27 cm) from top of rudder

F3F-1	3"	(7.62 cm)	2 1/4"	(5.71 cm)	10 1/2"	(27.14 cm)	18"	(45.72 cm)	from top of rudder
J2F-1	3"	(7.62 cm)	2 1/4"	(5.71 cm)	10 1/2"	(27.14 cm)	15"	(38.10 cm)	from top of rudder
PBY-1	4"	(10.16 cm)	3"	(7.62 cm)	5 8"	(15.88 cm)	37 1/2"	(95.25 cm)	from top of rudder, 19 1/2"
	-2								(49.53 cm) from leading edge of rudder
	-3								
P2Y-1	4"	(10.16 cm)	3"	(7.62 cm)	1 1/16"	(2.69 cm)	20"	(50.80 cm)	from top of rudder
	-2								
SBC-3	3"	(7.62 cm)	2 1/4"	(5.71 cm)	10 1/2"	(27.14 cm)	16"	(40.64 cm)	from top of rudder
SBC-4	3"	(7.62 cm)	2 1/4"	(5.71 cm)	10 1/2"	(27.14 cm)	22 1/2"	(57.15 cm)	from top of rudder
SB2U-1	3"	(7.62 cm)	2 1/4"	(5.71 cm)	10 1/2"	(27.14 cm)	24 1/2"	(62.23 cm)	from top of rudder
	-2								
SOC-1	3"	(7.62 cm)	2 1/4"	(5.71 cm)	10 1/2"	(27.14 cm)	29"	(73.66 cm)	from top of rudder
SU-1	3"	(7.62 cm)	2 1/4"	(5.71 cm)	10 1/2"	(27.14 cm)	22"	(55.88 cm)	from top of rudder
	-2								
TBD-1	3"	(7.62 cm)	2 1/4"	(5.71 cm)	10 1/2"	(27.14 cm)	13 1/2"	(34.29 cm)	from top of rudder

BUREAU NUMBER

Model	Size of Letters			Location to Center of Numeral	
	High	Wide	Stroke		
BG-1	3" (7.62 cm)	2 1/4" (5.71 cm)	1/2" (1.27 cm)	11"	(27.94 cm) from top of vertical fin
BT-1	3" (7.62 cm)	2 1/4" (5.71 cm)	1/2" (1.27 cm)	12 1/8"	(30.79 cm) from top of vertical fin
F2A-1	3" (7.62 cm)	2 1/4" (5.71 cm)	1/2" (1.27 cm)	25"	(63.50 cm) from top of vertical fin
F2F-1	3" (7.62 cm)	2 1/4" (5.71 cm)	1/2" (1.27 cm)	11 1/2"	(29.21 cm) from top of vertical fin
F3F-1	3" (7.62 cm)	2 1/4" (5.71 cm)	1/2" (1.27 cm)	11 1/4"	(28.57 cm) from top of vertical fin
J2F-1	3" (7.62 cm)	2 1/4" (5.71 cm)	1/2" (1.27 cm)	15"	(38.10 cm) from top of vertical fin
PBY-1	3" (7.62 cm)	2 1/4" (5.71 cm)	1/2" (1.27 cm)	37 1/2"	(95.25 cm) from top of vertical fin, 1 1/4" (3.17 cm) from trailing edge of fin



P2Y-1	3"	(7.62 cm)	2 1/4"	(5.71 cm)	10 1/2"	(27.14 cm)	6 1/2"	(16.51 cm)	from top of vertical fin
-2							34"	(86.36 cm)	forward of trailing edge
-3									
SBC-3	3"	(7.62 cm)	2 1/4"	(5.71 cm)	10 1/2"	(27.14 cm)	15"	(38.10 cm)	from top of vertical fin
SBC-4	3"	(7.62 cm)	2 1/4"	(5.71 cm)	10 1/2"	(27.14 cm)	17 3/4"	(45.08 cm)	from top of vertical fin
SB2U-1	3"	(7.62 cm)	2 1/4"	(5.71 cm)	10 1/2"	(27.14 cm)	17 1/2"	(44.45 cm)	from top of vertical fin
SOC-1	3"	(7.62 cm)	2 1/4"	(5.71 cm)	10 1/2"	(27.14 cm)	13"	(33.02 cm)	from top of vertical fin
SU-1	3"	(7.62 cm)	2 1/4"	(5.71 cm)	10 1/2"	(27.14 cm)	11"	(27.94 cm)	from top of vertical fin
TBD-1	3"	(7.62 cm)	2 1/4"	(5.71 cm)	10 1/2"	(27.14 cm)	13 1/2"	(34.29 cm)	from top of rudder hinge fitting

The overall length of the 6 inch (15.24 cm) high U.S. NAVY was 32 1/2 inches (82.55 cm) and of the 4 inch (10.16 cm) size was 22 1/4 inches (56.51 cm).

On March 27, 1940, the Commander Aircraft, Scouting Force, reported that the patrol aircraft assigned to Aircraft Scouting Force, with the exception of VP-14, were painted as shown below. Patrol Squadron Fourteen was assigned green markings pending receipt of new aircraft.

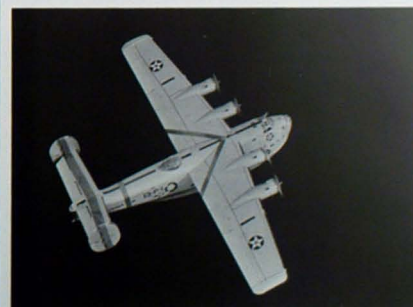
VP-11 — Blue	(Double Stripe)
VP-12 — Red	(Double Stripe)
VP-14 — Green	(Double Stripe)
VP-21 — Red	(Solid)
VP-22 — Yellow	(Solid)
VP-23 — Blue	(Solid)
VP-24 — Aluminum	(Solid)
VP-25 — Black	(Solid)
VP-26 — Green	(Double Stripe)
VP-31 — Green	(Single Stripe)
VP-32 — Red	(Single Stripe)
VP-41 — Blue	(Checker)
VP-42 — Red	(Checker)
VP-43 — Yellow	(Checker)
VP-44 — Black	(Checker)
VP-51 — Yellow	(Solid)
VP-53 — Red	(Solid)

squadron to another, as well as assignment of new aircraft to squadrons then in existence. A reassignment of squadron colors and tail markings would cause less confusion if made at this time, rather than upon the delivery of new aircraft. With this in mind Commander Aircraft, Scouting Force, recommended a new system of colors and distinctive markings to be assigned to the patrol squadrons. After several adjustments, these recommendations were approved by the Commander in Chief, United States Fleet on June 5, 1940.

Instructions to implement the new markings were issued on May 31, 1940, by Commander Aircraft, Scouting Force, to all Patrol Wings as follows:

The colors assigned patrol squadrons corresponded to those in use for section colors in 18 plane squadrons and were:

First squadron in each wing	— Red
Second squadron in each wing	— White
Third squadron in each wing	— Blue
Fourth squadron in each wing	— Black
Fifth squadron in each wing	— Green
Sixth squadron in each wing	— Yellow



During the next two years the number of patrol aircraft assigned was to increase approximately 100 percent. This would necessitate numerous transfers of aircraft from one



Left: The tail of a PBV-3 of Utility Squadron One of the Base Force (VJ-1F) in May 1940 showing the location of single stripes on the vertical and horizontal surfaces. In this case a black line is used to separate the White from the Aluminum finish.

To distinguish aircraft assigned to the Wings of Aircraft Scouting Force the following distinctive markings were specified for each Wing:

Patrol Wing One	—	Single Vertical Stripe
Patrol Wing Two	—	Double Vertical Stripe
Patrol Wing Three	—	Single Horizontal Stripe
Patrol Wing Four	—	Double Horizontal Stripe
Patrol Wing Five	—	Solid
Patrol Wing Six	—	Checkered
Patrol Wing Seven	—	Double Vertical Stripes

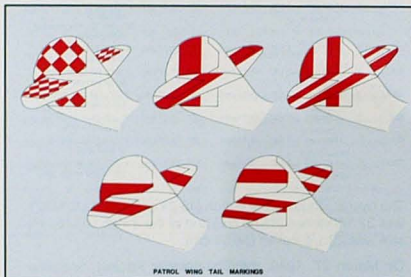
The instructions for the application of these tail markings, detailing their size and location, were as follows:

Single Vertical Stripe: Width of stripe was to be one-third of the maximum chord of horizontal stabilizer and elevator (approximately 32 inches [81.28 cm]). The rear edge of the rudder stripe was to be in line with the trailing edge of the elevator, and the forward edge of the rudder stripe was to be in line with the rear edge of the elevator and horizontal stabilizer stripe.

Double Vertical Stripes: Width of stripes was to be one-fifth of the maximum chord of horizontal stabilizer and elevator (approximately 18 1/2 inches [46.99 cm]). The stripes were placed symmetrically on the horizontal surfaces and the rudder stripes were placed so that edges of the stripes were in line with those on the horizontal surfaces to form a continuous stripe of a given color.

Single Horizontal Stripe: Width of stripe was to be one-third of the span of half the horizontal stabilizer (approximately 54 inches [137.16 cm]). The stripe was to be placed symmetrically on the two sides of the horizontal stabilizer and elevator, and symmetrically on the rudder with respect to the elevator.

Double Horizontal Stripes: Width of stripes on horizontal surfaces was to be one-fifth of span of half the horizontal stabilizer, (approximately 33 inches [83.82 cm]) and spaced symmetrically on the two sides of the horizontal stabilizers and elevators. Width of stripes on rudder was to be one-fifth of vertical dimension of rudder and fairing area beneath the rudder, approximately 28 inches (71.12 cm), and spaced symmetrically with respect to the elevator.



Stripes on horizontal surfaces (horizontal stabilizers and elevators) extended over those combined surfaces.

Stripes on vertical surfaces (the rudder) covered only that surface, while the vertical fin retained its original aluminum finish.

When solid colors were used, only the tail control surfaces (rudder and elevator) were to be painted.

Dimensions for checkered designs were for the squares to be 20 inches (50.80 cm) on a side. Only the tail control surfaces (rudder and elevator) were to be painted in checkered tail markings.

A one inch (2.54 cm) black border stripe was required on all colored markings to improve color contrast and the line of demarcation.

The dimensions and locations specified above applied to the PBV type only. The dimensions were given in approximate terms in order to permit units to adjust the color lines and rib spacings as considered desirable to produce the best appearance in tail painting. Once again this accounts for some of the variations seen in these markings.

While the directives specified an assortment of tail markings, there are few photographs that show how they were actually applied. There appear to be several factors that contributed to the dirt of photographs. As the number of patrol squadrons expanded, the existing aircraft were transferred to give some to each new squadron. This

Right: A SBD-3 assigned to U.S. Fleet Aircraft Tactical Unit painted overall Gray with White markings. This was a small unit under control of Commander Aircraft, Battle Force, U.S. Fleet to evaluate tactics, etc. Middle Left: Number one aircraft of VP-12 with its Red cowls, chevron and fuselage band. Note the thin White stripe to separate the Red chevron from the Orange Yellow of the wing. Tail stripes are Lemon Yellow. Middle Right: Northrop BT-15 of the Training Command flying over Miami, Florida. Bottom: North American SNJ-2 assigned to the Naval Reserve Air Base New York. The True Blue cowl and fuselage band would be correct for number 7 aircraft in a fleet squadron. The Blue tail assembly was a recognition feature on the New York reserve aircraft.





Left: A Curtiss SBC-3 assigned to the Air Group Commander on the USS YORKTOWN (CV-5). The empenage and diagonal stripe on the fuselage denoting the CAG are Red, the color assigned to the Yorktown. Bottom Left: Vought O3U-3 assigned to the Naval Aircraft Factory in Philadelphia during the test of prelacquered paper tape for quick camouflage. Bottom Right: Close up of prelacquered paper tape being evaluated as a quick means of camouflage in 1940.

resulted in many squadrons having only six aircraft. With so few aircraft the chances of a photograph showing specific squadron markings became quite slim. It was realized that such an extensive change would cause excessive work loads on the squadrons which were self-supporting and received little help from the stations or O&Rs, as well as causing interference with approved schedules if attempted immediately. Due to the pending transfer of aircraft and squadrons within the various wings, it was directed that aircraft and squadrons that were to be transferred did not have to be painted until located in the new organization. To further ease the problem, it was directed that the change must be completed in each squadron during any quarter, but that all aircraft assigned at the time of the directive had to be painted in the new markings by January 1, 1941.

It is believed that many of the transferred aircraft did have the squadron number changed. But due to the amount of work necessary to repaint the large tail assembly and because of more pressing needs, the aircraft continued to be operated with the previous squadron tail markings. It is also thought that due to this workload some of the new aircraft were simply never painted. If these assumptions are correct, then the new squadron tail markings were little more than a paper designation and were, in fact, never applied to many of the aircraft before the entire tail marking system was abandoned. These markings were eliminated by the change to the two-tone camouflage scheme which became

effective December 30, 1940, and the subsequent directive on markings dated February 26, 1941.

On July 2, 1940, the Chief of Naval Operations authorized the Commander in Chief, United States Fleet, to designate the identification tail markings of all US Fleet aircraft using any combination of colors or designs as he saw fit.

A series of tests were conducted in 1939/1940 to determine the practicability of using colored Scotch tape for temporary identification markings during hostilities. It was visualized that this would be a quicker method than the use of temporary water soluble paints. It was found in the initial tests that the color of the tape tended to remain on the aircraft surface after removal of the tape. It was suggested that additional tape with the color on the outside be procured for additional evaluation. Lacquered paper decorator tape was also procured. It was determined by actual fleet tests that the tape was difficult to apply and came off easily in flight. The removal of the tape also resulted in undesirable removal of the aircraft protective finish. In any event, the designs available were not apparent enough at medium or long ranges to make the tape worthwhile in view of the other objections. In a report to the Bureau of Aeronautics, dated July 19, 1940, Commander in Chief, United States Fleet, concurred with the findings of Commander Aircraft, Battle Force and Commander Aircraft, Scouting Force, that service tests of decorator's tape for identification of aircraft had a harmful tendency and, in any case, would not serve the intended purpose.



Right: A Curtiss SOC of Cruiser Scouting Squadron 7. Number 3 airplane shows that the USS WICHITA (CA-45), which carried four airplanes, was the flagship of Cruiser Squadron 7. Bottom: While the PB2M-1 Mars succumbed to the wartime paint scheme it still continued to carry its name on the bow. This was perhaps the only airplane to continue to have its popular name applied in violation of the directives.

On December 1, 1940, the designation of training squadrons at NAS Pensacola, Florida, were changed as follows:

Old Designation	Type Training	New Designation
VN2D8	Primary	VN1D8-A VN1D8-B VN1D8-C VN1D8-D* VN2D8
VN3D8	Basic	VN3D8
VN5D8	Instrument	VN4D8
VN4D8	Advanced VP	VN5D8
VN1D8	Advanced VO-VCS	

* This squadron was to be formed about April, 1941.

It must be remembered that the color schemes for the various squadrons were also changed with these changes in designation.

The new SR-2b, *Specification for Naval Aircraft Insignia and Marking*, was issued with an effective date of December 14, 1940. Class designations were increased to conform with the expanded aircraft mission assignment to include the following:

	Airplane	Rigid Airship	Nonrigid Airship	Kite Balloon
Bombing	VB	—	—	—
Fighting	VF	—	—	—
General Utility	VS	—	—	—
Utility Transport	VJR	—	—	—





LOCATION OF MARKING ON A PBY WING

Bottom Left: This Grumman F4F-3 of VMF-121 is overall Gray with White lettering. Markings on the fin and rudder are correctly applied. **Bottom Right:** A Vought SB2U-3 of Marine Scouting Squadron 2 (VMS-2) soon to become VMSB-231. The location of markings on the fin and rudder do not conform to the directives.

Training	VN	ZRN	ZNN	ZKN
Observation	VO	—	ZN	ZKO
Observation Scouting	VOS	—	—	—
Patrol	VP	ZRP	ZNP	—
Patrol Bombing	VPB	—	—	—
Transport (Multiengine)	VR	—	—	—
Scouting	VS	ZRS	ZN	—
Scouting Bombing	VSF	—	—	—
Scouting Observation	VOS	—	—	—
Torpedo Bombing	VTB	—	—	—
Transport (Single-engine)	VG	—	—	—

The Carrier Air Group Commander's aircraft was to be identified by a diagonal band, 14 inches (35.56 cm) wide, around the fuselage forward of the service marking. The designation COMMANDER (name of ship) GROUP was to be painted horizontally on each side of the fuselage. This band was to be of the same color as the distinguishing empennage painting of the carrier group.

The designations on aircraft with multiple tails for the serial



number as well as the letters and numbers denoting the manufacturer, class and model were applied only to the outboard side.

The following list of assigned tail colors and designations reflects the increased number of squadrons.

Patrol Wing One — Single Vertical Stripe (Elevators and Rudder)

VP-11	—	Insignia Red
VP-12	—	White
VP-13	—	True Blue
VP-14	—	Black

Patrol Wing Two — Double Vertical Stripe (Elevators and Rudder)

VP-22	—	Insignia Red
VP-23	—	White
VP-24	—	True Blue
VP-25	—	Black
VP-26	—	Willow Green
VP-27	—	Lemon Yellow

Patrol Wing Three — Single Horizontal Stripe (Elevators and Rudder)

VP-31	—	Insignia Red
VP-32	—	White

Right: In 1940, nonrigids still carried the airship designation on the bottom of the envelope at the bow with the national aircraft insignia. The airship designation was still carried on the side. Red, White, and Blue rudder stripes were also carried. **Middle Right:** Vought SB2U-2 of VS-72 assigned to the neutrality patrol. Note the half cowl Willow Green denoting aircraft number 15 and how the Blue stripe on the rear of the propeller is continued inboard to prevent glare in the pilot's eyes.



VP-33	—	True Blue
VP-34	—	Black

Patrol Wing Four — Double Horizontal Stripe (Elevators and Rudder)

VP-41	—	Insignia Red
VP-42	—	White
VP-43	—	True Blue
VP-44	—	Black

Patrol Wing Five — Solid (Complete Empennage)

VP-51	—	Insignia Red
VP-52	—	White
VP-53	—	True Blue
VP-54	—	Black
VP-55	—	Willow Green
VP-56	—	Lemon Yellow

Patrol Wing Six — Checkered (Elevators and Rudder)

VP-61	—	Insignia Red
VP-62	—	White

Patrol Wing Seven — Double Vertical Stripe (Elevators and Rudder)

VP-71	—	Insignia Red
VP-72	—	White

Battleship-based squadrons and Utility Squadrons were designated by solid tail colors similar to the carrier-based squadrons.

VO-1	—	Insignia Red, solid (Complete Empennage)
VO-2	—	White, solid (Complete Empennage)
VO-3	—	True Blue, solid (Complete Empennage)
VO-4	—	Black, solid (Complete Empennage)
VO-5	—	Lemon Yellow, solid (Complete Empennage)
VJ-1	—	Willow Green, solid (Complete Empennage)
VJ-2	—	Lemon Yellow, solid (Complete Empennage)
VJ-3	—	Aluminum, solid (Complete Empennage)



Cruiser-based squadrons and special aircraft not assigned to a squadron were designated by stripes on the elevators and rudder only.

VCS-2	—	True Blue, Double Horizontal Stripe
VCS-3	—	Insignia Red, Double Horizontal Stripe
VCS-4	—	True Blue, Single Horizontal Stripe
VCS-5	—	Lemon Yellow, Single Horizontal Stripe
VCS-6	—	Black, Single Horizontal Stripe
VCS-7	—	Willow Green, Single Horizontal Stripe
VCS-8	—	Black, Double Horizontal Stripe
VCS-9	—	Willow Green, Double Horizontal Stripe
USS RALEIGH	—	Insignia Blue, Double Horizontal Stripe
USS DETROIT	—	Insignia Blue, Double Horizontal Stripe
USS RICHMOND	—	Insignia Red, Double Horizontal Stripe



Left: Grumman Wildcat from VMF-111 at Quantico while on maneuvers. A most peculiar marking, even though temporary, to be carried on a tactical aircraft.

In keeping with the correct color names, the colors for the carriers were given as:

Lexington	—	Lemon Yellow
Saratoga	—	White
Ranger	—	Willow Green
Yorktown	—	Insignia Red
Enterprise	—	True Blue
Wasp	—	Black

The name is changed from before, but the colors remain the same.

In the event a squadron did have an approved insignia, the directive now required it to be applied to the fuselage of the unit's aircraft.

The instructions for painting the chevron and aircraft number on the upper surface of the wing had to be modified to accommodate monoplanes. For low-wing monoplanes the aircraft number was painted on each outer wing panel midway between the national aircraft insignia and the

extremity of the center wing panel. Where possible the chevron was to be applied so that the apex of the chevron aligned with the center of the pilot's cockpit. When the chevron markings on the wing terminated at the leading edge, it was to be continued to a point on the under surface of the wing approximately five percent of the chord from the leading edge.

In addition to the normal prescribed squadron markings, aircraft used in instrument training were to be painted with two red fore and aft stripes, three feet (91.44 cm) wide, on the upper surface of the upper wings and lower surface of the lower wings. In addition, a three foot (91.44 cm) wide red band was to be painted around the fuselage forward of the horizontal stabilizer.

The exact size and shape of letters and numerals to be applied to airships and aircraft was shown for the first time since *Aircraft Specification No. 49*, dated December 1919, and used the original illustration.



Left: A North American SNJ-3 with Red wing and fuselage stripes to indicate it is an instrument trainer prior to May 1942.



Right: Curtiss SBC-4 of VB-8 with special markings for use during maneuvers which were terminated by the bombing of Pearl Harbor on December 7, 1941. Bottom: This photo of the operating area at NAS Norfolk in February 1942 illustrates the variety of markings being used. A bare metal SNJ assigned to VF-72 for instrument work with no rudder stripes or side insignia. Another bare metal SNJ with rudder stripes as well as tactical aircraft with and without rudder stripes can be seen.

The Bureau of Aeronautics letter dated December 30, 1940, which specified the overall gray scheme for all ship-based aircraft, and blue gray and gray scheme for patrol aircraft, did not give any instructions for the application of insignia and markings. This was to be covered in separate correspondence.

This lack of instructions concerning the identification marking to be applied caused some concern within the fleet. The following system of markings, using both colors and shapes, was submitted to the Bureau of Aeronautics by Fighting Squadron 71 (VF-71) on January 20, 1941. As in the old system, there were four items that needed to be identified by the marker:

1. Carrier to which aircraft was assigned
2. Squadron the aircraft was a unit of

3. Section the aircraft was a unit of
4. Number within the section

Item number 1, the carrier to which the aircraft was assigned, was shown by the shape of the marker.

Item number 2, the squadron the aircraft was a unit of, was indicated by the color assigned the squadron. It was recommended that the standard section colors be retained for all these markings.

Item number 3, the section the aircraft was a unit of, was shown by the standard section color.

Item number 4, the number or position of the aircraft within the section, was indicated by the established sequence of colors by using red, white, or blue, to correspond to 1, 2, or 3.





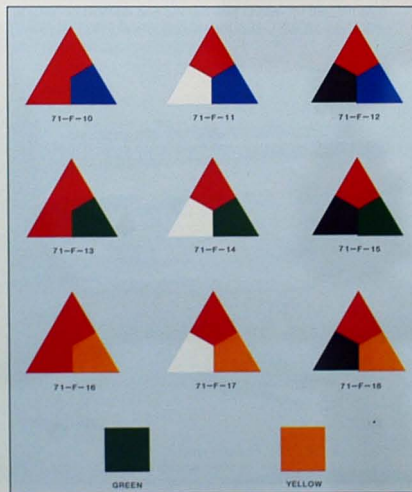
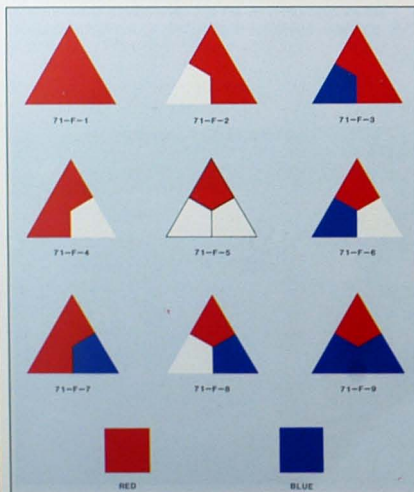
Left: Many airplanes being used for training continued to use some of the markings they used while in the fleet, such as the colored tail surfaces on the PZV-2, shown here, at NAS Pensacola, Florida, during April 1940.

A number of different shaped markers that could be assigned to different carriers were submitted. It was recommended that only figures constructed with straight lines be used. In reading these markers, if the stripes or sections were vertical, they were to be read from left to right; if horizontal, from top to bottom; if diagonal, from left to right; and if concentric, from the center out.

An example of the system was submitted using VF-71, which depicted all eighteen combinations for a squadron. A triangle divided into three equal parts was selected to represent the USS WASP. Reading clockwise from the top these sections indicated: (top) squadron, (right corner) section, (left corner) number in section. In this example, it was assumed that VF-71 as the first fighter squadron aboard would be assigned the color red. In this case, the marker for 71-F-1 would be solid red because the

squadron color was red, the first section color was red, and the number one aircraft in the section was to be indicated by red. The rest of the markers in the example are self-explanatory. The only other marking required was a black numeral on the leading edge of the left wing, clear of the propeller arc, for the benefit of the Landing Signal Officer.

While it was felt by the squadron that this would be a simple system to learn and could be applied to both sides of the vertical tail surfaces, it was really more complex than the established system which had just been discontinued. The marker would have to be large enough to distinguish, especially the concentric shapes, and would reintroduce bright colors to destroy the basic camouflage. In addition, it had the same limitations of the old system, which had reached its maximum capabilities, in that there were not enough colors or shapes for all the carriers then



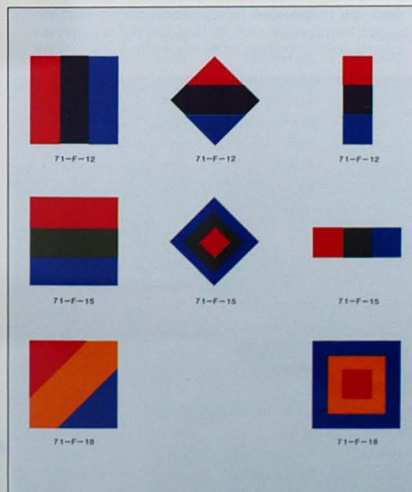
Right: These P3M-2s at NAS Pensacola, in 1940 only carry a sequential side number for identification.

contemplated. In any event the system was rejected and the squadron was directed to apply the normal fuselage markings.

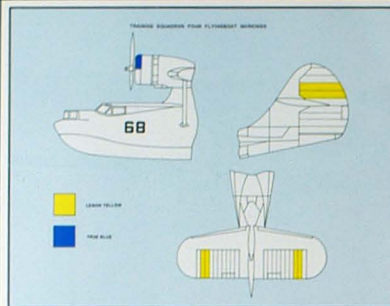
Specific markings for all Patrol Wings aircraft were issued by Commander Aircraft, Scouting Force, on February 1, 1941. The aircraft type and serial number on the tail were to be 4 inches (10.16 cm) high. While U.S. NAVY was not specified it was to be the same size. All squadron insignia, chevron, gunnery "E"s and squadron markings were to be eliminated. The number of aircraft within the squadron was to be painted on both sides of the bow, aft of the national aircraft insignia, and on the center section of the wing, 24 inches (60.96 cm) high. The number of the squadron was not to be used. The numbers of the aircraft assigned to the first section of each squadron were to be nonspecular Red; the second section nonspecular White; the third section

nonspecular Blue; the fourth section nonspecular Green; and spare aircraft were to be painted nonspecular Yellow. These aircraft numbers were assigned in blocks of 15 consecutive numbers for each squadron in a Wing. The lowest numbered squadron was to use 1 to 15, the second 16 to 30, etc. Thus VP-11 would use numbers 1 to 15; VP-12 numbers 16 to 30; VP-13 numbers 31 to 45; VP-14 numbers 46 to 60. The block of fifteen numbers was to be used for each squadron of a Wing irrespective of the number of aircraft assigned.

The first known directive mentioning the unit designation markings was a Bureau of Aeronautics letter to VF-71, dated February 18, 1941. Pending receipt of specific instructions VF-71 was authorized to apply the conventional fuselage markings, i.e., 71-F-1, in characters 12 inches (30.48 cm) in height in white on the sides of the fuselage.



Above: This Curtiss SOC-1 is assigned to the USS SALT LAKE CITY (CA-25) and carries only the True Blue single horizontal tail stripes of VCS-4 for identification.



Pensacola, issued a memorandum on the markings that were to be applied to their patrol planes. The squadron was divided into five divisions in much the same manner as a patrol wing was divided into squadrons. Each division was composed of nine airplanes. The aircraft were numbered and marked on the cowl, belly, and tail in much the same manner as airplanes in fleet squadrons.

The unit digit indicated the number of the airplane within the division, while the tens digit indicated the division number. The standard sequence of Navy color markings were used on the tails to indicate the division number. All airplanes with numbers ending in zero were spare aircraft.

First Division

Tail	Cowl	Belly Band	Number
Red	Aluminum	None	10
Red	All Red	Red	11
Red	Top half Red	None	12
Red	Bottom half Red	None	13
Red	All White	White	14
Red	Top half White	None	15
Red	Bottom half White	None	16
Red	All Blue	Blue	17
Red	Top half Blue	None	18
Red	Bottom half Blue	None	19

Second Division

Tail	Cowl	Belly Band	Number
White	Aluminum	None	20
White	All Red	Red	21
White	Top half Red	None	22
White	Bottom half Red	None	23
White	All White	White	24
White	Top half White	None	25
White	Bottom half White	None	26
White	All Blue	Blue	27
White	Top half Blue	None	28
White	Bottom half Blue	None	29

Third Division

Tail	Cowl	Belly Band	Number
Blue	Aluminum	None	30
Blue	All Red	Red	31
Blue	Top half Red	None	32
Blue	Bottom half Red	None	33
Blue	All White	White	34
Blue	Top half White	None	35
Blue	Bottom half White	None	36
Blue	All Blue	Blue	37
Blue	Top half Blue	None	38
Blue	Bottom half Blue	None	39

Fourth Division

Tail	Cowl	Belly Band	Number
Black	Aluminum	None	40
Black	All Red	Red	41
Black	Top half Red	None	42
Black	Bottom half Red	None	43
Black	All White	White	44
Black	Top half White	None	45
Black	Bottom half White	None	46
Black	All Blue	Blue	47
Black	Top half Blue	None	48
Black	Bottom half Blue	None	49

Fifth Division

Tail	Cowl	Belly Band	Number
Willow Green	Aluminum	None	50
Willow Green	All Red	Red	51
Willow Green	Top half Red	None	52
Willow Green	Bottom half Red	None	53
Willow Green	All White	White	54
Willow Green	Top half White	None	55
Willow Green	Bottom half White	None	56
Willow Green	All Blue	Blue	57
Willow Green	Top half Blue	None	58
Willow Green	Bottom half Blue	None	59

Right: A Grumman Wildcat with unit identification in Black against the Blue Gray two tone scheme to provide the least visibility.
Bottom: This Lockheed PB0-1 of VP-82 based at Argentia, Newfoundland, has a combination of the British camouflage and the US national aircraft insignia and rudder stripes.



Sixth Division

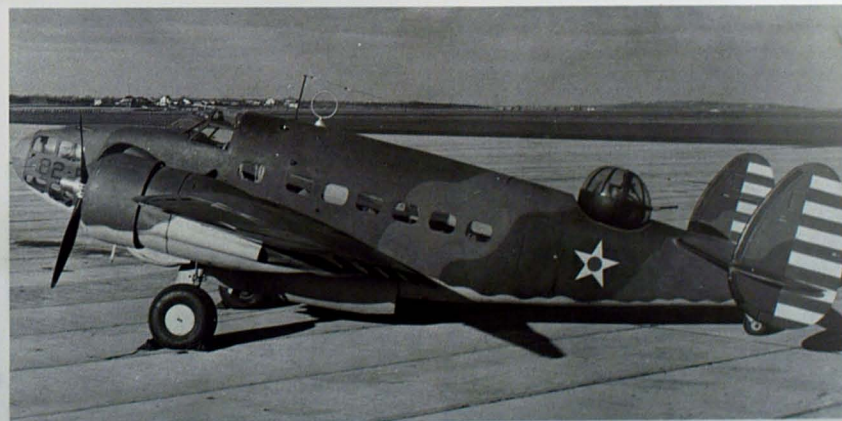
Tail	Cowl	Belly Band	Number
Lemon Yellow	Aluminum	None	60
Lemon Yellow	All Red	Red	61
Lemon Yellow	Top half Red	None	62
Lemon Yellow	Bottom half Red	None	63
Lemon Yellow	All White	White	64
Lemon Yellow	Top half White	None	65
Lemon Yellow	Bottom half White	None	66
Lemon Yellow	All Blue	Blue	67
Lemon Yellow	Top half Blue	None	68
Lemon Yellow	Bottom half Blue	None	69

The squadron at this time was flying the PBY and the stripe on the rudder was to be between the third and fifth ribs from the top. The stripe on the elevators was to be between the first (not end) rib, from the outboard side, to the third rib. A stripe was to be applied to each elevator.

The number was to be applied to each side of the hull with its forward edge in line with the aft edge of the pilot's sliding window. No dimensions were specified for these large numbers.

As conditions deteriorated in Europe, the US Navy started to move into a wartime environment. On February 26, 1941, the Bureau of Aeronautics issued letter Aer-E-25-HY, *Exterior Painting and Insignia and Marking of Fleet Aircraft*. This directive brought an end to the colorful recognition markings two months after the bright color schemes had been abolished. It called for the following marking changes.

Although no alphabet was shown, the shape of letters and numerals was described. The character width was to be approximately 3/4 of the height. The width of the individual strokes forming them was to be 1/6 of the height. All characters were to be of the modified vertical block type, uniform in shape and size. All letters and numerals applied to the outer surfaces of aircraft were to be either nonspecular Black or White, depending upon the color of





Left: Curtiss SOC-3A landing on the USS LONG ISLAND (ACV-1). Note the new VCS designation for VS-201 indicating it is assigned to an escort carrier as Escort Scouting Squadron 201. **Bottom Left:** A Vought OS2U-3 assigned to the Commander Patrol Wings Atlantic Fleet painted in the standard fleet colors rather than the Dark Blue fuselage previously specified for command aircraft. **Bottom Right:** Vought OS2U-3 of VO-1 assigned to the battleship USS ARIZONA (BB-39) in the two tone scheme. Note how Black is used on the Blue Gray and White on the Light Gray for least visibility.

the background to which they were applied. The color used was to provide the *least* contrast with its background. White was to be used on Light Gray and Black on Blue Gray.

The location of the service marking was changed from the fuselage to above the serial number on the vertical fin. The U.S. was eliminated and NAVY or MARINES was to be 1 inch (2.54 cm) high, as was the serial number and model designation. These measurements also applied to patrol aircraft and superseded those specified by Commander Aircraft, Scouting Force, on February 1, 1941.

Fuselage side markings were only to be used for identification purposes. They continued to use the three designating markings of squadron number, squadron class, and number of aircraft in the squadron. These markings were reduced to 12 inches (30.48 cm) in height. The aircraft number was also to be painted in the center of the wing span. For monoplanes, the number was to be placed on each half of the wing with the inboard edge at a distance from the fuselage equal to one-half of the overall width of the fuselage. A small numeral on the upper half of the cowl was authorized to indicate the number of the aircraft within the squadron.

Colored tail markings, including the vertical red, white and blue stripes and section markings, i.e., wing chevrons and fuselage bands, were eliminated, as were engine cowl bands. Section identification was by the aircraft number only.



The use of the Marine Corps emblem on aircraft was terminated.

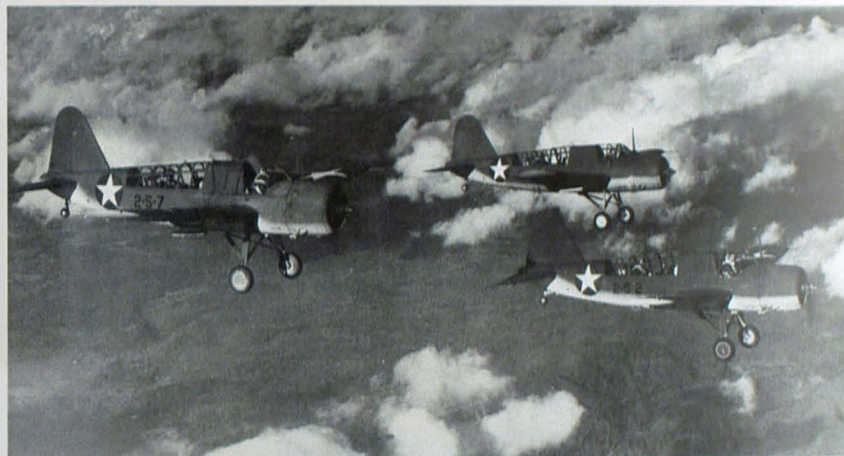
Group Commanders' stripes were eliminated. COMMANDER (name of ship) GROUP was retained in 4 inch (10.16 cm) letters horizontally on each side of the fuselage.

Supplemental instructions concerning the location of red instrument stripes were issued by the Bureau of Aeronautics on April 24, 1941. The outboard edge of the fore and aft stripes on the wings was to be 12 inches (30.48 cm) inboard of the national aircraft insignia. The stripe on the fuselage was to be approximately midway between the trailing edge of the wing and the leading edge of the horizontal stabilizer.

On May 20, 1941, the Commander in Chief, United States Atlantic Fleet, issued a directive that now seems ludicrous. The recent camouflage of Atlantic Fleet aircraft had rendered them more difficult to locate in the event of a forced landing at sea. In order to assist searching aircraft and vessels, each aircraft (land- or water-based) was hereafter to carry, on all over water flights, a can of ready-mixed bright orange or bright yellow paint (or dope) and a brush. This equipment was to be stowed in such a location that it would be readily accessible to the pilot in case of a forced landing in the water. It was felt that painting the fuselage, tail surfaces, wings, and other portions of the aircraft with this orange or yellow paint, subsequent to a forced landing, would materially assist in locating the aircraft in the water.



Right: Stearman NS-1 trainers at NAS Corry Field well illustrates the simple numerical numbering of airplanes in the Training Command with no reference to a squadron number. The aircraft are Yellow overall with Black markings. **Middle:** Vought OS2U Kingfisher of Scouting Squadron Two from NAS Seattle, Washington, December 1942. **Bottom Left:** Vought SB2U of VS-42 aboard the USS RANGER (CV-4) in August 1942. The two tone scheme has faded to the point that no line of demarcation can be seen. **Bottom Right:** Acronyms while useful can cause considerable trouble as in the case of this OS2U Kingfisher. This strange marking identifies the number two airplane assigned to Headquarters and Service Squadron of Marine Aircraft Group Eleven.





Left: TBF/TBMs of Escort Scouting Squadron 29 (VGS-29) in mid 1942. **Middle:** With the issue of Technical Order 52-43 in July the squadron number no longer was to be applied to the airplane. The squadron type and aircraft number continued in some commands. **Bottom Left:** TBF, SBD, and F4's being spotted after recovery on the USS INDEPENDENCE (CV-22) May 1943. Note that the aircraft numbers have been painted white for greatest visibility but the squadron number and type remain black. **Bottom Right:** A good example of the assortment of markings to be found on training planes midway in WW II.



Right: The application of the aircraft number on the forward edge of the cowl or landing gear doors, as on this Wildcat, was an optional aid to the plane captain in identifying his aircraft as it taxied in. **Bottom:** A SNJ instrument trainer at NAS Melbourne, Florida.

NAS San Diego, *Local Process Specification No. 128a*, dated January 2, 1942, is the only directive known to specify the location of the Bureau Number, NAVY and the Model Number on the tail of aircraft painted with red and white horizontal stripes. They were to be applied in as close agreement as possible with the one-third of the rudder rule already established, but to be located so as to fall entirely within a field of solid color, and to be black in color instead of white.

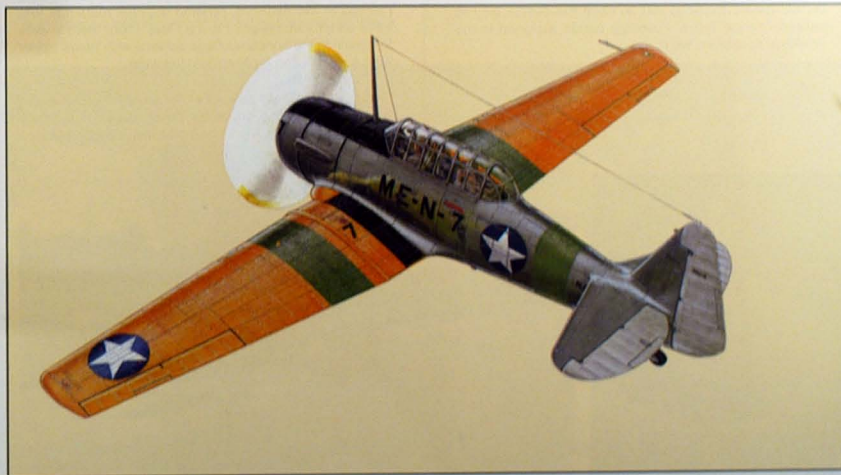
Commander Aircraft, Scouting Force, recommended in a dispatch dated January 28, 1942, that the special markings for instrument flying aircraft be painted green instead of red due to the possible confusion with the Japanese national markings. This was approved the following day in a Bureau of Aeronautics dispatch which said new instructions were being written for all of Naval aviation which would specify

light green stripes instead of red. The size and location remained the same as before.

Bureau of Aeronautics letter Aer-E-2571-MVS, dated February 6, 1942, modified the instructions in SR-2b concerning exterior painting, insignia and markings.

The aircraft serial number was now to be painted on the fin on the same horizontal line as the model designation on the rudder, rather than just being specified to be near the top, as before.

The Group Commander's aircraft was now to be identified by the number of the carrier group in characters 4 inches (10.16 cm) high on each side of the fuselage. This Air Group number was the same as the ship hull number. For example, the Lexington Group Commander's aircraft would be marked 2.





Left: These F4Fs at Henderson Field, Guadalcanal, show the inconsistency in markings caused by changes in the directives and inability to make the change for an extended period due to operational commitments. Note that #81 uses large White numerals while #36 has small Black numerals.

Bottom Left: A free balloon being prepared for launching at NAS Moffett Field, California in November 1943, shows the branch of service and Bureau Number. The complete inscription reads U.S. NAVY 03545.

Bottom Right: These Grumman F4F-4s at Henderson Field, are a typical example of the weathered appearance aircraft soon obtained under tropical conditions. Aircraft identification now started to be applied in a color to give the greatest contrast.

Aircraft not assigned to regularly organized squadrons, but which were assigned to stations, were to have the station name painted on the side of the fuselage in the location normally used for the squadron designation. Aircraft attached to ships, but not assigned to regularly organized squadrons, were to have no special markings applied. Identification of these aircraft was by the serial number on the fin only.

Aircraft attached to squadrons based on vessels other than aircraft carriers were marked with the squadron number only. The ship name was no longer to be used.

One of the few remaining directives on painting aircraft in the Training Command during this period was NAS Pensacola *Local Process Specification No. 8-42*, dated March 12, 1942. These instructions applied to all aircraft operated at NAS Pensacola and outlying fields attached to Pensacola.

VN1D8 (Basic Training) was to have the overall aircraft painted Orange Yellow. Fuselage bands assigned to the individual squadrons were:

VN1D8-A	No fuselage band
VN1D8-B	Black
VN1D8-C	White
VN1D8-D	Light Green



Squadron numbers were Black numerals 12 inches (30.48 cm) high beginning with number 1 in each squadron. Characters were to be modified vertical block style, uniform in shape and size.

VN2D8 aircraft were to be painted and marked as Fleet type aircraft in the two-tone scheme with squadron numbers to start with number one.

VN3D8 aircraft were to be painted and marked as Fleet type aircraft in the two-tone scheme. In addition, 36 inch (91.44 cm) wide Red bands were to be applied around the aft fuselage and wings, retaining this marking within the Training Command. Nose cowlings were also painted Red. A small white numeral three inches (7.62 cm) high was painted on the upper half of the cowl.

VN4D8 flying boats, such as the PBV-1 and newer, were painted in the two-tone scheme with full markings, the same as aircraft assigned to the Fleet. Older models were to remain in the noncamouflage scheme with Yellow upper wing surfaces and an Aluminum fuselage.

VN5D8 OS2Us were painted in the two-tone scheme with full markings, the same as Fleet aircraft. Primary seaplanes were in the Orange Yellow noncamouflage scheme.

Right: Note the Black and White markings on this TBM taking off from the USS BUNKER HILL (CV-17) in June 1943. It is believed these markings belonged to the Training Command which was operating off the carrier at this time. Below: This F4U-1 Corsair of VF-17 carries the full designation just prior to the change which would delete the unit number. The squadron insignia is incorrect as it should be on the fuselage under the windshield.



Transport and VM Unit aircraft were fully camouflaged and marked the same as Fleet aircraft. The station insignia was to be applied to the fuselage or hull in such locations as dictated by the design and other markings, but was not to exceed an area bounded by a 6 inch (15.24 cm) square. The name PENSACOLA, for example, was to be painted on the fuselage in the location normally occupied by the squadron designation immediately forward of the national aircraft insignia.

On April 29, 1942, Commander Carriers, Pacific Fleet, modified the aircraft side markings. In order to preserve the security of the identity of carriers engaged in operations in enemy waters, the requirement for side markings to identify aircraft as to squadron number, type of squadron, and individual aircraft number, was modified by the removal of the squadron number.

SR-2c, dated January 5, 1943, changed the color of lettering used on aircraft. All letters and numerals applied to camouflaged aircraft were to be either nonspecular Black

or nonspecular Intermediate Blue, depending on the color of the background upon which they were applied. The color was to be one of *least* practical contrast to its background, e.g., Intermediate Blue on White or Dark Blue and Black on Intermediate Blue. In the case of noncamouflaged aircraft, all letters and numerals were to be either glossy Black or White, depending on the color of the background upon which they were applied. The color was to be one of *greatest* contrast in order to give the highest visibility.

The Light Green fore and aft stripes on the wings of instrument training aircraft were to be located an equal distance from each wing tip and to clear the national aircraft insignia. The stripes on monoplanes were to completely encircle the wings.





Left: Grumman F6F-3 Hellcats at Munda, New Georgia, September 1943, painted in accordance with Technical Order 52-43 with large White numbers on the cowl and vertical stabilizer. Bottom Left: These Wildcats are identified as being in the first fighter squadron of the NAOTC based at NAS Jacksonville, Florida.

Numerous changes were made in the markings applied to the exterior of US Naval aircraft as shown in the following chart.

Marking	Location	Size on Camouflaged Aircraft	Size on Noncamouflaged Aircraft
ACTIVITY MARKING (MANDATORY) on those shore-based aircraft which were not assigned to operating squadrons or training centers) to consist of the name of the activity to which the aircraft was assigned.	Both sides of fuselage forward of the national aircraft insignia except on patrol planes where it was to be behind the insignia. This position was that normally occupied by squadron markings.	12" (30.48 cm) high	12" (30.48 cm) high
ARCTIC SERIAL NUMBER (MANDATORY) Number assigned by Bureau of Aeronautics.	Both sides of vertical fin on same line as model designation.	1" (2.54 cm) high. On large flying boats, etc., letters to be 3 1/2" (8.89 cm) high.	3 1/2" (8.89 cm) high minimum



BRANCH OF SERVICE MARKING (MANDATORY) on maximum visibility painted trainers, marking shall consist of the word NAVY or MARINES as applicable.	Both sides of the fuselage midway between top and bottom and aft of the national aircraft insignia.	4" (10.16 cm) high	
On all other aircraft, marking shall consist of the word NAVY or MARINES as applicable.	Immediately above serial number both sides of vertical fin.	1" (2.54 cm) high. On large flying boats, etc., letters to be 3 1/2" (8.89 cm) high.	1" (2.54 cm) high. On large flying boats, etc., letters to be 3 1/2" (8.89 cm) high.
ENGINE COWL MARKINGS (Optional) to consist of number of aircraft in the squadron.	Upper half of engine cowl.	4" (10.16 cm) high	4" (10.16 cm) high
GROUP COMMANDER (when used) GROUP COMMANDER GUNNERY E (when used)	Both sides of fuselage aft of the national aircraft insignia.	4" (10.16 cm) high	
INDIVIDUAL SQUADRON INSIGNIA (when used)	Forward of all other fuselage markings except as noted in the case of patrol planes.	3" (7.62 cm) high (maximum)	3" (7.62 cm) high (maximum)
MODEL DESIGNATION (MANDATORY) Figures and number in accordance with Specification 51-3.	Forward of squadron markings, both sides of aircraft.	6" (15.24 cm) high (maximum)	12" (30.48 cm) high (maximum)
SQUADRON MARKINGS (MANDATORY) WHEN AN AIRCRAFT IS ASSIGNED TO A SQUADRON) First Letter — Clats of squadron. Second: Numeral(s) — Number of aircraft in squadron.	Both sides of rudder or on outboard side of each multiple rudder.	1" (2.54 cm) high. On large flying boats, etc., letters to be 3 1/2" (8.89 cm) high.	3 1/2" (8.89 cm) high (maximum)
	Both sides of the fuselage forward of the national aircraft insignia except on patrol planes where it was to be aft of the insignia.	12" (30.48 cm) high	18" (45.72 cm) high (minimum)

NOTE: ON TRAINERS OMIT CLASS OF SQUADRON DESIGNATION

All individual squadron identification was lost at this time despite the previously used three-part designation on the side the fuselage was deleted.

WING MARKINGS (MANDATORY) on all airplanes except maximum visibility painted trainers and those not regularly assigned to squadrons. Consists of the number of the aircraft in the squadron.	Center of top wing span. On low wing and medium monoplane to be on each half wing with inboard edge at a distance from the fuselage equal to 1/2 the width of the fuselage and centered on the wing.	12" (30.48 cm) high	12" (30.48 cm) high
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Right: This SNJ-4 shows the application of the Naval Air Operational Training Command (NAOTC) system of designation for a training plane at Deland, Florida. Once again the aircraft number is a sequential number for all airplanes at Deland. Middle: These F4Us in the Marshall Islands all carry local numbers in the 250-260 block with no identification of the unit. Bottom Left: A SBD on antisubmarine patrol with a 350 pound depth bomb. Unit airplane number is now the only identification and is painted to give the greatest contrast. Bottom Right: Directives assigning local markings have been destroyed resulting in confusion over the meaning of many markings carried during WW II. These SBDs in the Marshalls in February 1944, are a good example. Why is the one coded C29 while the others carry three digit numbers in the 730 to 735 block?





Left: The 17-B-5 is an unusual application of unit designation both as to being placed on the undersurface of the wing and that it can only be read from the front. The unit aircraft number on the wheel door is of little more use to the ground crew than the number on the side of the cowl.
Middle: A Howard GH-2 assigned to VR-2 when it was a component of the Naval Air transport Service. The Light Green bands around the wings and fuselage identify this as an instrument trainer. The Light Green cowl marking is an added squadron embellishment.
Bottom Left: An Eastern Aircraft FM-2 of the NAS Miami fighter training squadron landing aboard the USS SOLOMONS (CVE-67) May 1945.
Bottom Right: This N2S-4 from NAS New Orleans in 1944, has its aircraft number in large characters on the underside as an aid in identifying a low flying aircraft.



Right: Vought F4Us of the 5th fighter squadron at NAS Jacksonville, Florida, September 1944. Obviously the tail numbers are a sequential number system for the base or command and do not indicate the number within the squadron.



As before, the word U.S. NAVY was still to be applied in letters 54 inches (137.16 cm) high on the envelope of non-rigid airships. The class letter and number designation of each airship was to be in characters 20 inches (50.80 cm) in height. Additionally, those airships used for training purposes could also have the airship designation painted in characters 54 inches (137.16 cm) high on the side of the envelope along the horizontal axial plane between the U.S. NAVY and the leading edge of the horizontal stabilizer fin. All letters and numerals on the side surface were to read from forward aft on the left side, and aft forward on the right side.

The expansion of naval aviation brought with it a requirement to identify aircraft operating in various training operations from those assigned to Fleet units. The Naval Air Operational Training Command (NAOTC) on January 12, 1943, established the following system for marking aircraft assigned to the NAOTC bases in the Florida area. The shape, size and color of all characters was to be in accordance with the requirements of SR-2b, and were to be painted on both sides of the fuselage. These letters and numerals were divided into three groups, each group separated by a dash, as follows:

First Group

One or two characters to designate the Naval Air Station (NAOTC) and the number of the Operational Training Unit to which an aircraft was assigned. No numeral was necessary if there was only one Operational Training Unit of that aircraft type attached. A single letter designated the Air Station to which an aircraft was assigned, with the exception of Deland and Melbourne, which had two letters to differentiate them from Daytona Beach and Miami. The assigned letters were:

Naval Air Station	Letters
Jacksonville	J
Miami	M
St. Simons Island (Brunswick)	B
Daytona Beach	D
Melbourne	ME
Vero Beach	V
Fort Lauderdale	F

Lake City	L
Deland	DE
Sanford	S
Banana River	R (When NAOTU
Key West	K are established)

Second Group

One letter indicating the type of Operational Training Unit (aircraft type).

Naval Air Station	Letters
Fighter	F
Scout Bomber	S
Torpedo Bomber	T
Patrol Bomber	P
Landplane Bomber	B
Miscellaneous Trainer (Navigation, Instrument, etc.)	N

Third Group

The number of aircraft in the unit. For example:

NAS Jacksonville had two Fighter Operational Training Units. Aircraft No. 22 of VF O.T.U. #2 would have been painted J2-F-22.

NAS Fort Lauderdale had one Torpedo Bomber Training Unit. Aircraft No. 22 would have been painted F-T-22.

NAS Melbourne had several instrument training SNJs. Aircraft No. 1 would have been painted ME-N-1.

Small numerals were authorized to be painted on each side of the cowl for easier identification when the aircraft was on the ground. Utility aircraft at these bases were to be marked in accordance with SR-2b.

This directive did not apply to other training commands, such as Pre-Operational Training, Carrier Qualification Training Units, or to the VO-VCS Operational Training Unit.

An entry in the War Diary of ComNorth Pacific, dated April 30, 1943, stated that "... the Task Force Commander informed all commands that VO and VS aircraft operating in the North Pacific west of Kodiak will carry an 8 inch (20.32 cm) stripe on both sides of vertical stabilizer and on bottom



of the horizontal stabilizer effective May 2, in order to facilitate identification of these planes by friendly fighter aircraft." While not so stated, it appears that this was done in preparation for the Attu Campaign which was launched on May 11.

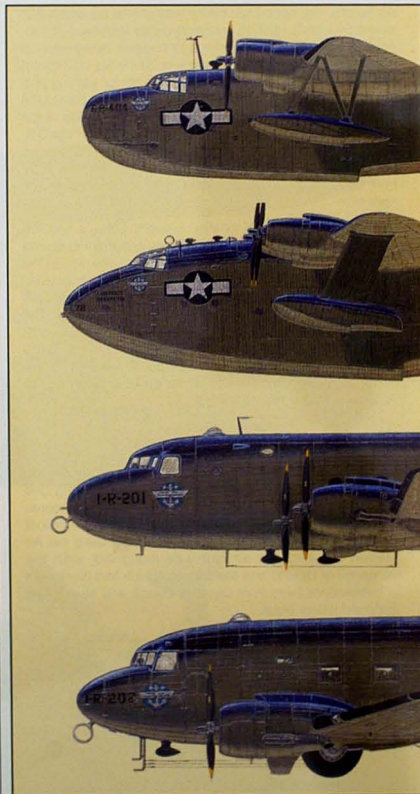
Bureau of Aeronautics Technical Order No. 52-43, dated July 21, 1943, stated among other things, that all symbols which gave the official name or numerical designation of a unit were to be eliminated from squadron and other unit crests, insignia and markings on aircraft.

Both Air Force Pacific Letter No. 12L-43, dated September 9, 1943, and Air Force Atlantic Fleet Letter No. 54L-43, dated October 12, 1943, basically contained the provisions of Bureau of Aeronautics Technical Order No. 52-43 and stated that no red color was to be used in unit insignia applied to aircraft attached to the Pacific or Atlantic Fleets. Still, for historical and public relations purposes, the Navy Department continued to approve and register large numbers of insignias in which red was used. However, this was done with the understanding that for the duration of the war such insignia were not to be applied to aircraft unless a substitute color was used in areas where the above two directives applied. Additionally, Air Force Pacific Letter No. 12L-43 prohibited the painting of names on aircraft attached to the Pacific Fleet.

Naval Air Operational Command letter NM29-11/OTA-8//F39 Serial 17128 dated October 27, 1943, modified the identification markings established on January 12, 1943, with these changes.

Air Station	Change	Letters Assigned
NAS Key West, FL	Delete	K
NAS Beaufort, SC	Add	K
MCAS Edenton, SC	Add	E
NAAS Green Cove Springs, FL	Add	G
NAAS Cecil Field, FL	Add	C

Only the Operational Training Command aircraft based at Marine Corps Air Station Edenton were to be so marked. Not the Marine Corps aircraft.



Right: A Vought OS2U Kingfisher making a Charlie recovery alongside the USS NEW YORK (BB-34) in June 1944. The circled number is unusual. Note that the vessel name is no longer used on battleship and cruiser based aircraft.
Bottom Right: Nose art on naval aircraft was unusual during WW II. The design is a play on words as used on this Transport Air Group (TAG) airplane at NAS Honolulu in June 1944.



An insignia was designed for the Naval Air Transport Service (NATS) a year after it was put into operation. The instructions concerning this insignia were contained in Technical Order No. 101-43, dated November 3, 1943. This insignia consisted of stylized wings bearing the inscription NAVAL AIR TRANSPORT SERVICE superimposed on a fowl anchor on a circular background with a rope outline. The insignia was applied to the forward part of the fuselage, with the center 25 inches (63.50 cm) aft of, and on the center line of the squadron markings. The circle of the insignia was 24 inches (60.96 cm) in diameter. It was applied using decalcomania transfers.

Contract operated aircraft, in addition to this insignia, had the words CONTRACT OPERATION applied adjacent to the insignia in letters 5 inches (12.70 cm) high. The word OPERATION was centered 2 inches (5.08 cm) below the word CONTRACT. These aircraft also had the aircraft serial number applied in characters 12 inches (30.48 cm) high, centered across the bow.

SR-2d, dated December 22, 1943, made several major changes in the markings applied to noncamouflaged aircraft as well as those finished in the basic camouflage scheme. On camouflaged aircraft the size of the aircraft number within the squadron, when used on the engine cowl and landing gear doors, was increased to 6 inches (15.24 cm). Both of these locations were optional. Nonspecular Black or Insignia White was to be used on the cowl to provide the greatest visibility, while nonspecular Black was used on the landing gear doors for the same reason. The same number was to be painted in Insignia White on both sides of the fin and rudder above the horizontal stabilizer. Single numerals were to be located close to the hinge; double numerals were to be located on each side of the hinge. However, on multiengine aircraft the aircraft number was to be located immediately aft of the national aircraft insignia on the fuselage. On aircraft with multiple vertical tail surfaces these numerals were to be applied only to the outboard side of each tail. The size of these numerals varied with the size of the aircraft. On aircraft with a wingspan of 50 feet (1524.00 cm) or less, the numerals were 16 inches (40.64 cm) high, and 24 inches (60.96 cm) high for aircraft with a wingspan greater than 50 feet (1524.00 cm). At the option of the Commanding Officer, they could be 36 inches (91.44 cm) high on aircraft with a wingspan of 200 feet (6096.00 cm)

or greater. This system of identification eliminated all reference to any specific unit and made it possible to draw aircraft from a pool as replacements were needed without the necessity of having to repaint them with specific squadron markings. This pool replacement program was used widely throughout the Pacific for both carrier and shore-based squadrons.

Branch of service, aircraft serial number and model designations were increased to 4 inches (10.16 cm) on each side of the vertical tail surfaces. In the case of aircraft having multiple tails, these markings were only to be applied on the outboard side of each tail.

Aircraft not painted in the basic camouflage scheme were to be marked in a different manner. Shore-based aircraft, not assigned to operating squadrons, were to have the name of the activity to which they were assigned painted in letters 12 inches (30.48 cm) high on both sides of the





Left: TBF aboard the USS CORE (CVE-13) July 1943. For some reason this fleet squadron has the "T" for torpedo squadron in Black and the aircraft numeral in White. Bottom: TBMs from the training carrier USS MANTANIKAU (CVE-101) in October 1944. These letters are not to be confused with the later letter designation system.

fuselage forward of the national aircraft insignia, except on patrol aircraft where it was to be aft of the national aircraft insignia. This was the location normally occupied by the squadron markings. The aircraft serial number was to be displayed on both sides of the vertical fin. The model designation was to be on both sides of the rudder on a line with the serial number. These characters were to be a minimum of 4 inches (10.16 cm) in height. The branch of service — NAVY or MARINES — was located directly above the serial number in letters 1 inch (2.54 cm) high. This could be increased to 4 inches (10.16 cm) on large flying boats, etc. These markings were to be located down 1/3 of the distance between the tip of the vertical fin and the horizontal stabilizer. On maximum visibility painted training aircraft the branch of service was to consist of the word NAVY and be located on both sides of the fuselage midway between the top and bottom and aft of the national aircraft insignia. Engine cowl markings were to be only 4 inches (10.16 cm) high.

If an aircraft not painted in the basic camouflage scheme was assigned to a squadron, the numerals designating its number in the squadron were painted in figures at least 18 inches (45.72 cm) high on both sides of the fuselage forward of the national aircraft insignia, with the exception of patrol aircraft where it was aft of the national aircraft insignia.

All these markings on noncamouflaged aircraft were to be in glossy Black or White depending on the color of the background upon which they were applied. The color used was to be the one of *greatest* contrast to give the highest visibility.

Amendment 1 to SR-2d, dated March 13, 1944, changed the basic camouflage scheme to glossy Sea Blue for fighter aircraft. In accordance with this, colors for letters and numerals were changed to glossy Black or glossy White depending on the background to which they were applied. The color used was to be the *greatest* contrast in



order to give the highest visibility on all but antisubmarine warfare camouflaged aircraft. The color used on ASW aircraft was to be one of *least* contrast to its background.

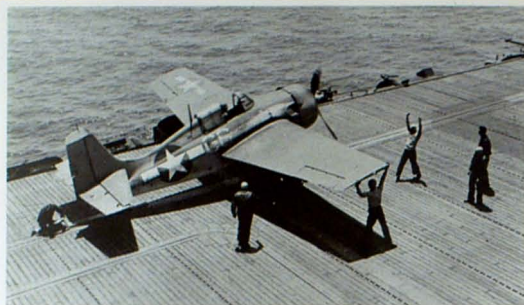
SR-2e, dated June 26, 1944, left the size and color of squadron markings on aircraft painted in the ASW camouflage scheme to the discretion of the tactical commander.

Uniformity of permanent markings was highly desirable for security reasons. However, when in the opinion of the tactical commander, security would not be violated, or when the need for additional identification aids exceeded the security risk, any or all painted surfaces of the aircraft, including those occupied by specific markings with the exception of the national aircraft insignia, could be covered with temporary markings of any contrasting color with the exception of red or reddish orange. Temporary paint colors of White, Yellow and Medium Green were recommended for these markings.

During the last two years of the war, many of the aircraft assigned to the carriers in the Pacific carried symbols denoting the ship or Air Group to which they were assigned. The orders, if any, which specified these markings were local Fleet directives, none of which are known to exist. However, a reasonable record can be recreated by working from photographs. It appears that the symbols represented the vessel as far as the CVs were concerned. In the case of those carried on aircraft actually operating from the CVEs though, it appears that the symbols belonged to the units embarked and were only seen on a specific ship while that unit was aboard.

Above: This F6F-5N of VMF(N)-511 aboard the USS BLOCK ISLAND (CVE-106) in February 1945, is identified as belonging to a nightfighter squadron without identifying the unit. Below: A TBM from USS MAKASSAR STRAIT (CVE-91) with its distinctive tail marking.





Left: FM-2 on catapult aboard USS WINDHAM BAY (CVE-92) June 1944, conducting carrier qualification. The significance of the San Diego area assigned G6 squadron code is unknown.

The following chart of the CVs known to have been operating in the Pacific during the period of approximately August 1943, when these symbols began to appear, through January 27, 1945, lists the known symbols used.

CV Tail Code Symbols

Ship	Description
CV-3 Saratoga	—
CV-4 Ranger	—
CV-6 Enterprise	White triangle, with aircraft number on fin. Point of triangle up.
CV-9 Essex	Horizontal stripe on top of fin and rudder.
CV-10 Yorktown	Aft sloped line on fin.
CV-11 Intrepid	—
CV-12 Hornet	White circle on fin.
CV-13 Franklin	—
CV-14 Ticonderoga	Broad "V" on fin below aircraft number.
CV-15 Randolph	—
CV-16 Lexington	Hollow white triangle on fin and rudder. Point of triangle down.
CV-17 Bunker Hill	Horizontal line above and below aircraft number on fin.
CV-18 Wasp	Small solid triangle at top of fin. Point of triangle up.
CV-19 Hancock	Horseshoe across hinge line at top of fin and rudder.
CV-20 Bennington	—
CVL-22 Independence	Circle outline with aircraft number inside.
CVL-23 Princeton	—
CVL-24 Belleau Woods	—
CVL-25 Cowpens	Top of fin and rudder painted white with stripe across base of fin and rudder.
CVL-26 Monterey	6 inches (15.24 cm) fore and aft stripe near each wing tip.
CVL-27 Langley	Top of fin and rudder painted white.
CVL-28 Cabot	Vertical stripe on hinge line continued down on fuselage.
CVL-29 Bataan	—
CVL-30 San Jacinto	X on rudder.

Similar markings were carried by some CVE-based squadrons, but they have not been catalogued at this time.

On January 27, 1945, Commander Air Force, Pacific Fleet, wrote to the Chief of Naval Operations explaining the new system of geometric designs to be issued to the CVs and CVLs. Due to the unavoidable complications arising from the operation of a large number of carriers in close proximity to one another, various Air Groups had resorted to the use of symbols painted on the tail surface of their aircraft to facilitate rendezvous after takeoff, during confusion over target areas, and before landing. These patterns, adopted by the various CVGs acting on their own initiative, were small geometric forms and symbols painted in white, usually in conjunction with an identifying number within the design or somewhere near it.

Realizing that this procedure could be improved upon and should be standardized, ComAirPac prepared a series of tail and wing tip markings for all CVs and CVLs. Wing tip markings were included to aid identification with a greater number of angles than was possible with the current system, which only marked the tail surfaces.

United States Navy Air Force, Pacific Fleet, Confidential Technical Letter No. 2CTL-45, dated January 27, 1945, issued a standard set of twenty-eight geometrical designs. Twenty-seven of them were assigned to the CV and CVL class aircraft carriers which constituted Task Force 58. These designs were assigned to the vessel and were applied to all aircraft of the attached Air Group as long as it was aboard. They were applied to both sides of the fin and rudder. While the drawings only showed the design on the top surface of the right wing, subsequent directives indicate that it was also to be applied on the under surface of the left wing tip. Except for the designs assigned to the Lake Champlain and Bataan, all the designs were White against a Sea Blue background. The drawings for the Lake Champlain and Bataan show a second color on the wing tip, but not on the tail marking. The directive did not specify what the second color was, but in view of previous directives on temporary markings it seems safe to assume they were to be either Yellow or Green.

The Commander Task Force 58.5, composed of the Saratoga and Enterprise operating night fighter groups, was authorized to prescribe different markings for the carriers of that group if they desired. The markings carried by

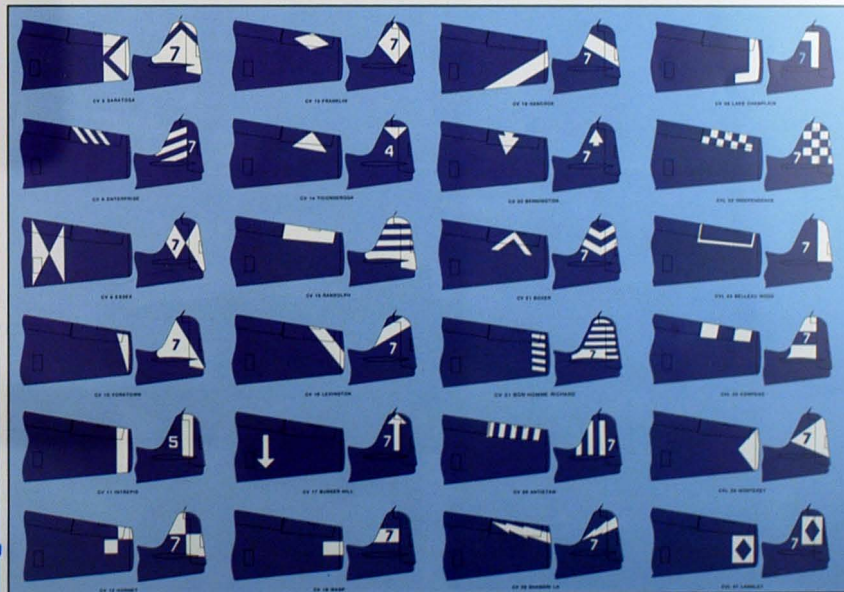


Right: Vought F4Us aboard the USS BUNKER HILL (CV-17) with its White "G" symbol on the tail and White cowl marking.

the Saratoga airplanes were reversed from the colors shown in the drawings. The Enterprise used a completely different design consisting of a horizontal spearhead in outline form, including the aircraft number inside the design. This had less white and was more suitable for use on night fighter aircraft. The design was applied only to the tail.

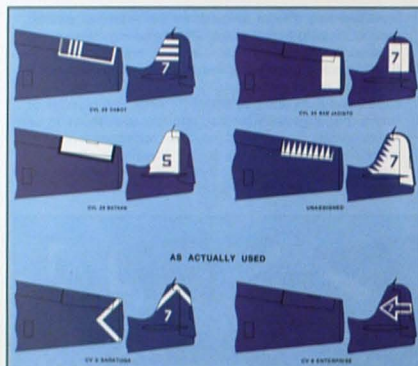
On February 11, 1945, Commander Air Force, Pacific Fleet, letter A3/FF12-5 Serial 3133, introduced a little known identification system for aircraft in the Hawaiian Sea Frontier. All carrier and training type airplanes were to be

identified with a letter followed by the individual aircraft number running from 1 to 99. These markings were to be applied by the appropriate Carrier Aircraft Service Unit (CASU), making sure that the aircraft based on a given field were numbered without duplication. These markings were to be completed by March 1, 1945. The purpose of these markings was to facilitate the identification of Hawaiian Sea Frontier airplanes after numerous reports of violations of air discipline by US Naval aircraft. These violations involved aircraft flying too close to transport aircraft and ground installations.





Left: Curtiss SB2C-1s of VT-74 aboard the USS MIDWAY (CVB-41) during shakedown in the Caribbean. Bottom: A Grumman F6F assigned to the USS RANDOLPH (CV-15).



The letters and numerals were to be 36 inches (91.44 cm) high. They were to be White if on a dark background, or Black if on an aluminum or light background. They were to be located on the underside of the left wing and both sides of the fuselage. In the event the fuselage size did not permit the placing of letters 36 inches (91.44 cm) in height, the characters were to be as near 36 inches (91.44 cm) as possible, but in no case could they be smaller than 18 inches (45.72 cm) in height. For better visibility, a dash was to be placed between letter and number.

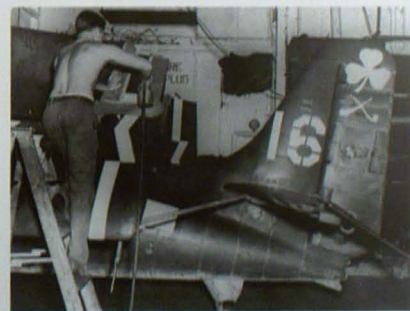
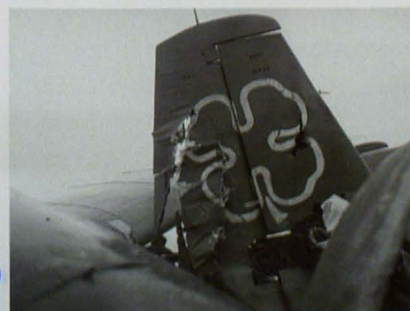
All carrier types which included the F6F, FM, F4U, SB2C, SBD, TBF, and TBM were to be marked as directed. Multi-engine airplanes, such as the JRB, JRF, J4F and SNB, were exempt. However, training types such as the SNV and SNJ were to be so marked.

The letter assignments were:

CASU-2	NAS Barbers Point	A, B, C, D, E, F,
CASU-38	NAS Kaneohe	G, H,
CASU-1	NAS Ford Island	I, J,



Right: Curtiss SB2C-1Cs of VB-2 from the USS HORNET (CV-12) June 1944, showing the White circle carried on the tail of all its aircraft. Middle: A Grumman F6F-5N of VMF(N)-534, showing only an aircraft number for identification purposes. VMF(N)-534 was one of the few Marine Corps squadrons to display a squadron insignia on its aircraft, and then not correctly. Bottom Left: Several squadrons used this recognition symbol aboard the USS PETROF BAY (CVE-80) in late 1944 and early 1945. It is believed that this TBM-1C belonged to VC-76. Bottom Right: In addition to the markings applied top and bottom of the wingtips, the shamrock and clay pipes are a most appropriate symbol on the FM-2 aboard the USS SHAMROCK BAY (CVE-84) in May 1945.



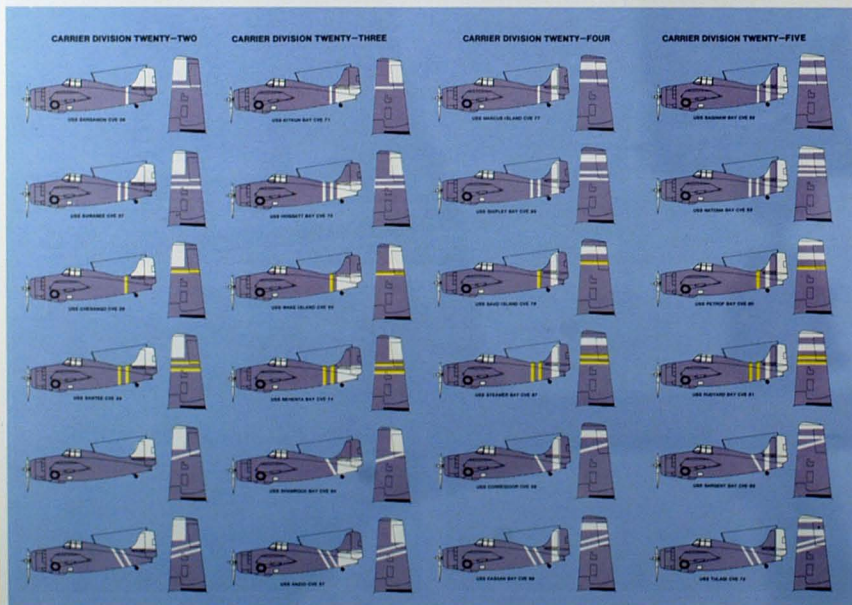


Left: A Curtiss SB2C-1C of VB-5 aboard the USS YORKTOWN (CV-10) March 1944. This is one of the earliest examples of special tail markings.

CASU-32	NAS Kahului	K, L, M, N,
CASU-4	NAS Puunene	O, P, Q,
CASU-31	NAS Hilo	R, S, T,
Marine	MCAS Ewa	U, V, W

A letter from the Commanding Officer CASU-1, dated February 18, 1945, was sent to the Commanding Officers of the following squadrons informing them of their letter and number assignments.

Letter I	—	CASU-1 Nos. 1 to 94 inclusive NAS Pearl Harbor (Operations) 95 to 99 inclusive.
Letter J	—	VS-53 1 to 19
		VS-69 20 to 39
		VS-46 40 to 59
		Open 60 to 65
		VS-69 66 to 69
		Open 70 to 99

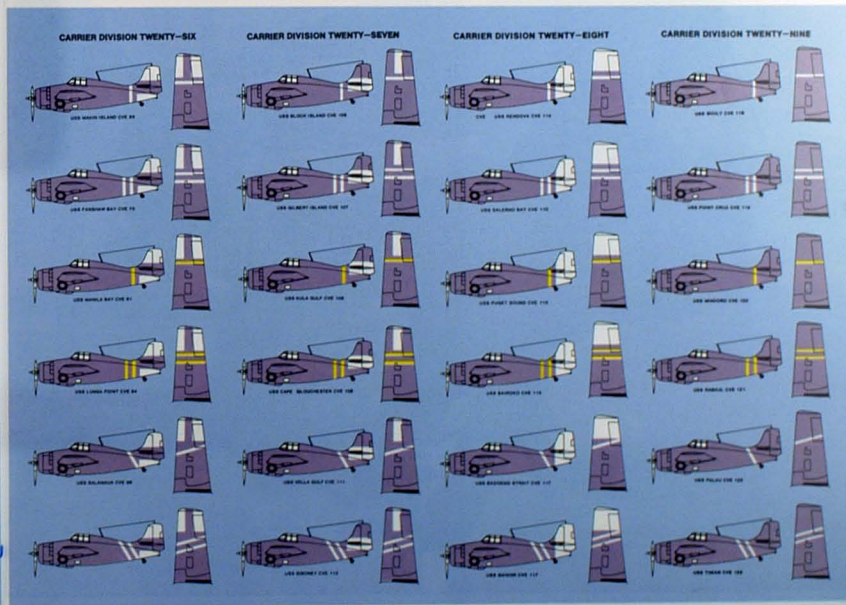


Right: TBM-3 of VC-92 aboard the USS TULAGI (CVE-72) in 1945. The large assortment of unit tail markings finally caused the "G" symbols and CVE markings to be assigned in an attempt to bring some order to the confusion of locally assigned recognition markings.

Air Force, Pacific Fleet, Confidential Technical Letter No. 4CTL-45, dated June 2, 1945, prescribed a series of recognition symbols for CVEs. These markings were to be painted on both sides of the vertical tail surfaces, as well as the upper right and lower left wing tips. All CVEGs, MCVGs and VCs assigned to ships of the Escort Carrier Force, Pacific, were to carry these designs. The standard color was White against Sea Blue. However, some of the designs show a third color. It is known that the aircraft of Marine Carrier Air Group 4 (MCVG-4) aboard CVE-109 Cape Gloucester painted the small stripes in the design as

well as the aircraft number in yellow. It would seem to be a reasonable assumption that all the other designs that show a third color were also painted yellow.

Each Carrier Division was assigned a basic design. The position of the individual vessel within the Division was indicated by a series of narrow stripes. This sequence of stripes was the same for all Divisions. Due to ship assignments, not all Divisions operated with a full complement, so all the possible combinations were not used.





Left: The Pine Tree geometric symbol assigned to the USS BENNINGTON (CV-20) applied to a Grumman F6F-5 in February 1945. **Bottom:** An Eastern Aircraft FM-2 painted in the markings assigned to a composite squadron aboard the USS FANSHAW BAY (CVE-70), Carrier Division Twenty Six.

The geometrical symbols carried on Task Force 58 aircraft were difficult to describe over the radio and were not readily identifiable. To relieve this situation Commander Task Force 38, in his July 1945 message 061121, directed that a system of 24 inch (60.96 cm) high White block capital letters be used to identify the aircraft of the CVs and CVBs. These letters were to be carried on the top right and lower left wing tips and both sides of the rudder in the same manner as the geometric symbols. This was the beginning of the two letter

Visual Identification System still in use.

CV-3	Saratoga	CC
CV-4	Ranger	PP
CV-6	Enterprise	M
* CV-9	Essex	F
* CV-10	Yorktown	RR
# CV-11	Intrepid	E
# CV-12	Hornet	S



Right: Tail markings carried by VC-11 from June 1944 to February 1945 aboard the USS NEHENTA BAY (CVE-74). **Middle:** A Grumman F6F-5 with the horseshoe symbol of the USS HANCOCK (CV-19) November 1944. The squadron insignia can be seen under the windshield. **Bottom Left:** A Curtiss SB2C-1C assigned to the USS SHANGRA LA (CV-38) missed the arresting cable and ran into the barrier March 15, 1945. **Bottom Right:** Curtiss SB2C assigned to the USS YORKTOWN (CV-10) in August 1945, with the new letter tail code.





Left: While nose art was seldom applied to Navy and Marine Corps aircraft, VMF-222 on Samar, Philippine Islands, in 1945, applied the emblem of the Navy's Construction Battalions (the SEABEES) on their aircraft as a tribute to the men who built airfields all the way from Guadalcanal to Okinawa. Middle: Nicknames were not widely used on naval aircraft. This F6F-5N had obviously been down several times for repairs. Note how visible the aircraft number on the landing gear door is to the ground crew. Bottom Left: This Light Gray and Aluminum doped SNJ-2 at NAS Jacksonville in April 1945, is another example of the local markings of an airplane. It does not fit into the letter system for Operational Training Command at Jacksonville. Bottom Right: This Consolidated PB4Y-2 in the Jacksonville area August 1945, is a perfect example of local identification markings that can not be explained. However, the consistency of these markings indicates an extensive marking system was established for aircraft within the continental United States by some senior command.



Right: Willow Green fuselage and wing stripes indicating an instrument trainer. Bottom Left: A Marine Corps F6F on the USS BLOCK ISLAND (CVE-106) is identified by the letter M under the large block letter I on the fin. Bottom Right: K-101 of ZP-14, performing mine clearing operations in the Italian Theater, was the only airship in the lighter-than-air fleet to carry any nose art.

CV-13	Franklin	LL
* CV-14	Ticonderoga	V
* CV-15	Randolph	L
* CV-16	Lexington	H
CV-17	Bunker Hill	Y
* CV-18	Wasp	X
* CV-19	Hancock	U
* CV-20	Bennington	TT
CV-21	Boxer	ZZ
* CVL-22	Independence	D
* CVL-24	Belleau Wood	P
* CVL-25	Cowpens	A
* CVL-26	Monterey	C
CVL-27	Langley	K
# CVL-28	Cabot	R
* CVL-29	Bataan	T
* CVL-30	San Jacinto	B
* CV-31	Bon Homme Richard	SS
# CV-36	Antietam	W
* CV-38	Shangri-La	Z
# CV-39	Lake Champlain	AA
CVB-1	Midway	YY
CVB-2	Franklin D. Roosevelt	FF
CVB-3	Coral Sea	EE

Those vessels marked with a * used the block letters. The vessels marked with # continued to use the geometric

shapes throughout the war. The remaining carriers were put out of action before this system could be implemented, or they were not operating in the Pacific at this time. The three CVBs were not operational while this system was in effect.

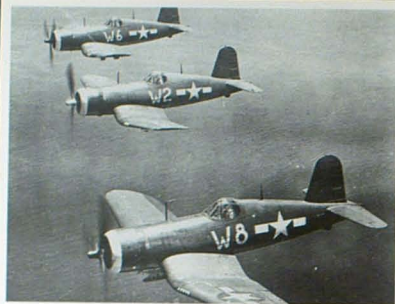
The side numbers carried on US Navy/Marine Corps aircraft during the later part of World War II has caused considerable confusion among model builders and history buffs in trying to determine their significance and the sequence used. Air Force, Pacific Fleet, Confidential Technical Letter No. 5CTL-45 Side Numbers For Naval Aircraft Attached to Aircraft Carriers, dated July 18, 1945, gives the best answer and is quoted in part:

"1. In response to numerous inquiries regarding the numbering system to be followed in painting side numbers on the aircraft of a squadron or group, the following instructions are promulgated:

(a) Side numbers shall not conform to any certain block of numbers for the type of squadron or aircraft.

(b) Side numbers shall be assigned for convenience of local identification as may be determined by the air group commander or composite squadron commander, subject to any special instructions which may be issued by tactical commanders or the commanding officers of aircraft carriers to which groups may be assigned.





Left: Vought F4U-1D from MCAS Ewa, Territory of Hawaii, at the end of WW II. Bottom: A F8F Bearcat assigned to CASU-1 at Ford Island July 1945. How glossy these Sea Blue airplanes were when first received can be seen by the reflection in the wing.

2. The tail markings shall be as specified in Air Force, Pacific Fleet, Confidential Technical Letters 2CTL-45 and 4 CTL-45."

The same basic concept was used by all commands. Unfortunately these locally assigned marking directives were not considered important enough to be forwarded to either Chief of Naval Operations or the Bureau of Aeronautics and none are presently known to exist.

Though the geometric symbols have been replaced by letters aboard most of the CVs, they were retained aboard the CVEs. Air Force, Pacific Fleet, Confidential Technical Letter No. 8CTL-45, dated September 3, 1945, specified markings for the two additional CVE divisions 28 and 29.

Commander Air Force, Pacific Fleet letter A3/FF12-5, Serial 19030, dated September 10, 1945, assigned the following code letters to the Naval Air Stations in Hawaii, rather than to the CASUs. These letters were still to be followed by a number from 1 to 99 inclusive. In the event

that all available numbers in the 1 to 99 series were used, and no additional letters were available, the use of numbers over 100 was authorized. These markings were to be applied to all station aircraft by October 1, 1945.

NAS Barbers Point	CASU-2	A, B, C, D, E, F, Y,
NAS Kaneohe	CASU-38	G, H,
NAS Ford Island	CASU-1	I,
NAS Ford Island	Utility Wing	J, U,
NAS Kahului	CASU-32	K, L, M, N,
NAS Puunene	CASU-4	O, P, Q,
NAS Hilo	CASU-31	R, S, T,
MCAS Ewa	Marines	V, W, Z

These letters were followed by a number from 1 to 99 for each letter. The letters and numbers were to be 36 inches (91.44 cm) high and white on a dark background or black if



Right: An Eastern Aircraft TBM-3U assigned to the USS BADOENG STRAIT (CVE-116). Note there is no unit identification to this ship assigned aircraft. Bottom: High visibility markings for air rescue work are applied to this Martin PBM-3 operating out of NAS Norfolk, VA.



on an aluminum or other light background. They were located on both sides of the fuselage under the cockpit and under the left wing.

AN-I-38 Army-Navy Aeronautical Specification Insignia and Markings For Search and Rescue Aircraft, Design Requirements For, was issued on October 17, 1945. This was the first directive for marking naval aircraft specifically for search and rescue operations. A 36 inch (91.44 cm) glossy Orange Yellow stripe was to encircle the aft portion of the hull, approximately 3 feet (91.44 cm) forward of the leading edge of the horizontal stabilizer. This stripe was not

to extend onto the last step of the hull. A 6 inch (15.24 cm) wide glossy Black border was applied to each edge. A glossy Orange Yellow rectangle was placed on each side of the forward part of the hull, centered between the leading edge of the wing and the bow. The height of the rectangle was to be 33 percent of the vertical dimension of the projection of the fuselage side at the point of application. However, the height was not to exceed 36 inches (91.44 cm) nor be less than 20 inches (50.80 cm). The length of the rectangle was to be three times the height with a 2 inch (5.08 cm) wide glossy Black border. This rectangle was to be located as near as possible to the





Left: A Beech JRB-6 assigned to Headquarters Marine Corps in 1949. The last three digits of the Bureau Number are used for identification. Note the base name on the fin and the Red placard on the engine cowl with one White star indicating a Brigadier General is aboard. Bottom: A glossy Sea Blue F7F-3 identified with locally assigned Yellow markings in 1947, is from an unidentified Marine Corps squadron. Note the Marine Corps emblem on the nose. These markings are hard to explain as the two letter tail codes were in effect by this time and the Marine Corps emblem was not yet authorized on aircraft.

center of the vertical projection of the fuselage at the point of application. The appropriate aircraft identification number was to be applied in glossy Black block numerals within the rectangle.

Wing tip floats and struts were painted glossy Orange Yellow, as was the upper and lower surface of both wing tips. This painting was to extend inboard a distance equal to 7 percent of the total wing span excluding the wing tip floats, if any. A glossy Black border 6 inches (15.24 cm) wide was to be applied at the inboard edge. The upper surface of the wing center section, including the rear projection portion of the engine nacelles, was also to be painted glossy Orange Yellow to a point just outboard of the inboard engine nacelle. A glossy Black border 6 inches (15.24 cm) wide was to be applied at each outboard edge. The word RESCUE was to be superimposed in glossy Black. Centered aft of the word RESCUE was to be the base or unit designation and aircraft identification number. These characters were to be modified vertical block type, uniform in shape and size. Individual characters were to be 36

inches (91.44 cm) high, 27 inches (68.58 cm) wide, with the width of individual strokes forming them 6 inches (15.24 cm) wide. Spacing between each character was to be 12 inches (30.48 cm). These markings were to be in addition to those normally required on this type of aircraft.

The base name or unit designation and aircraft number were also applied on the bottom of the hull, between the bow and the main step extending from chine to chine. The top of the characters was to be at the port chine of the hull and painted Orange Yellow with a 2 inch (5.08 cm) glossy Black border. The width of the characters was to be 3/4 of the height with the individual strokes forming the characters 1/6 of the height.

Aircraft Circular Letter (ACL) No. 131-45, dated November 16, 1945, established three classifications of combat aircraft.

(a) *First Line Aircraft*. Combat models, other than training, with suitable military characteristics and performance to engage in unlimited combat operations.

Right: A good example of the problem caused by using letters in the identification system that can be misinterpreted. Was this to read N1 or N17? The squadron mate on the left answers the question that it definitely was intended to read N1. The bands are Willow Green and White with Yellow lettering. Bottom: A Grumman F6F assigned to the Commander Carrier Aircraft Group 3, Cdr. L.M. Bauer.



(b) *Second Line Aircraft*. Combat aircraft, other than training, which were suitable for service but whose deficiency in military characteristics and performance contained a recognized handicap for unlimited combat service. This only applied to inferiority in military characteristics or performance and in no way reflected on safety or suitability for flight.

(c) *Training Aircraft*. All combat models assigned to designated fleet training units or the Training Command. No training aircraft were to be classified as First or Second Line.

The aircraft in these three categories were to be designated as follows:

(a) *First Line Aircraft* by the standard navy designation, i.e., F7F-2N.

(b) *Second Line Aircraft* by a letter A- preceding the standard Navy designation, i.e., A-F4U-1.

(c) *Training Aircraft* (combat types) by a letter N- preceding the standard Navy designation, i.e., N-F6F-5.

The designation as First or Second Line Aircraft was made by the Deputy Chief of Naval Operations (Air) by means of Aviation Circular Letters when changes occurred. Once an aircraft was designated as a training airplane the designation could not be changed except by the Deputy CNO (Air).

The prefix N- was to be applied to all combat aircraft models in the Training Command, including the Reserve Training Command.

Air Force, Pacific Fleet, letter F39 FF12-5/(15-on), dated January 8, 1946, gave instructions for application of the marking of the fast carrier aircraft. This directive also assigned new alphabetical designations for the CVs, CVSs and CVLs in place of the provisional letters specified in the CTF-38 message of July 6, 1945. The assignment of the same letter to a different carrier than designated in the July





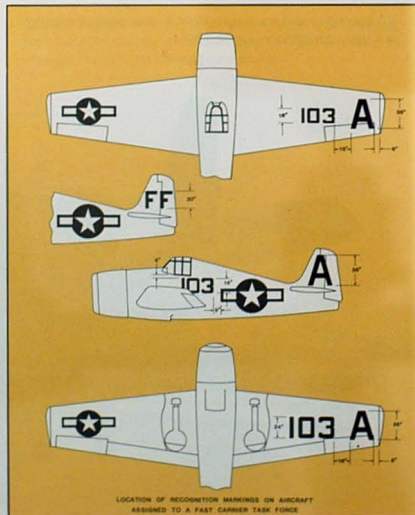
Left: An unusual method of identifying this F6F-5 as the CO's aircraft of VBF-20. The full fuselage designation reads COBF-20.

message may well have caused the erroneous identification of some photographs as to what ship the aircraft were actually assigned. The extent to which this January directive was implemented has not been determined. These new letters were:

Name	Class Number	Ident. Symbol	Name	Class Number	Ident. Symbol
Saratoga	CV-3	MM	Langley	CVL-27	PP
Ranger	CV-4	BB	Cabot	CVL-28	UU
Enterprise	CV-6	EE	Bataan	CVL-29	VV
Essex	CV-9	E	San Jacinto	CVL-30	YY
Yorktown	CV-10	Y	Bon Home Richard	CV-31	KK
Intrepid	CV-11	HH	Leyte	CV-32	L
Hornet	CV-12	FF	Kearsarge	CV-33	K
Franklin	CV-13	S	Oriskany	CV-34	D
Ticonderoga	CV-14	TT	Antietam	CV-36	A
Randolph	CV-15	R	Princeton	CV-37	P
Lexington	CV-16	LL	Shangri La	CV-38	X
Bunker Hill	CV-17	U	Lake Champlain	CV-39	Z
Wasp	CV-18	XX	Tarawa	CV-40	T
Hancock	CV-19	N	Midway	CVL-41	M
Benington	CV-20	SS	F.D. Roosevelt	CVL-42	F
Boxer	CV-21	D	Coral Sea	CVL-43	C
Independence	CVL-22	DD	Valley Forge	CV-45	V
Belleau Wood	CVL-24	RR	Philippine Sea	CV-47	H
Cowpens	CVL-25	CC	Saipan	CVL-48	ZZ
Monterey	CVL-26	AA	Wright	CVL-49	W

White block capital letters 36 inches (91.44 cm) high were located on both sides of the vertical tail surfaces, the top of the right wing and underside of the left wing panel. The letters on the wings were to be 6 inches (15.24 cm) in from the wing tip. Aircraft numbers were to be 16 inches (40.64 cm) high, located on each side of the fuselage 9 inches (22.86 cm) forward of the national aircraft insignia with the top of the numbers 6 inches (15.24 cm) below the cockpit rim, and on the top of the right wing 18 inches (45.72 cm) inboard of the letter code. Numerals 24 inches (60.96 cm)

high were to be located on the underside of the left wing 18 inches (45.72 cm) inboard of the letter code. The individual strokes of the 36 inch (91.44 cm) letters were to be 4 inches (10.16 cm) wide, with all other dimensions in accordance with SR-2e. Whenever double letters were used, they were to be 30 inches (76.20 cm) high, placed in the same positions as the single letters described above. Construction of these double letters was to be in accordance with SR-2e, with the exception that the horizontal component could be reduced to accommodate the letters to the shape of the tail on some aircraft. Any portion of the Bureau Number and aircraft type designation on the vertical tail surfaces which were covered by the letter symbol was to be outlined in black on the letter. This overpainting was not to change the characteristic of the letter symbol.



LOCATION OF RECOGNITION MARKINGS ON AIRCRAFT ASSIGNED TO A FAST CARRIER TASK FORCE



Right: A Howard NH-1 assigned to VR-3, a component of Naval Air Transport Service, for use as an instrument trainer. Below: The number 1 Grumman F7F-3N assigned to VMF(N)-531 in 1948. The underlined tail code shows this is a Marine Corps squadron.

Aircraft numbers for fuselage and wings were to be assigned in blocks by type and squadron. Using the sequence VF, VBF, VSB, VTB, squadrons were to be assigned a block of numbers as follows: 1st squadron, 101 - 199; 2nd squadron, 201 - 299; 3rd squadron, 301 - 399; 4th squadron, 401 - 499; etc., using consecutive numbering within blocks. CAG aircraft could be marked 100, 200, 300, or 400, etc., according to the type aircraft assigned.

Squadron insignia could be applied to the fuselage about 12 inches (30.48 cm) forward of the fuselage number and 12 inches (30.48 cm) below the cockpit rim extended.

The dimensions given in these instructions could be modified to allow the letters and numerals to best conform to the surface on which they were applied, providing that such modification did not cause confusion and defeat the purpose for which this system had been devised, i.e. quick identification and recognition of our own aircraft.

Air Force, Pacific Fleet, Confidential Technical Letter No. 1CTL-46, dated March 29, 1946, cancelled the designations previously prescribed in 4CTL-45 and 8CTL-45. These cancelled marking directives were to be retained

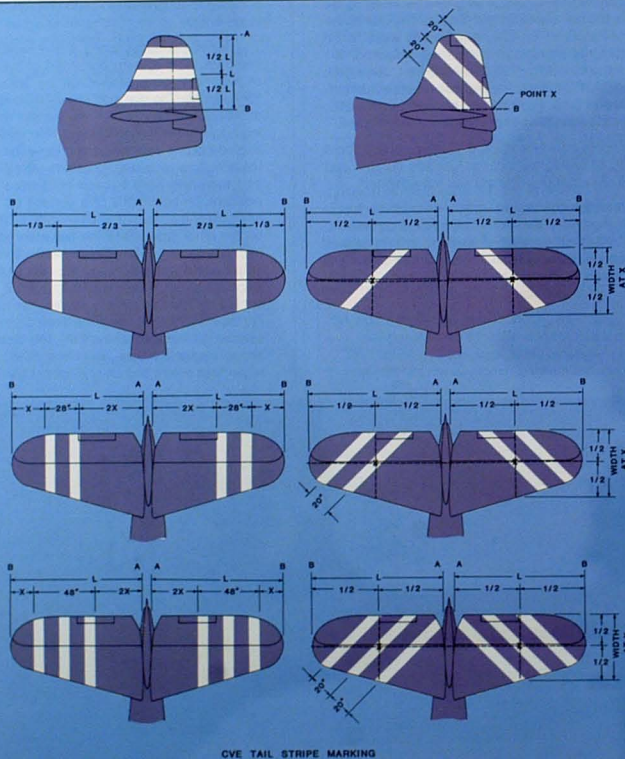
pending reassignment to such units as might be activated in the future.

This letter also established a new series of identification markings. The system consisted of parallel fore and aft stripes, or diagonal stripes, on the horizontal and vertical tail surfaces. The diagonal stripes were at 45° to the longitudinal axis of the aircraft. They slanted down from the leading edge to the trailing edge on the vertical stabilizer and angled inboard from the leading edge to the trailing edge on the horizontal stabilizer. All stripes were eight inches (20.32 cm) wide and were painted in identically corresponding positions on both sides of a surface so that the stripe on one side of a surface would coincide exactly with the stripe on the other side where the two meet at the leading and trailing edges. As with all systems, there were exceptions. A stripe could not extend all the way to the trailing edge because the surface on which it was painted was intersected by another surface, thereby terminating the stripe. For example, the lowest of the three diagonal stripes on the vertical tail surfaces of the F6F. The distance from center line to center line was 20 inches (50.80 cm) in all cases regardless of fore and aft or diagonal configuration.





Left: Left: A F4U-5 assigned to VMF-224 from MCAS Cherry Point, North Carolina. Note the placement of the Marine Corps insignia on the side of the fuselage.

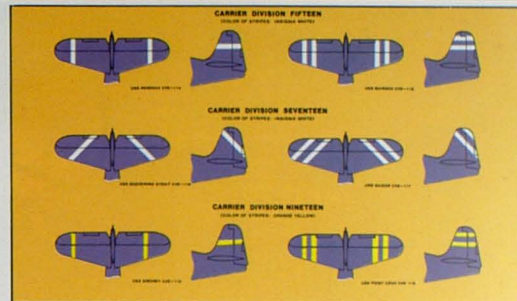


Dimensions are not given on the drawing for locating fore and aft stripes because of variations in size from one aircraft to another.

Lines A and B on the vertical stabilizer were parallel to the longitudinal axis of the aircraft. Line A was tangent to the tip of the vertical stabilizer, while line B was tangent to the fairing of the horizontal stabilizer at its highest point. The center line of a single stripe was located parallel to and half way between lines A and B. When two stripes were used the second was located parallel to and 20 inches (50.80 cm) (center line to center line) above the single stripe. When a third stripe was required it was to be located 20 inches (50.80 cm) (center line to center line) below the middle stripe.

Lines A and B on the horizontal stabilizer were parallel to the longitudinal axis of the aircraft. Line A was tangent to the widest point of the vertical stabilizer, while line B was tangent to the outer tip of the horizontal stabilizer. A single stripe was located so that its center line was in from the tip 1/3 of the distance between lines A and B. The method of locating multiple stripes was a little different. The overall width of the stripes (28 inches [71.12 cm] for two stripes; 48 inches [121.92 cm] for three stripes) was subtracted from the length of the stabilizer, the distance between lines A and B. This figure was divided by three. One-third was the distance from the outer edge of the outer stripe to the tip, and two-thirds was the distance from the inner edge of the inner stripe to the vertical stabilizer, line A.

The position of diagonal stripes on the vertical stabilizer was dependent on the use of a reference point that would be applicable to all aircraft types. Once again no dimensions were given since they varied with aircraft type. In order to locate the reference point a line parallel to the longitudinal axis of the aircraft was drawn on the vertical stabilizer. This line was tangent to the highest point of the horizontal stabilizer and is shown on the drawing as line B. The point on the drawing where line B crossed the trailing edge is shown as point X. This was the reference point for locating the stripes. One stripe was positioned 45° from the longitudinal axis of the aircraft so that its *lower edge* passed through point X. When two stripes were used, the upper stripe was positioned 20 inches (50.80 cm) (center line to center line) above the single stripe. When three stripes were used the middle and upper stripes were



positioned the same as for two stripes. The lowest stripe was positioned 20 inches (50.80 cm) (center line to center line) below the middle stripe. The lower end of the third stripe was not permitted to extend below line B.

The location of diagonal stripes on the horizontal stabilizer was also determined by a reference point which, in this case, was located in the center of the surface. The length of the horizontal stabilizer was the distance between parallel lines A and B. Line A was parallel to the longitudinal axis of the aircraft and tangent to the vertical stabilizer at its widest point. Line B was tangent to the outermost tip of the stabilizer. Point X was established by determining the width of the horizontal stabilizer at a point 1/2 the distance between lines A and B. This was the center of the surface and was the reference point from which the stripes were all laid out. The center line of a single stripe was at 45° to the longitudinal axis of the aircraft and passed through point X. When two stripes were used the outer stripe was located parallel to and 20 inches (50.80 cm) (center line to center line) outboard from the single stripe. A third stripe, when needed, was located parallel to and 20 inches (50.80 cm) (center line to center line) inboard of the single stripe.

While the system did provide for one, two and three stripes, the three stripe groupings were never assigned to a carrier.

Aviation Circular Letter 131-45 was superseded by ACL 134-46, dated September 12, 1946, with an effective date of October 1, 1946. All combat carrier models assigned to fleet training units or the Training Command were to be retained in this combat configuration during their first and second overhaul or modification. When requested by the Training Command, the Bureau of Aeronautics would consider the processing of these aircraft to a noncombat configuration during the third or later overhaul. When considered essential to flight training operations, combat-type airplanes could have external, or otherwise readily removable, combat equipment such as rocket launchers, armor plate, guns, deicer and anticrew equipment, and similar items removed when authorized by the Bureau of Aeronautics. Such equipment had to be retained and be reinstalled in the airplane when it was turned in for the next overhaul or transferred.



Left: The first letters of the ship's name, underscored for a Marine unit, identify this F4U-4 Corsair assigned to VMF-114 while attached to the USS SALERNO BAY (CVE-110) in 1947. During this period, six Marine Corps squadrons were assigned to CVEs as part of the ship complement.

Activities having combat-type aircraft which were noncombat configured were to designate these airplanes with a letter "T" immediately preceding the letter "N". Second line aircraft were still to be designated by an A- preceding the aircraft designation. A training aircraft of combat type on its first or second service tour that was being transferred to an activity outside the Training Command, or fleet training unit, was to be returned to its normal classification as a First or Second Line aircraft, as appropriate, at the time of transfer. Such an aircraft being transferred after the second overhaul was to continue to retain the training N- designation.

ACL 172-46, dated December 23, 1946, superseded and cancelled ACL 134-46. The provisions for the prefix "A", "TN", and "N", to the aircraft designations was continued.

From the beginning of Naval aviation there had been a search for an easy system to rapidly identify aircraft. The Chief of Naval Operations issued Aircraft Circular Letter No. 156-46, dated November 7, 1946, establishing a Visual Identification System for all Navy and Marine Corps aircraft. In order to be effective such a system had to be simple, readable and possess enough different combinations to cover the number of aircraft carriers and all types of squadrons to which naval aviation might expand in case of war. A system using letters and numerals satisfies these requirements as long as distinctive characters are used. The elimination of the ambiguous letters G, J, N, O, Q and Y left ample combinations to cover such expansion. Since each letter has a phonetic equivalent in communication procedures, the problem of describing geometric markings was replaced by the simple process of enunciating the names of the letters of the alphabet. Under this system each aircraft carrier had either a single or double letter symbol, some of which were a holdover from the old systems.

Carrier squadrons were identified by a letter-number system. Letters were assigned to carrier groups to clearly signify the parent carrier. Three digit numbers were assigned by type and squadron. The three digit block number system of aircraft identification was modified to reflect the change in squadron designation to:

VF Squadron	101 - 199
VF Squadron	201 - 299
VA Squadron	301 - 399
VA Squadron	401 - 499

As before, the numbering of aircraft within a squadron was to use consecutive numbers starting with the lowest number. CAG aircraft could be marked 100, 200, 300, or 400 depending on the type of aircraft assigned.

VP, VPP, VPW, VPM, VU, VRU, VX and VCN squadrons also used a letter-number system. However, for these squadrons the first of the two letters designated the wing or class designation while the second letter designated the squadron within the wing. One or two digit numerals designated the aircraft number within the squadron starting with 1 and running consecutively.

Fleet Aircraft Service Squadrons (FASRONS) used a numerical system consisting of at least the last three digits of the aircraft bureau number.

The Training Command used a letter-number system. The first of two letters designated the base or station, while the second letter identified the squadron and/or class designation. One, two or three digit numbers were used to number the aircraft within the squadron with the numbers running consecutively. The Chief, Naval Air Training, controlled the assignment of letter symbols within the Training Command.

Naval Air Transport System used a numerical system consisting of the bureau number to identify its aircraft.

Marine Corps carrier-based squadrons used the letters assigned to the parent carrier. On shore-based squadrons the first letter designated the Wing or other command, while the second letter referred to the squadron within the Wing or Command. The letters were underscored to denote Marine. Under this system it was possible to have the same code letters assigned to a Navy squadron and a Marine Corps squadron concurrently. The only distinction being the line under the code letter(s) to denote Marine. One or two digit numerals were used to number the aircraft within the squadron starting with number one, and continuing consecutively.

All aircraft not identified in the above categories were marked with the last three digits of the aircraft's bureau number.



Right: Curtiss SB2C-5s identified by the International Orange fuselage band as reserve aircraft from the VA squadron at NAS Denver, Colorado. Bottom: Aircraft assigned to Naval Air Reserve squadrons were identified by an International Orange band around the fuselage to distinguish them from a fleet squadron with the same number, as shown on this Curtiss SB2C-4 assigned to a reserve attack squadron at NAS St. Louis.

The letter codes assigned under this directive were:

Assignment List of Letter Symbols for Aircraft Carriers

Vessel Name	Class Number	Identification Symbol
Midway	CVB-41	M
F.D. Roosevelt	CVB-42	F
Coral Sea	CVB-43	C
Randolph	CV-15	R
Boxer	CV-21	B





Left: Marine reserves from the fighter squadron at NAS Jacksonville, Florida deployed to MCAS El Toro, California for their annual training in 1947. Notice the VMF-452 airplanes ashore from the USS BAIROKO (CVE-115). Bottom Left: Hellicats assigned to a VF squadron at NAS Dallas, Texas.



Right: F4U-4 of VF-75 March 1946. The use of the squadron designation on the vertical tail is only known to have been used by the squadrons of CVBG-75 aboard the USS MIDWAY (CVB-41).

Leyte	CV-32	L
Kearsarge	CV-33	K
Oriskany	CV-34	RI
Antietam	CV-36	A
Princeton	CV-37	P
Shangri La	CV-38	S
Tarawa	CV-40	T
Valley Forge	CV-45	V
Philippine Sea	CV-47	PS

Saipan	CVL-48	SA
Wright	CVL-49	W
Salerno Bay	CVE-110	SB
Siboney	CVE-112	SI
Rendova	CVE-114	RE
Bairoko	CVE-115	BA
Badoeng Strait	CVE-116	BS
Saidor	CVE-117	SR
Sicily	CVE-118	SL
Point Cruz	CVE-119	PZ
Mindoro	CVE-120	MI
Palau	CVE-122	PA

Assignment List of Letter Symbols For Fleet Air Wings and Their Squadrons

FLEET AIR WING 1 A		
VP-MS 11	(ex VP-21)	AA
VP-HL 8	(ex VP-108)	AB
VP-ML 1	(ex VP-128)	AC
FLEET AIR WING 2 B		
VP-MS 7	(ex VP-27)	BA
VP-HL 13	(ex VP-115)	BB
VP-HL 3	(ex VP-124)	BC
VP-HL 5	(ex VP-143)	BD
VP-ML 6	(ex VP-146)	BE
FLEET AIR WING 3 C		
VP-MS 10	(ex VP-74)	CA
VP-MS 3	(ex VP-136)	CB
VP-MS 4	(ex VP-204)	CC
FLEET AIR WING 4 D		
VP-AM 1	(ex VP-53)	DA
VP-AM 2	(ex VP-62)	DB

VP-HL 7	(ex VP-107)	DC
VP-HL 10	(ex VP-120)	DD
VP-HL 12	(ex VP-122)	DE
VP-AM 5	(ex VP-5)	DF

FLEET AIR WING 5 E

VP-MS 9	(ex VP-19)	EA
VP-AM 3	(ex VP-71)	EB
VP-AM 4	(ex VP-73)	EC
VP-ML 5	(ex VP-135)	ED
VP-MS 5	(ex VP-205)	EE
VPP-2	(ex VD-2)	EF
VPM-2	(ex VPW-2)	EH

FLEET AIR WING 7 H

VP-HL 4	(ex VP-104)	HA
VP-HL 6	(ex VP-114)	HB
VP-HL 11	(ex VP-111)	HC

FLEET AIR WING 10

VP-MS 3	(ex VP-28)	LA
VP-HL 9	(ex VP-119)	LB

FLEET AIR WING 11

VP-MS 1	(ex VP-201)	MA
VP-MS 8	(ex VP-208)	MB

FLEET AIR WING 14

VP-MS 2	(ex VP-22)	SA
VP-ML 2	(ex VP-130)	SB
VP-ML 4	(ex VP-144)	SC
VPP 1	(ex VD-5)	SD

FLEET AIR WING 18

VP-MS 6	(ex VP-32)	WA
VP-HL 2	(ex VP-102)	WB
VP-HL 1	(ex VP-116)	WC
VPM 1	(ex VPW-1)	WD

Assignment List of Letter Symbols for Battleship and Cruiser Squadrons

(VO) BAT SPOT RONS		
VO-1B		BA
VO-2B		BB
(VO) CRU SPOT RONS		
VO-1C		CA
VO-2C		CB
VO-10C		CC
VO-12C		CD
VO-13C		CE
VO-15C		CF
VO-17C		CH

Assignment List of Letter Symbols for Marine Corps Squadrons

FIRST MARINE AIRCRAFT WING		
HEDRON MAW 1		Δ
VMO 3		ΔΔ
VMO 6		ΔB
VMR 153		ΔC
HEDRON MAG 24		ΔD
VMF 115		ΔE
VMF 211		ΔE
VMF 218		ΔH
VMF(N) 533		ΔI
SECOND MARINE AIRCRAFT WING		
HEDRON MAW 2		B
HEDRON MAG 11		BA
HEDRON MAG 14		BB
VMF 122		BC
VMF 212		BD
VMF 222		BE





Left: Marine reserves from the fighter squadron at NAS Jacksonville, Florida deployed to MCAS El Toro, California for their annual training in 1947. Notice the VMF-452 airplanes ashore from the USS Bairoko (CVE-115). Bottom Left: Helicats assigned to a VF squadron at NAS Dallas, Texas.



Right: F4U-4 of VF-75 March 1946. The use of the squadron designation on the vertical tail is only known to have been used by the squadrons of CVBG-75 aboard the USS MIDWAY (CVB-41).

Leyte	CV-32	L
Kearsarge	CV-33	K
Oriskany	CV-34	RI
Antietam	CV-36	A
Princeton	CV-37	P
Shangri La	CV-38	S
Tarawa	CV-40	T
Valley Forge	CV-45	V
Philippine Sea	CV-47	PS

Saipan	CVL-48	SA
Wright	CVL-49	W
Salerno Bay	CVE-110	SB
Siboney	CVE-112	SI
Rendova	CVE-114	RE
Bairoko	CVE-115	BA
Badoeng Strait	CVE-116	BS
Saidor	CVE-117	SR
Sicily	CVE-118	SL
Point Cruz	CVE-119	PZ
Mindoro	CVE-120	MI
Palau	CVE-122	PA

Assignment List of Letter Symbols For Fleet Air Wings and Their Squadrons

FLEET AIR WING 1 A		
VP-MS 11	(ex VP-21)	AA
VP-HL 8	(ex VP-108)	AB
VP-ML 1	(ex VP-128)	AC

FLEET AIR WING 2 B		
VP-MS 7	(ex VP-27)	BA
VP-HL 13	(ex VP-115)	BB
VP-HL 3	(ex VP-124)	BC
VP-HL 5	(ex VP-143)	BD
VP-ML 6	(ex VP-146)	BE

FLEET AIR WING 3 C		
VP-MS 10	(ex VP-74)	CA
VP-MS 3	(ex VP-136)	CB
VP-MS 4	(ex VP-204)	CC

FLEET AIR WING 4 D		
VP-AM 1	(ex VP-53)	DA
VP-AM 2	(ex VP-62)	DB

VP-HL 7	(ex VP-107)	DC
VP-HL 10	(ex VP-120)	DD
VP-HL 12	(ex VP-122)	DE
VP-AM 5	(ex VP-5)	DF

FLEET AIR WING 5 E		
VP-MS 9	(ex VP-19)	EA
VP-AM 3	(ex VP-71)	EB
VP-AM 4	(ex VP-73)	EC
VP-ML 5	(ex VP-135)	ED
VP-MS 5	(ex VP-205)	EE
VPP-2	(ex VD-2)	EF
VPM-2	(ex VPW-2)	EH

FLEET AIR WING 7 H		
VP-HL 4	(ex VP-104)	HA
VP-HL 6	(ex VP-114)	HB
VP-HL 11	(ex VP-111)	HC

FLEET AIR WING 10		
VP-MS 3	(ex VP-28)	LA
VP-HL 9	(ex VP-119)	LB

FLEET AIR WING 11		
VP-MS 1	(ex VP-201)	MA
VP-MS 8	(ex VP-208)	MB

FLEET AIR WING 14		
VP-MS 2	(ex VP-22)	SA
VP-ML 2	(ex VP-130)	SB
VP-ML 4	(ex VP-144)	SC
VPP 1	(ex VD-5)	SD

FLEET AIR WING 18		
VP-MS 6	(ex VP-32)	WA
VP-HL 2	(ex VP-102)	WB
VP-HL 1	(ex VP-116)	WC
VPM 1	(ex VPW-1)	WD

Assignment List of Letter Symbols for Battleship and Cruiser Squadrons

(VO) BAT SPOT RONS		
VO-1B		BA
VO-2B		BB

(VO) CRU SPOT RONS		
VO-1C		CA
VO-2C		CB
VO-10C		CC
VO-12C		CD
VO-13C		CE
VO-15C		CF
VO-17C		CH

Assignment List of Letter Symbols for Marine Corps Squadrons

FIRST MARINE AIRCRAFT WING		
HEDRON MAW 1		Δ
VMO 3		ΔΔ
VMO 6		ΔB
VMR 153		ΔC
HEDRON MAG 24		ΔD
VMF 115		ΔE
VMF 211		ΔF
VMF 218		ΔH
VMF(N) 533		ΔI

SECOND MARINE AIRCRAFT WING		
HEDRON MAW 2		B
HEDRON MAG 11		BA
HEDRON MAG 14		BB
VMF 122		BC
VMF 212		BD
VMF 222		BE



Left: A TBM-3E assigned to the reserve squadrons at NAS Squantum, Massachusetts.



Right: A Douglas R4D-5 with bare metal finish. The last three digits of the Bureau Number is used as an identification code. Note the propeller warning stripe that surrounds the fuselage. Below: Corsairs of the NAS Squantum reserve squadrons. Note the position of the International Orange stripe on these aircraft.

HEDRON MAG 21	BE
VMR 252	BH
VMR 952	BI
HEDRON MAG 22	BK
VMF 113	BL
VMF 314	BM
VMF 422	BP
VMO 1	BR
HEDRON MAG 53	BS
VMF 531	BT
VMF 532	BU
VMF 354	BV

AIRCRAFT FLEET MARINE FORCE PACIFIC	P
HEDRON AIR FMF PAC	P
HEDRON MAG 15	PA
VMR 352	PB
VMR 953	PC
VMR322	PD

MARINE AIR WEST COAST	W
HEDRON MARINE AIR WEST	W
HEDRON MAG 12	WA
HEDRON MAG 25	WB
VMR 152	WC
VMR 253	WD
HEDRON MAG 31	WE
VMF(N) 534	WF
VMF(N) 542	WH
HEDRON MAG 32	WI
VMF 224	WK
VMF 311	WL
HEDRON MAG 33	WM
VMF 223	WP
VMF 312	WB
VMF 323	WS
VMF 254	WT

AIRCRAFT FLEET MARINE FORCE ATLANTIC	L
MARINE CORPS AIR BASES CHERRY POINT	E
MARINE CORPS SCHOOLS QUANTICO	EA

**Assignment List of Letter Symbols
for Miscellaneous Squadrons**

VX 1		XA
VX 2		XB
VX 3		XC
VX 4		XD
VRU 1	(ex VRJ 1)	RA
VRU 2	(ex VRJ 2)	RB
VRU 3	(ex VRJ 3)	RC
VRU 4	(ex VRJ 4)	RD
VU 1	(ex VJ 1)	UA
VU 2	(ex VJ 2)	UB
VU 3	(ex VJ 3)	UC
VU 4	(ex VJ 4)	UD
VU 5	(ex VJ 15)	UE
VU 6	(ex VJ 11)	UF
VU 7	(ex VJ 7)	UH
VU 8	(ex VJ 8)	UI
VU 9	(ex VJ 9)	UK
VU 10	(ex VJ 16)	UL
NIGHT DEVRON (PAC)		
VCN 1		PA
NIGHT DEVRON (LANT)		
VCN 2		LA

In addition to the fuselage band identifying Naval Reserve aircraft, a series of letters were assigned to each Air Station as shown:

Anacostia	A	Columbus	C
Atlanta	B	Denver	P
Dallas	D	Grosse Ile	I
Glenview	V	Los Alamitos	L

Jacksonville	F	Miami	H
Memphis	M	New Orleans	X
Minneapolis	E	Norfolk	S
New York	R	Olathe	K
Oakland	G	St. Louis	U
Seattle	T	Willow Grove	W
Squantum	Z		



A second letter was used to identify the type of squadron as follows:

Attack	A
Fighter	F
Patrol	P
Transport	R
Utility	U

For example, the letter assigned to NAS Anacostia was A, so fighter aircraft assigned to their Reserve Squadron(s) would be identified by the letters AF; attack aircraft would

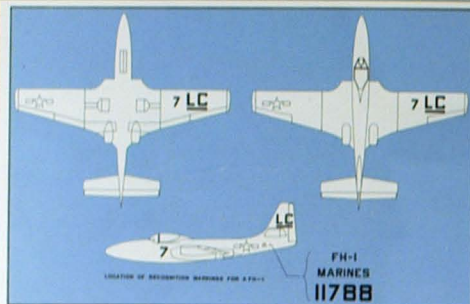
be identified as AA; patrol aircraft as AP; transport aircraft as AR; and a utility aircraft as AU.

It can be seen from this that an aircraft from a Fleet squadron and a Reserve squadron could carry the same tail codes. An aircraft from the USS SAIPAN (CVE-48) would be coded SA, as would an attack aircraft from the Reserve squadron at NAS Norfolk. The difference would be in the Orange fuselage band on the Reserve aircraft.

On December 12, 1946, the Chief of Naval Operations issued Aviation Circular Letter No. 165-46, which in part stated that the markings, previously specified in Aviation Circular Letter No. 156-46, could be delayed until receipt of the revised issue of SR-2. VO-3C was added to the list with a code of CI, as was OPDEV FOR (Operational Development Squadron Four) with a code of CK. NIGHT DEV RON (PAC) (Night Development Squadron Pacific) and NIGHT DEV RON (LANT) (Night Development Squadron Atlantic) were deleted.

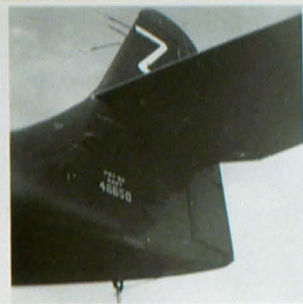
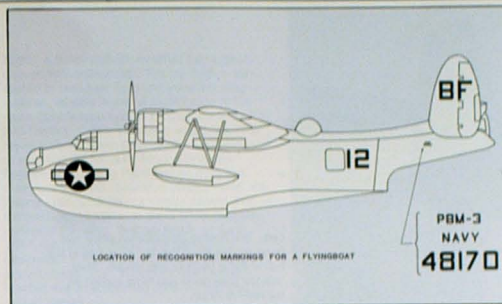
The letters were now assigned to the Carrier Aircraft Groups rather than the vessel. These designations were:

CVBG 1	M
CVBG 3	F
CVBG 5	C
CVG 1	T
CVG 3	K
CVG 5	S
CVG 7	L
CVG 9	PS
CVG 11	V
CVG 13	P
CVG 15	B
CVG 17	R
CVG 19	A
CVG 21	RI
CVLG 1	SA
CVEG 1	BS
CVEG 2	SL



Below: McDonnell FH-1s of VMF-122 show the placement of the identification code on the right wing in the same location as used on the left wing for the national aircraft insignia. These two marking locations are reversed on the under surface of the wing.

Opposite Right: On flying boats the aircraft, type, branch of service, and Bureau Number were carried high on the rear of the hull as shown on this reserve squadron PBV-GA. Opposite Lower: All Marine Corps squadrons were identified by a bar under the visual identification system code letters as shown on this McDonnell FH-1 of VMF-122.



The assignment of Marine Fighting Squadrons (CVE) to carriers was reflected by their assigned identifying symbols, as follows.

VMF 114	SB
VMF 214	BE
VMF 225	MI
VMF 452	BA
VMF 461	EA
VMF 513	SB

SR-2f, with an effective date of January 2, 1947, contained many changes in the markings to be applied to Naval aircraft. The branch of service — NAVY or MARINES — was moved back to both sides of the fuselage in letters 1 inch (2.54 cm) high. It was centered with respect to a vertical reference line drawn from the extreme forward point of the horizontal stabilizer to the lowest point of the fuselage and centered between these two points. The letters and numerals designating the model were spaced vertically one inch (2.54 cm) above the branch of service in letters and numerals one inch (2.54 cm) high. The aircraft serial number was spaced vertically one inch (2.54 cm) below the branch of service in numerals two inches (5.08 cm) high. Unit identifying letters, assigned by Aviation Circular Letter 156-46 and subsequent directives, were placed on both sides of the vertical fin and rudder above the horizontal stabilizer, centered on the vertical surfaces. They were applied on the outboard sides only on multiple vertical fins and rudders. These letters were 36 inches (91.44 cm) high for a single letter and 30 inches (76.20 cm) high for double letters. Width of individual strokes was to be 4 inches (10.16 cm). In case of double letters, the width of each letter could be reduced to accommodate the letters to the shape of the tail, retaining maximum clarity, visibility and congruity. These letters were also located on the upper surface of the right wing and lower surface of the left wing, 6 inches (15.24 cm) in from the tip, placed so as to balance the appearance of the national aircraft insignia on the opposite wing. This placement did not conform with the illustrations provided in the instructions and it is believed that the distance specified was a typographical error. The same sizes were used for applying these letters at both wing and tail locations.



The Unit Aircraft Numeral was again to be applied to both sides of the fuselage. The aft edge of the number was to be nine inches (22.86 cm) forward of the national aircraft insignia. In the case of patrol planes, where the national aircraft insignia was located on the bow, the Unit Aircraft Numeral was placed aft of the trailing edge of the wing. The top of the numerals was to be six inches (15.24 cm)



below the line of the cockpit rim, or cockpit rim line extended. These numerals were to be the largest of the following standard sizes: 16 inches (40.64 cm), 20 inches (50.80 cm), 24 inches (60.96 cm), 28 inches (71.12 cm), 32 inches (81.28 cm), and 36 inches (91.44 cm). However,

they were not to exceed 50 percent of the height of the projection of the fuselage side at the point of application. The same numeral was to be applied on the upper surface of the right wing and lower surface of the left wing, 18 inches (45.72 cm) inboard of the Unit Identifying Letter.



Left: The reserve identification stripe was to be applied aft of the rear most step in the hull of flying boats or amphibians. Note how the base name was to be applied on the reserve stripe.

These numerals were to be 24 inches (60.96 cm) high. Additional optional use of these numerals was authorized on the upper half of the nose, one marking on each side, and on the landing gear fairing. When so used the numerals were to be six inches (15.24 cm) in height. The size and color of the Unit Aircraft Numeral for aircraft finished in land camouflage scheme were left to the discretion of the tactical commander.

Squadron insignia once again was authorized to be used on all Naval aircraft. This was an optional marking, but when used, was to be located on both sides of the fuselage. The top of the insignia was to be 6 inches (15.24 cm) below the line of the cockpit rim, or cockpit rim line extended, and directly below the most forward point of the junction of windshield with the fuselage. The insignia could be no larger than a six inch (15.24 cm) square.

In addition to the markings prescribed in SR-21 for all Naval aircraft, Reserve aircraft were identified by a glossy International Orange stripe around the fuselage forward of the empennage. The width of this band was equal to the outside diameter of the blue border surrounding the national aircraft insignia. The band was to be centered on the insignia and just meet, but not overlap, the insignia border. In the event the blue border and circle were omitted, as authorized in the case of Sea Blue or Black aircraft, the International Orange band was to terminate at the outside radius specified for such a border, as if it had been applied. Where the fuselage insignia was located forward of the wing, as in the case of the hull of patrol flying boats, a 35 inch (88.90 cm) band was to be painted aft of the Unit Aircraft Number approximately midway between the trailing edge of the wing and leading edge of the horizontal stabilizer.

Hospital aircraft, in addition to the normal required markings, were identified by a glossy Insignia Red cross in a glossy Insignia White circle in the locations allotted to the Unit Identifying Letter(s). This insignia consisted of five Insignia Red squares arranged in the form of a symmetrical cross centered inside an Insignia White circumscribed circle. The length of the cross arms were to be 30 inches (76.20 cm) and the diameter of the circle 38 inches (96.52 cm), except where the dimensions of the aircraft would not permit this size, or where this size would be incongruous. In these cases, the size could be modified

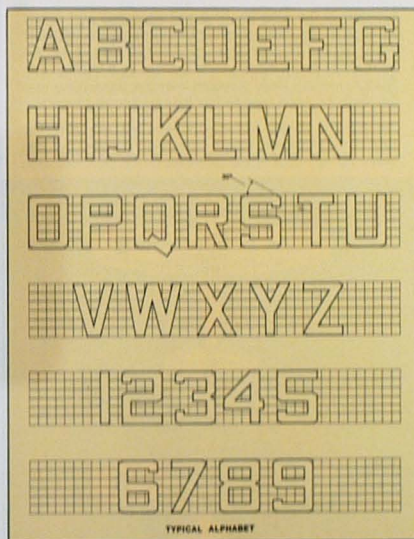
to best conform to the surface to which they were applied, while maintaining the same dimensional ratios.

A new alphabet was shown for use on heavier-than-air aircraft. The previously issued alphabet was still to be used on lighter-than-air aircraft with no change being made in the width of the individual strokes forming the letters.

On January 6, 1947, the Naval Air Advanced Training Command Headquarters issued Headquarters Circular Letter No. 1-47 which directed that the following Visual Identification System letters and numbers be applied to all aircraft within the command as soon as practicable.

Activity	Identifying Symbol	Block of Numbers
<u>NAS Jacksonville</u>	M	
Instructors ATU #9	MA	101 - 199
VA, ATU #4	MB	201 - 299
VO, ATU #6	MC	301 - 399
<u>NAS Banana River</u>	B	
VF, ATU #2	BA	101 - 199
VA, ATU #5	BB	201 - 299
VP-MS, ATU #10	BC	301 - 399
Senior Officers' Refresher Squadron	BD	401 - 499
<u>NAAS Cecil Field</u>	C	
VF, ATU #1	CA	101 - 199
VF, ATU #3	CB	201 - 299
<u>NAS St. Simons Island</u>	S	
NRTS	SA	101 - 199
<u>NAS Whiting Field</u>	W	
WP-ML, ATU #11	WA	101 - 199
VP-HL, ATU #12	WB	201 - 299
VPP, ATU #13	WC	301 - 399
CQ, ATU #7	WD	401 - 499

Right: A Beech SNB-2H modified for hospital duty at NAS Jacksonville. The red cross is also applied to the upper right and lower left wing surfaces. Middle Right: A modification to the visual identification system assigned the letter F to NAS Oakland, California reserve squadrons. The newly assigned North American FJ-1 is being used to advertise the Naval Air Reserve program. Bottom Left: During the transition from NAS Livermore to NRBH Oakland in October 1946, this reserve TBM-3E displays a hastily painted #66 on the fuselage in addition to the G-57 on the under surface of the wing. Bottom Right: In April 1947, this NRBH Oakland TBM displays the designation N-TBM-3E to indicate its training aircraft status. The "V" prefix to the Bureau Number was an accounting code not intended for aircraft display.





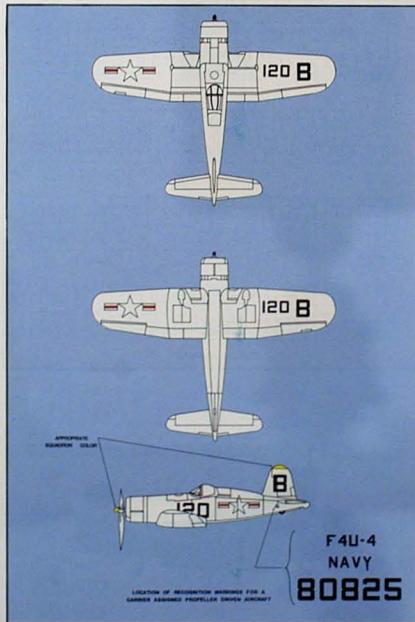
Left: A North American SNJ-5 assigned to NAS Moffett Field, California, is identified by the last three digits of its Bureau Number and base name. Contrary to specifications, it appears that the name is applied in two lines on the right wing. Opposite: The short-lived gold rectangle with Scarlet U.S. MARINES is shown on this R5D. Note the two star plaque under the pilot's cockpit window denoting a Major General is aboard.



SR-21 was modified by Amendment 1 with an effective date of February 28, 1947. In the case of shore-based aircraft, where no Unit Identifying Letter symbols were assigned, the name of the air station (e.g., NORFOLK), or abbreviation of the unit's title (e.g., FASRON) was to be used in place of the Unit Identifying Letter. This marking was to be placed on the vertical tail surfaces and wings in the locations specified for the Unit Identifying Letter. The letter sizes used in this marking on the vertical tail surfaces was reduced so that it could be accommodated on the fin and rudder. If the name of the unit contained more than one word, they were to be placed on separate lines. The size of letters used on the wing was to be the largest which would fit in the space specified. In this case, if the name of the unit contained more than one word, they must be on one line. Standard sizes from six inches (15.24 cm) to 18 inches (45.72 cm), in three inch (7.62 cm) increments, were directed. The spacing of the Unit Identifying Letter on the wings was amended to place the center of this marking at a distance from the wing tip equal to 1/3 of the distance from the

fuselage to the wing tip. Fore and aft, it was in a similar location to the national aircraft insignia on the opposite wing. Where CNO directives specified the use of the last three digits of the aircraft serial number as a visual identification marking, these numerals were the same size and in the same locations specified for the Unit Aircraft Numeral.

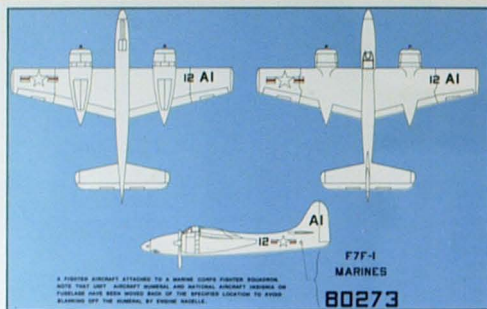
The hospital insignia instructions were also modified. The ratio of the cross arm length remained the same, but was identified as 15/19 of the diameter of the circumscribed



circle. The diameter of this circle when applied to the vertical tail surfaces was to be 2/3 of the mean chord of the fin and rudder. The circumscribed circle when applied to the wings was to be the same diameter as the circumscribed circle of the national aircraft insignia on the opposite wing (remember this does not include the blue border).

Amendment 2, effective May 15, 1947, further modified SR-21. Transport aircraft, assigned to Marine Corps transport squadrons only, were authorized to carry a Gold rectangle 66 inches (167.64 cm) by 12 inches (30.48 cm), with a 1/2 inch (1.27 cm) Black border, bearing the inscription U.S. MARINES in eight inch (20.32 cm) Scarlet letters. The transport squadrons were to establish a standard location





Middle: This Douglas R4D-6R was assigned to Aircraft, Fleet Marine Force, Atlantic, with the Scarlet and Gold U.S. MARINES on the fin and Marine Corps emblem on the nose forward of the aircraft number. Bottom: A Piaseki HRP-1 in Sea Blue identified by the last three digits of its Bureau Number. The only branch of service identification is the Marine Corps emblem on the fuselage. National aircraft insignia is displayed on the top and bottom of the fuselage in line with the troop door as well as on each side of the fuselage.



Right: Due to the engine nacelles blocking so much of the fuselage side of this Grumman Tigercat, assigned to the First Marine Aircraft Wing, Headquarters Squadron, the aircraft number is applied to the engine cowl. Note the Red and White propeller warnings on the fuselage. Bottom: A Douglas R5D-3 assigned to the Naval Air Transport Service, does not show any VFR squadron assignment, but shows the full Bureau Number on the nose forward of the NATS insignia.



for this marking for each model of aircraft they operated. In general, this rectangle was located in a horizontal position on the vertical fin and below the Unit Identifying Letter(s).

The Marine Corps emblem was again authorized to be applied on both sides of the fuselage. It was now to be used in lieu of the squadron insignia provided it was placed in the same location and was the same size as specified for the squadron insignia. Squadron insignia could still be no larger than six inches (15.24 cm). Marine Corps transport aircraft were authorized to carry the Marine Corps emblem applied to both sides of the fuselage below the lower rim of the cockpit windows directly below the most forward point of the junction of the windshield and the

fuselage. No size was designated for the emblem on transports. Aircraft could not carry both a squadron insignia and a Marine Corps emblem.

Naval Air Transport Service (NATS) aircraft were authorized to have the NATS insignia applied to both sides of the fuselage below the lower rim of the cockpit windows directly below the most forward point of the junction of the windshield with the fuselage. This had originally been authorized by Technical Order No. 101-43, dated November 3, 1943.

An addition was made to Carrier Air Group squadron markings. The propeller spinner, approximately the top seven inches (17.78 cm) of the fin and rudder, on both sides, above the Unit Identifying Letter(s) were to be colored to





Left: Bare metal SNJs at Turner Field, Marine Corps Schools, Quantico, Virginia, in 1948. Notice the assortment of markings on one flight line. The code EA was assigned to Marine Corps Schools. The second and third aircraft are marked MCAS Quantico and also carry the EA designation while the fourth SNJ uses the last three digits of its Bureau Number and does not display the EA. All were serviced by Aircraft Engineering Squadron 12 (AES-12). Middle Right: In addition to the prescribed branch of service and national aircraft insignia, this free balloon at NAS Lakehurst, New Jersey, is identified as belonging to the reserve lighter-than-air squadrons based there.

designate squadrons within the Group. The colors used were to conform to the following sequence:

- 1st Squadron or Unit — Insignia Red
- 2nd Squadron or Unit — Insignia White
- 3rd Squadron or Unit — Light Blue
- 4th Squadron or Unit — Light Yellow
- 5th Squadron or Unit — Light Green
- 6th Squadron or Unit — Black, outlined with a White border

Reverting to a practice of early aviation, the abbreviated rank and last name of the assigned pilot could be placed on both sides of the fuselage in two inch (5.08 cm) high letters under the cockpit rim, above and aft of the squadron insignia. This marking was to be in either Black or White depending on the background to which it was applied so that it was given the greatest contrast for good visibility.

Nonrigid airships assigned to Naval Reserve squadrons were to have the words U.S. NAVAL RESERVE applied in letters 54 inches (137.16 cm) high in the locations specified for the marking U.S. NAVY. These instructions also applied to any free balloons assigned to Naval Reserve squadrons.

Aviation Circular Letter 53-47, dated May 15, 1947, *Visual Identification System for Naval Aircraft*, added the tail codes for the two Fleet Airborne Electronic Units. These were FAETULant as FA and FAETUPac as FP.

The markings applied to aircraft being used for search and rescue were modified with the issue of AN-1-8a on June 2, 1947. Aircraft painted glossy Sea Blue did not require the Black border on the Orange Yellow markings. The national aircraft insignia that normally was applied to the bow was moved aft on the hull to clear the Orange Yellow rectangle. The shape and size of the characters in the Orange Yellow rectangle were now to be approximately 2/3 of the height of the rectangle. The width of the characters was to be 3/4 of the height with the width of the individual strokes to be 1/6 the height.

Permanently shore-based helicopters assigned a rescue mission were to have the entire fuselage painted glossy Orange Yellow with the word RESCUE in glossy Black characters at the widest part of the top (aft of the enclosure) and bottom of the fuselage in the largest



vertical block letters space would permit.

A third change was made to the basic SR-2f instruction with the issue of Amendment 3, having an effective date of May 1, 1948. This amendment increased the size of the branch of service — NAVY or MARINES — and model designation to two inches (5.08 cm) and the aircraft serial number to four inches (10.16 cm). The location remained the same. The markings directed by SR-2 were not required for military aircraft used for research projects. The marking of such aircraft were subject to Bureau of Aeronautics approval in each case.

The Commanding Officer of NavScol, CIC, based at NAS Glenview was directed by Chief of Naval Air Reserve



Right: Douglas JD-1 of Utility Squadron 7 (VJ-7) in the colorful scheme for a twin engine tow plane. Bottom: A Curtiss SC-1 showing the markings of an airplane assigned to the Naval Air Test Center, Patuxent River, Maryland. In this case both the last of the Bureau Number and the unit designation have been applied to the wings.

Training (CNAReTra) letter NM58-1/F40 Serial 38053, dated August 27, 1947, to apply the following letter-number system to aircraft assigned to the CIC School.

F6F-5	LF	500 - 550
SNB	LT	550 - 600
SNJ	LT	600 - 625

Reflecting the reduction in naval aviation after the war Headquarters Circular Letter No. 51-47 issued by the Advanced Training Command on November 25, 1947, cancelled the requirements of Headquarters Circular Letter No. 1-47, and replaced them with the following markings.

Activity	Identifying Symbol	Block of Numbers
NAS Jacksonville		
VF, ATU #1	MA	101 - 199

VF, ATU #2	MB	201 - 299
VA, ATU #4	MC	401 - 499
VA, ATU #5	MD	501 - 599
VO, ATU #6 and		
VP-MS, ATU #10	ME	601 - 699
Instructors ATU	MF	901 - 999

NAS Corpus Christi

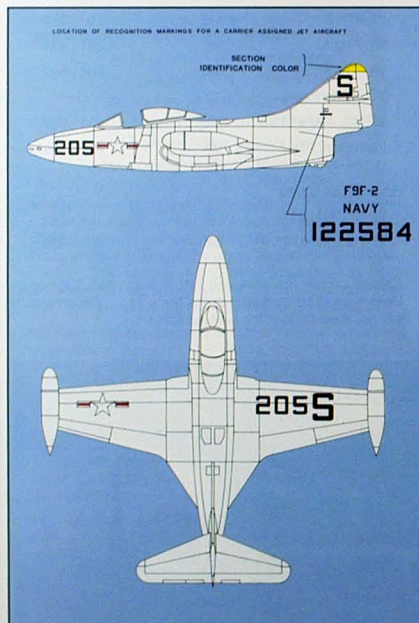
VP-ML, ATU #11	CA	101 - 199
VP-HL, ATU #12	CB	201 - 299

Station aircraft not assigned to the Advanced Training Units were to be marked with the name of the station and the last three digits of the bureau numbers.





Left: A VMF-115 Grumman F9F-2B Panther. The suffix "B" denotes the aircraft has been modified with racks to carry bombs and rockets.



Aviation Circular Letter No. 69-48, dated August 4, 1948, Visual Identification System for Naval Aircraft, reflected the change in composition of Carrier Air Groups. The three-digit numbers to identify individual aircraft within each squadron were modified as follows:

VC CAG Division	0 - 99
VF Squadron	101 - 199
VF Squadron	201 - 299

VF Squadron	301 - 399
VA Squadron	401 - 499
VA Squadron	501 - 599

All transport squadrons were now to be identified by the assigned letter codes with the individual aircraft within the squadron identified by the last three digits of the bureau number.

Squadrons (other than those in Carrier Air Groups) including Patrol, Utility, Development, Observation, Fleet Training and Helicopter squadrons were now included in these tail codes. Underscoring was no longer required to denote Marine Corps units.

Administrative and post student training aircraft attached to units other than those listed above, except Marine Corps Headquarters Squadrons, were to have the ship, station or unit to which assigned spelled out in lieu of a letter designation (e.g., NORFOLK, FASRON 7, MIDWAY, etc.). The individual aircraft was to be identified by the last three digits of the bureau number.

The revised list for identification letters to Naval aviation units was:

Carrier Air Groups and Squadrons

(The asterisk indicates new letter designations. The previous designation is shown in parenthesis.)

CVG-1	(CVG-1)	T
CVG-2	(CVBG-1)	M
CVG-3	(CVG-3)	K
CVG-4	(CVBG-3)	F
CVG-5	(CVG-5)	S
CVG-6	(CVBG-5)	C
CVG-7	(CVG-7)	L
CVG-9	(CVG-9)	D* (PS)
CVG-11	(CVG-11)	V
CVG-13	(CVG-13)	P
CVG-15	(CVG-15)	A
CVG-17	(CVG-17)	R
CVG-19	(CVG-19)	B
VC-4		NA*

VC-5		NB*
VC-11	(VAW-1)	ND*
VC-12	(VAW-2)	NE*
VC-21	(CVEG-1)	BS
VC-22	(CVEG-2)	SL
VC-23	(CVEG-3)	MI
FAWTUPAC	(VCN-1)	PA
FAWTULANT	(VCN-2)	LA

Patrol Squadrons

VP-1	(VP-ML-1)	CD* (AC)
VP-2	(VP-ML-2)	SB
VP-3	(VP-ML-3)	CB
VP-4	(VP-ML-4)	SC
VP-5	(VP-ML-5)	MC
VP-6	(VP-ML-6)	BE
VP-7	(VP-ML-7)	HE
VP-8	(VP-ML-8)	HD
VP-20	(VP-HL-10)	DD
VP-21	(VP-HL-11)	RC
VP-22	(VP-HL-2)	CE* (AE)
VP-23	(VP-HL-3)	EH
VP-24	(VP-HL-4)	HA
VP-25	(VP-HL-13)	BB
VP-26	(VP-HL-6)	HB
VP-27	(VP-HL-7)	DC
VP-28	(VP-HL-8)	CF* (AF)
VP-29	(VP-HL-12)	DF
VP-32	(VP-AM-2)	DB
VP-33	(VP-AM-3)	EB
VP-34	(VP-AM-4)	EC
VP-40	(VP-MS-10)	CA
VP-41	(VP-MS-11)	MA* (AA)
VP-42	(VP-MS-2)	SA
VP-43	(VP-MS-3)	BC



Right: The Light Yellow tail tip and 400 series numbers, of these ADs of VA-115 from CVG-11, show this is the number four squadron in the Air Group.

VP-44	(VP-MS-4)	CC
VP-45	(VP-MS-5)	EE
VP-46	(VP-MS-6)	BD* (AD)
VP-47	(VP-MS-7)	BA
VP-48	(VP-MS-8)	MB
VP-49	(VP-MS-9)	EA
VP-51	(VPW-1)	EW
VP-61	(VPP-1)	SD
VP-62	(VPP-2)	EF

Transport, Utility and Miscellaneous Squadrons

VR-1		RP*
VR-2		RA*
VR-3		RT*
VR-5		RS*
VR-6		RU*
VR-8		RH*
VR-21	(VRU-1)	RZ*
VR-22	(VRU-2)	RB
VR-23	(VRU-3)	RC
VR-24	(VRU-4)	RD
VR-31	(VRF-1)	RE
VR-32	(VRF-2)	RF
VR-44	(VR-4)	RM
VO-1		UB* (CB)
VO-2		UC* (CI)
VU-1		UA
VU-4		UD
VU-5		UE
VU-7		UH
VU-9		UK
VU-10		UL



Left: A Boeing PB-1W of VPB-101 used for anti-submarine warfare carries a large number 4 in Yellow on the nose. Middle: Not only were the aircraft coded by colors and characters, but the handling equipment was also. In this case, it is the beaching gear for a PSM. The large floatation tanks on the beaching gear are painted Red and Green to eliminate any confusion in the water as to which wheels fit the left side and which fit the right side of the hull. Opposite: A McDonnell FH-1 Phantom with nonregulation White nose, tip of tail, rear fuselage and U.S. MARINES of VMF-122 painted for the 1949 National Air Races.



VX-1		XA	
VX-2		XB	
VX-3	(CVLG-1)	XC*	(SA)
VX-4		XD	
HU-1		UP*	
HU-2		UR*	
FAETULANT		FA	
FAETUPAC		FP	
ZP-1		ZW	
ZP-2		ZL	

Marine Corps Squadrons

AIRFMFLANT	LZ*	(L)
AIRFMFPAC	WZ*	(P)
AIRFMFWESPAC LW*	(W)	
HEDRON-1	AZ*	(A)
HEDRON-2	LL	
HEDRON-11	LM*	(LA)
HEDRON-12	WA	
HEDRON-14	LN*	(LB)
HEDRON-15	AV*	(PA)
HEDRON-24	AW*	(AD)
HEDRON-33	WM	
HMX-1	XM	
MATACS-1	LI	
MATACS-2	WV*	(WE)
VMF-115	AE	
VMF-122	LC	
VMF-211	AF	
VMF-212	LD	
VMF-214	WE*	(RE)
VMF-218	AH	
VMF-222	LE	
VMF-223	WP	
VMF-224	WK	
VMF-225	WI*	(SI)
VMF-311	WL	
VMF-312	WR	
VMF-322	AD*	(PD)
VMF-323	WS	
VMF-452	AB*	(BA)



VMF(N)-114	LK	
VMF(N)-513	WF	
VMF(N)-531	LT	
VMF(N)-533	AI	
VMF(N)-542	WH	
VMP-254	WT	
VMP-354	LV	
VMO-1	LR	
VMO-3	AA	
VMO-6	WB	
VMR-152	WC	
VMR-153	AC	
VMR-252	LH	
VMR-352	LB*	(PB)
VMT-1	LF	
VMT-2	WD	

Chief of Naval Air Technical Training (CNATechTra) letter NM58-3/F39 Serial 4410, dated September 10, 1948, assigned visual identification letters-numbers for aircraft assigned to activities of Naval Air Technical Training (NATechTra). The delay in assigning these markings was caused by the thought that such markings should be assigned by the Naval Air Stations these units were tenants of so they would be in line with the supporting activities' codes. This letter directed that the following were to be applied:

Type Aircraft

Marking

CNATechTra — Administrative & Transportation Pool

R4D-5	Memphis 106
JRB	MU 228 - 235

Naval Air Technical Training Center, Memphis

R4D-5	MTE 212
-------	---------

SNB-5	MTE	300 - 320
SNJ	MT	280 - 299
F6F-5	MF	26 - 50

Naval Air Technical Training Unit, Olathe

SNB	KT	300 - 320
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Naval Air Technical Training Unit, Glenview

F6F-5	LF	500 - 550
SNB	LT	550 - 600

Naval Air Technical Training Unit, Pensacola

SNB	PT	1 - 12
F6F	PF	13 - 19
SNJ	PT	20 - 29

Naval Air Reserve Training Command (NAResTraComd) Memorandum No. 168-48, dated September 23, 1948, cancelled the previous instructions and reestablished the list of letter symbols for aircraft assigned to Naval Air Reserve Training Command activities. These letters were to be applied in accordance with SR-2f, the same as fleet activities.

Akron	L	Miami	H
Anacostia	A	Minneapolis	E
Atlanta	B	New Orleans	X
Birmingham	T	New York	R
Columbus	C	Norfolk	S
Dallas	D	Oakland	F
Denver	P	Olathe	K
Glenview	V	Seattle	T
Grosse Ile	I	Spokane	N
Jacksonville	F	St. Louis	U
Los Alamitos	L	Squantum	Z
Memphis	M	Willow Grove	W

It should be noted that the aircraft class letter designation was no longer required.

Nontactical aircraft, such as R4D, JRB, SNB, SNJ, and J2F, assigned to reserve units, were to use the last three digits of the Bureau Number, the same as fleet units.



Left: A Curtiss SB2C of Torpedo Squadron 74 still carried the three part identification while aboard the USS MIDWAY during the Arctic Cruise in November 1948.

Tactical aircraft were to be identified numerically by numbers within the blocks listed for the aircraft types.

Aircraft Type	Number
N-F6F-5	1 - 50
N-FG-1D, N-F4U-4	51 - 100
N-SB2C-5	101 - 125
N-TBM-3E	126 - 175
N-PV-2	176 - 200
N-PBY-5A	201 - 215

The International Orange fuselage stripe was not to be applied to aircraft assigned for USN flight proficiency or to other aircraft not directly connected with the Air Reserve Program.

Chief of Naval Air Basic Training letter NAT/F39-1/VV Serial 1675 dated September 27, 1948, assigned visual identification letters for aircraft assigned to activities of the Naval Air Basic Training Command. These letter(s) were to be as follows.

Activity	Station Designator	Unit Designator
NAAS Chevalier Field	P	
NAAS Corry Field	C	
BTU-2	C	A
IBTU	C	B
NAAS Saufley Field	S	
BTU-3	S	A
CQTU-4S		B
NAAS Whiting Field	W	
BTU-1A W		A
BTU-1B W		B
NAAS Barin Field	B	

Revision 1 to NAResTraComd Memorandum No. 168-48, dated November 24, 1948, added the provision that in the event of a conflict in the last three digits of the Bureau Number, the last four were to be used in identifying non-tactical aircraft. For example, two aircraft assigned to a unit

one with Bureau Number 27764, and the other with Bureau Number 23764. The unit aircraft numbers selected would be 7764 and 3764. The base identification letter would also be used.

CNAResTra letter NM58-1/F39 Serial 60738, dated December 1, 1948, cancelled the previous markings authorized on August 27, 1947, for the CIC School at Glenview and replaced them with the following:

F6F	T	500 - 550
SNB/SNJ	T	with the last three or four numerals of the aircraft Bureau Number as applicable

On December 28, 1945, the Chief of Naval Air Reserve Training Command added the letters B and H to the list of base identification letters for NAS Lincoln and NAS Niagara respectively.

After three modifications to SR-2f, it was superseded by SR-2g on February 1, 1949. Painting and upkeep proved to be more of a problem than was deemed justifiable. Thus, after a short splurge, the Gold rectangle with Scarlet U.S. MARINES on the tail of Marine Corps transport aircraft was discontinued.

CNO directives permitted nontactical aircraft to be marked with the last four digits of the aircraft serial number to differentiate it from another aircraft having the same last three digits. This marking was to be located in place of the Unit Aircraft Numeral and be of the same size.

U.S. NAVY was now required on all experimental model aircraft on the upper surface of the right wing and bottom surface of the left wing in letters 30 inches (76.20 cm) high in a similar location as the national aircraft insignia on the opposite wing.

The model designation and serial of nonrigid airships were to be applied to the side of the car with the horizontal center line of the lettering located about 18 inches (45.72 cm) below the bottom of the fairing. The group marking was to be located approximately 25 percent of the car length from the front of the car. The characters used for these markings were to be 4 inches (10.16 cm) high.



Right: A nonrigid K type airship identified as number 3 in Lighter-Than-Air Squadron 2 (ZP-2).

Unit Identifying Letter and Numerals to designate the group, squadron or station to which the airship was assigned, as well as the airship number within the squadron, were to be painted on both sides of the lower vertical fin and centered with respect to that surface. These letters and numerals were to be 40 inches (101.60 cm) high.

In the case of airships assigned to air stations or shore units, where no identifying letter symbols were assigned, the name of the air station (e.g., LAKEHURST), or an abbreviation of the unit's title, was to be painted on both sides of the lower vertical fin in letters 15 inches (38.10 cm) high. The model and serial number were to be below in characters 40 inches (101.60 cm) high. The entire group was to be centered on the surface.

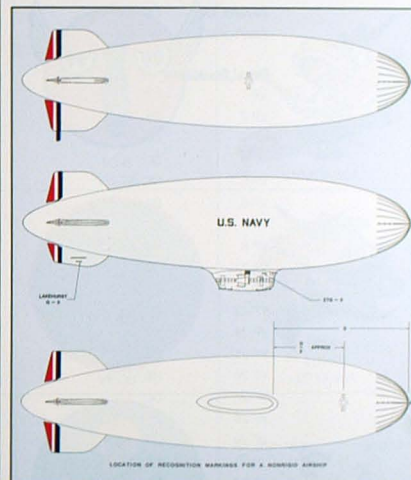
Naval Reserve airships were to be marked the same as airships attached to a station with the name of the air station where the Reserve Unit was based.

The June 15, 1949, *Aircraft Complements and Allowances of the Navy and Marine Corps*, CNO Serial 1770P50, also included the Visual Identification System tail codes. Some new squadrons were identified, as well as changes in letters for several others. As always some squadrons had been disestablished and no longer appeared on the list. The following list has been extracted from this directive:

Carrier Air Groups and Squadrons

CVG-1	T
CVG-3	K
CVG-4	F
CVG-5	S
CVG-6	C
CVG-7	L
CVG-8	E
CVG-11	V
CVG-13	P
CVG-15	A
CVG-17	R
CVG-19	B

VC-3	NP
VC-4	NA



VC-5	NB
VC-11	ND
VC-12	NE
VC-21	BS
VC-22	SL
VC-23	MI
VC-24	SI
VC-25	SK
VC-31	SP
VC-32	SR
VC-33	SS
VC-61	PP
VC-62	TL



Left: F4U-4 assigned to VMF-211 with Red and White striped tail cone and tip of rudder. A six inch (15.24 cm) squadron insignia is beneath the windshield. Opposite: Grumman F6F-5s of the newly reformed VF-3 flying out of NAS Oceana, Virginia, in October 1945, reverted to the three-part identification markings.

FAWTULANT LA
FAWTUPAC PA

Patrol Squadrons

VP-1	CD
VP-2	SB
VP-3	CB
VP-4	SC
VP-5	MC
VP-6	BE
VP-7	HE
VP-8	HD
VP-21	HC
VP-22	CE
VP-23	EH
VP-24	HA
VP-25	BB
VP-26	HB
VP-27	DC
VP-28	CF
VP-29	DE* (DF)
VP-33	EB
VP-34	EC
VP-40	CA
VP-42	SA
VP-44	CC
VP-45	EE
VP-46	BD
VP-47	BA
VP-48	MB
VP-49	EA
VP-51	EW
VP-61	SD
VP-62	EF

Transport, Utility and Miscellaneous Squadrons

VR-22 RB

VR-23 RC
VR-24 RD

VO-1 UB

VU-3 UF

VU-4 UD

VU-7 UH

VU-10 UL

VX-1 XA

VX-2 XB

VX-3 XC

VX-4 XD

HU-1 UP*

HU-2 UR*

FAETULANT FA

FAETUPAC FP

ZP-1 ZW

ZP-2 ZL

Marine Corps Squadrons

AIRFMFLANT LZ

AIRFMFPAC WZ

AIRFMFWESPAC LW

HEDRON-1 AZ

HEDRON-2 LL

HEDRON-11 LM

HEDRON-12 WA

HEDRON-14 LN

HEDRON-15 AV

HEDRON-24 AW

HEDRON-33 WM

continued on page 160



VMSB-341



VS-5



VS-6
VB-13



VMTB-464



VMB-621



CAG-1



VP-33



VP-51
VB-101
VP13-101



VMF-214



VMF-124



VP-24 VPB-24



VS-3



VMT-1



VS-71



ZP-1



VP-42



Opposite: A beautifully restored Goodyear FG-1D painted to represent an aircraft assigned to VF-17 during WWII is shown here during an air show at Ottawa, Ontario, Canada in August 1971. The pirate flag, painted on the cowl, reflects the Corsair name. To the Japanese, the Corsair was called, not without some respect, "Whistling Death." This name came from the fact that air, passing through the oil intercooler ducts, made a distinctive whistling sound. Right: Taken in May 1968 at Grumman's Calverton field, this F6F-3 was painstakingly restored to represent an aircraft assigned to VF-41. However, not all markings are according to regulations.



VP-MS-2 VP-42



VJ-1



VT(N)-53



VE-2



VRF-1 VR-31



VS-33



ZP-31



FAPS-1



VS-31



VP-HL-13



VB-116 VP-116
VPB-116 VP-HL-1



VP-32 VP-52 VPB-52



VT-4
VA-ZA



VT-80



VP-71



VF-13



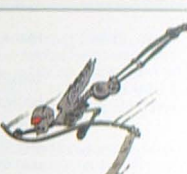
VF53A



VS-72



VP-6CG



VF-10



VF-9



VPB-130 VP-ML-2
VP-130 VP-2



VC(N)-1



VP-44
VPB-44



VMO-6



CBAS-San Francisco



VF-7 VF-72



VF-47



VB-139



VB-92



VT-19



VMF-111



Left: This VX-3 Bell HTL-1 shows the problem in marking the early helicopters. Note the XJR2F-1 beneath. Below: McDonnell FH-1 in nonregulation markings as exhibited by VMF-122 at the National Air Races of 1949.

HMX-1	XM
MATACS-1	LI
MATACS-2	WV
VMF-115	AE
VMF-122	LC
VMF-211	AF
VMF-212	LD
VMF-214	WE
VMF-218	AH
VMF-222	LE
VMF-223	WP
VMF-224	WK
VMF-225	WI

VMF-311	WL
VMF-312	WR
VMF-322	AD
VMF-323	WS
VMF-452	AB
VMF(N)-114	LK
VMF(N)-513	WF
VMF(N)-531	LT
VMF(N)-533	AI
VMF(N)-542	WH
VMP-254	WT
VMP-354	LV



Right: This Douglas AD-4Q of VA-55, shows the placement of the unit code and aircraft number on the under surface of the wing. The unit code can be seen on the upper right showing the positioning of these markings on the upper surface. Below: East coast Reserve squadron's Corsairs at MCAS El Toro during the annual two week training exercise in 1948. Aircraft from Anacostia, Columbus, Jacksonville and Miami are shown.

VMO-1	LR
VMO-3	AA
VMO-6	WB
VMR-152	WC
VMR-153	AC
VMR-252	LH
VMR-352	LB
VMT-1	LF
VMT-2	WD

NAResTraComd Memorandum Number 298-49, dated August 17, 1949, superseded NAResTraComd Memo Number 168-48 and added the N-F6F-5P and N-F8F-1 to the 1 to 50 block of side numbers. N-FH-1 and N-FJ-1 replaced the N-SB2C-5 in the 101 to 125 block. N-PBY-6A was added to the 201 to 215 block.

On October 5, 1949, NAResTraComd Memorandum Number 298-49 was revised. N-F6F-5, N-F6F-5P, N-F8F-1, N-FG-1D and N-F4U-4 were now all to be identified in the 1 to 100 block.



SECTION 4

MAINTENANCE AND SAFETY MARKINGS

CHAPTER 4 1940-1949

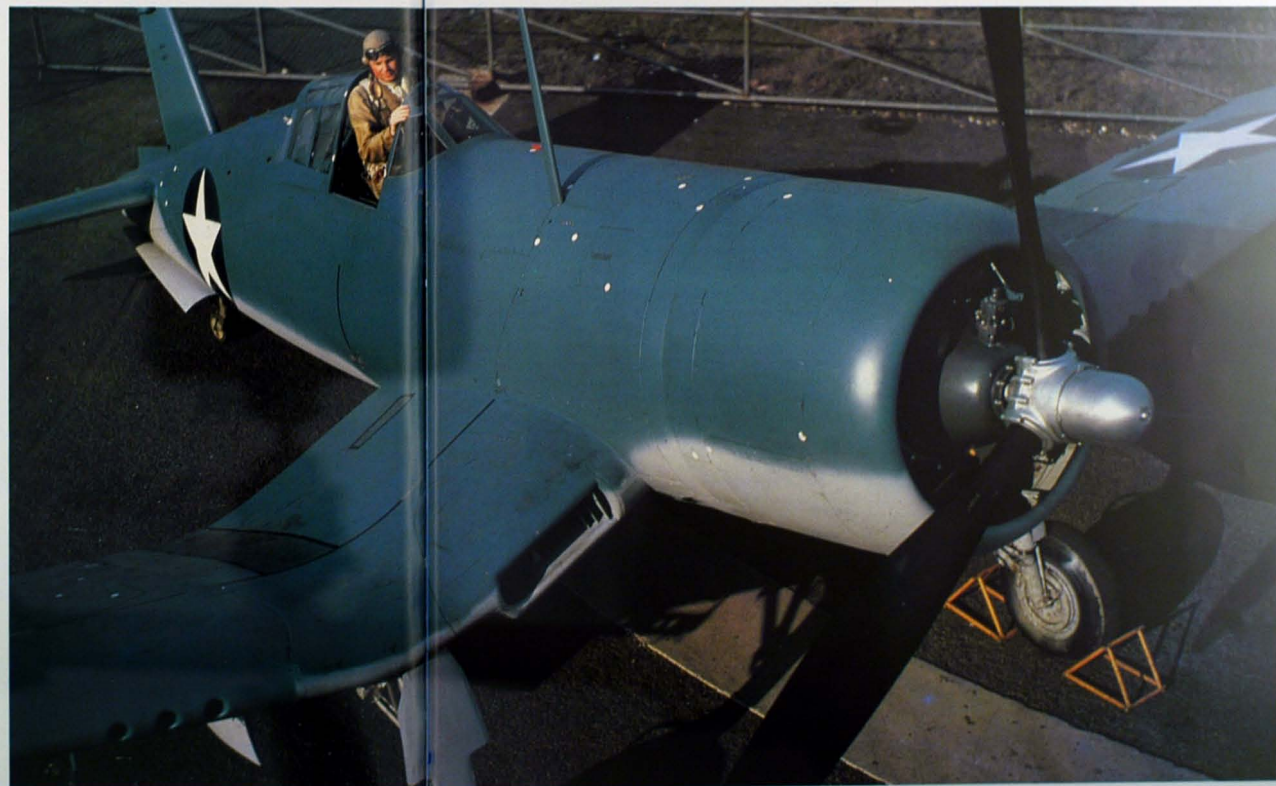
Generally, maintenance and safety markings as they applied to Naval aircraft were so small that they aren't visible in photographs. They are included here to help make the record complete as well as to assist those involved in the restoration of aircraft.

Amendment 2 to SR-15c, *The Protection of Naval Aircraft and Parts*, dated July 10, 1940, required that the inner surfaces of diving flaps were to be painted Insignia Red as a safety measure for those working on the aircraft so that they couldn't accidentally be caught in closing flaps.

SR-2b, dated October 8, 1940, was a major change in the technical markings applied to Naval aircraft. After four years of use, the color identification of piping systems was again modified. Some designations were dropped and new title/color combinations were added to properly identify the various systems which had changed functions over the years. The correct designations were:

Fuel	Red
Oil (Lubricating)	Yellow
Coolant (Prestone)	White-Black-White
Coolant (Water)	White
Fire Extinguisher	Brown
Flotation Equipment	Light Blue
Oxygen	Light Green
Pitot Pressure:	
Air Speed	Black

Right: Vought test pilot Willard B. Boothby prepares to test fly a brand new F4U-1 Corsair at the company's Stratford, Connecticut facility in 1942. Note the multitude of safety and maintenance instructions applied over the airframe.





Left: Douglas R3D-2 assigned to VMJ-2 in October 1940, showing the colored bands on the propeller tips and locally applied propeller warning stripe on the fuselage prior to the Bureau directed safety marking. Entire airplane is bare metal with Black markings and the Red, White, and Blue vertical rudder stripes still used by the Marine Corps.

Static Pressure:

Air Speed, Altimeter	
Climb Instrument	Black-Light Green
Manifold Pressure	White-Light Blue
Vacuum	White-Light Green
Hydraulic Oil Pressure:	
Max. 20 p.s.i.	Light Blue-Light Green
Min. 20 p.s.i.	Yellow-Light Green
Steam	Light Blue-Black
Purging	Light Blue-Yellow
Exhaust Analyze	Light Blue-Brown
Anti-icing	White-Red
Vent (Closed Compartment)	Red-Black
Smoke Screen Equipment	Brown-White

Filler caps for fuel and oil tanks, hand pulls for fire extinguishers, floatation equipment, and all other parts and attachments for which identification was necessary or desirable were to be painted the color applicable to the particular material concerned.

The basic doping code remained unchanged. However, the list of code letters was expanded to include the designation of new activities doing the work. Commercial activities were to be identified by the same letter as used to indicate their name in the manufacturer, type and model of aircraft designation painted on the rudder. Naval overhaul activities were now identified by the following designating letters:

SD	NAS San Diego, California
NOR	NAS Norfolk, Virginia
NAF	Naval Aircraft Factory, Philadelphia, Pennsylvania
PEN	NAS Pensacola, Florida
CS	NAS Coco Solo, Canal Zone
PH	NAS Pearl Harbor, Territory of Hawaii
SE	NAS Seattle, Washington

Naval Reserve Bases were identified by the letters designating the base followed by the letters RB. Under the new system the numerals indicating the number of coats preceded the letter/numeral combination indicating the specification number of the dope. The first group of characters indicated the number of clear coats and the second group

of characters indicated the number of pigmented coats. Numerals indicating the date of completion as month, day and year followed the last dope specification number. The letters indicating the finishing activity followed the date. For example:

4-2D12d 8-15-40 SD

indicated that four coats of clear and two coats of aluminum pigmented dope — Specification D-12d, finished August 15, 1940, by NAS San Diego, California.

4D12d 3D13c 8-15-40 NAF

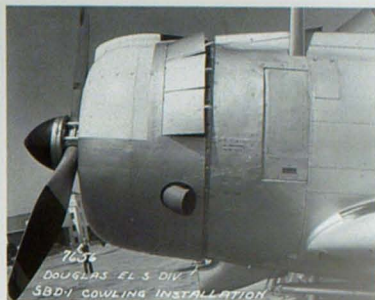
indicated that four coats of clear dope — Specification D-12d, and three coats of Yellow pigmented dope — Specification D-13c, finished August 15, 1940, by the Naval Aircraft Factory in Philadelphia, Pennsylvania.

Propellers on patrol aircraft did not have to have the Red, Yellow and Blue stripes painted on the tips unless they were a hazard to personnel. However, Bureau of Aeronautics letter Aer-E-25-HY, dated February 26, 1941, changed the color on propeller tips to read Chrome Yellow versus Bright Yellow, and Dark Blue versus Insignia Blue. It is believed that these were only color name changes and that no actual change was intended in shade. All propellers were to have the front and back of the remaining portion of the blade to the hub painted in nonspecular Black or Dark Blue. This, of course, was not necessary on those propellers which had the surface finished in anodic coating dyed Black or Dark Blue.

The doping code was transferred from the SR-2 series to the SR-70 series, *Application of Dopes and Lacquers to Fabric Surfaces of Aircraft*, with the issue of Amendment 1 to SR-70b, dated April 15, 1941. Since Naval aviation had expanded immediately prior to World War II, the number of overhaul facilities also expanded. This expansion and later reduction is shown in Appendix F.

On February 6, 1942, the Bureau of Aeronautics published a letter modifying the instructions on the exterior painting, insignia and markings on Fleet aircraft. This letter directed that the colors for marking propeller blade tips were to be changed again. They were now designated Insignia Red, Orange Yellow versus Chrome Yellow, and back to Insignia Blue from Dark Blue. Again, this was an exercise in changing color names without an actual change in color.

Right: Servicing instructions typical of the period are shown on this early version of the SBD-1. The Blue stripe on the back of the propeller blade is extended to prevent glare in the pilot's eyes. Note the logo and legend applied to the face of the propeller blades.
Bottom: Few service and technical markings were applied to the nonrigid airships. However, due to the hazard to personnel, a Red propeller warning stripe was applied to each side of the control car.



SR-15d, dated March 26, 1942, deleted the requirement for a two inch (5.08 cm) water line on the exterior of the hull of flying boats and amphibians. This marking was now painted on the inside of the hull in a color of maximum visibility as an aid in locating leaks and the insertion of plugs.

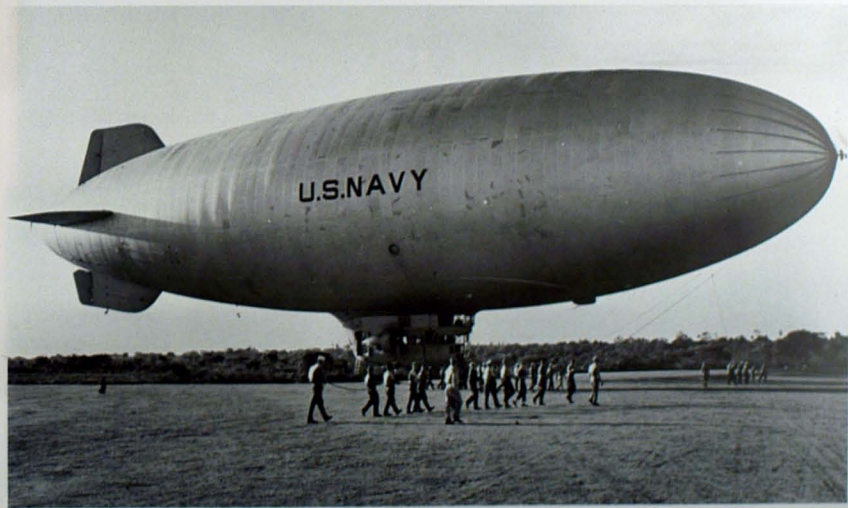
Amendment 1 to NAS Jacksonville Local Process Specification No. 9-42, dated May 11, 1942, added two new markings for piping systems.

Oxygen Filler Line	Light Green - Yellow - Light Green
Manifold Pressure Line to Fuel Tank Pressure Unit	Red - Yellow

(It has not been determined what the exact date was that these colors were adopted, but this is the earliest reference found.)

On August 28, 1942, the Bureau of Aeronautics cancelled the requirement to paint propeller tips with Red, Yellow, and Blue bands, provided that the blades were painted a nonspecular Orange Yellow on both sides extending from the tip to four inches (10.16 cm) from the tip.

SR-2c, dated January 5, 1943, specified many new technical markings that were to be applied to all aircraft. Besides Hand Grips and Lift Points that were already identified, such other facilities as Baggage Compartment and Life Raft Stowage were to be identified. Emergency equipment such as Fire Extinguisher, Hood Release, and





Left: Not many aircraft were identified so completely for emergency rescue as this Beech JRB-4. Battery location instructions can be seen behind the door. Below: A F4F-4 Wildcat having its guns and sight harmonized. The propeller now has just an Orange Yellow tip for safety purposes but note all the technical information stenciled on each blade.

emergency equipment operating handles were to be clearly marked to indicate both function and operating instructions. Filler Caps for fuel and oil tanks, and all other external parts and fittings for which identification was necessary or desirable, were to be painted the color assigned to the function concerned. Wherever signs were necessary, appropriate markings were to be applied.

Walkways of camouflaged aircraft were bounded by a Black line one inch (2.54 cm) wide and marked with the word, WALKWAY, applied inside the boundary lines at sufficiently frequent intervals to indicate the walkway area. In the case of noncamouflaged aircraft, the entire walkway surface was painted Black with nonskid material, and the word WALKWAY could be omitted. Steps were to be suitably indicated.



Right: A Grumman F7F-4P assigned to Marine Photographic Squadron 254 (VMP-254) in 1948, showing the propeller warning stripe and the identification of an ammunition box access door.



Floater were to have a safety stripe indicating the plane of the propeller path. On camouflaged aircraft this marking was to be two parallel, wavy lines, one inch (2.54 cm) wide and three inches (7.62 cm) apart, painted in nonspecular Insignia Red from chine to chine. The included area was to be marked with the words DANGER PROPELLER. These words were to be in nonspecular Insignia Red letters two inches (5.08 cm) high at sufficiently frequent intervals to indicate the dangerous area. On noncamouflaged aircraft, the marking was to be a straight band three inches (7.62 cm) wide in Insignia Red extending from chine to chine. Adjacent to the stripe the words DANGER PROPELLER were to be applied in Insignia Red letters two inches (5.08 cm) in height at sufficiently frequent intervals to indicate the dangerous area.

Handling truck markings were applied on hulls and pontoons to indicate the "hard points" which were to rest on the handling truck chocks. These points were indicated by a Black stripe two inches (5.08 cm) wide, extending a sufficient distance to provide clear indication of function and boundaries.

The four inch (10.16 cm) warning stripe on propeller tips could now be either glossy or nonspecular Orange Yellow depending on whether the aircraft was finished in the basic noncamouflage or camouflage scheme.



PROPELLER DANGER MARKINGS ON MULTICOLORED AIRCRAFT AND FLOATS

Amendment 2 to SR-70d, dated August 31, 1943, specified that the manufacturer would not include the date in the original doping code applied to the fabric surfaces. The date of application was to be applied only by overhaul activities. With the increase in metal-skinned aircraft, the need for fabric work decreased and many overhaul activities were dropped from the doping code list as shown in Appendix F.

SR-2d, dated December 22, 1943, required that the Orange Yellow warning stripe on propellers 15 feet (457.20 cm) or greater in diameter was to be six inches (15.24 cm) wide.

NAS Alameda, California, Assembly and Repair Department Local Process Specification No. 81, dated January 2, 1945, is the earliest directive located which specifies ENCLOSURE RELEASE or ESCAPE PANEL RELEASE as a mandatory marking that must be applied in letters one inch (2.54 cm) in height at the outside release latches of the aircraft, with a Red arrow as applicable.

SR-70e, dated July 20, 1945, directed that when predoped fabric has been used for covering the surface the letters PDF precede the normal doping code. Two examples of the code in use at this time are:

For predoped fabric: PDF 4AN-D-1 2AN-D-3 3-1-45 NANC



PROPELLER DANGER MARKINGS APPLIED: REDDIE FORBUSH



Left: A bare metal T-1 assigned to VMF-311 in 1948. Note the Red warning stripe around the aft fuselage in line with the turbine blades.
Bottom: Another VMF-311 Lockheed T-1 with numerous safety and service instructions stenciled on the bare metal skin.

The above indicates predoped fabric with four coats clear dope, Specification AN-D-1, and two coats camouflage dope, Specification AN-D-3, finished March 1, 1945, by Naval Air Material Center, Philadelphia, Pennsylvania.

For undoped fabric: 1D-34 3AN-D-1 2AN-D-2 2-15-45 SD

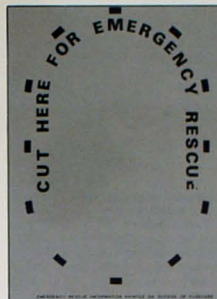
The above indicates one coat of fungicidal first coat dope, Specification D-34, three coats clear dope, Specification AN-D-1, two coats of pigmented gloss dope, Specification AN-D-2, finished February 15, 1945, by NAS San Diego, California.

The formal identification of escape hatches and their operation was directed in AN-I-37 *Army-Navy Aeronautical Specification, Identification of Escape Hatches*, dated September 12, 1945. These markings were to be Orange Yellow, except on a yellow surface where the color was to be glossy Black. Escape hatches were to be identified inside the aircraft as well as outside. Internally an identification band was to be painted completely around

the periphery of escape hatches, doors and exits wherever possible or practicable, as a quick visible indication of an escape exit for crew and passengers. This marking band was to be as wide as possible, not exceeding two inches (5.08 cm) and in no case less than one inch (2.54 cm) in width. If possible, the width of this band was to be equally divided between the mounting and the door or escape hatch itself. Where lining would cover any of these markings, the marking was to be applied to the lining itself.

All handles, releases, catches and knobs for inside hatches and exit doors were also required to be painted Orange Yellow. The words EMERGENCY EXIT were to be painted on the escape hatch, door, or exit in the most readily visible location in letters preferably two inches (5.08 cm) high, but in no case less than one inch (2.54 cm) high.

Readily visible, suitably descriptive working instructions were to be marked on the door or structure of the aircraft, as near as practicable to the emergency release or handle,



Bottom: Grumman F9F-2B assigned to VMF-115 showing numerous safety and operating instructions. Note that the aircraft Bureau Number is applied to the removable nose cone just aft of the aircraft number as an aid in returning the correct nose after maintenance had been performed on the avionics and ordnance equipment. This was also done on the removable tail section.



to fully explain its operation. The wording was to be standard English, such as "PUSH," "PULL," "TURN," "SLIDE," etc. These instructions were to be in letters preferably one inch (2.54 cm) in height, but in no case less than 1/2 inch (1.27 cm) in height.

Except for those emergency exits located near the pilot's cockpit, a protected radioactive luminescent marker(s) was to be permanently affixed to the escape panel release handle or placed as near as practicable to the escape panel release handle so that in reaching for the marker(s) the escape panel release handle would be encountered.

All external panel releases were to be labeled EXIT RELEASE on the outside of the aircraft to facilitate quick identification. The wording describing the operation of the release handle was to be in standard English, such as "PUSH," "PULL," "TURN," "SLIDE," etc., the same as applied inside. This lettering was to be at least 1 inch (2.54

cm) in height and placed as near as practicable to the latch of the escape panel.

If the structure immediately surrounding auxiliary exits, (windows and navigator's domes, etc.) was free from heavy members, bulkheads, main longitudinal members, and from oxygen, fuel and oil lines, or battery leads, it was to be marked both inside and out of the fuselage with a broken band. This band was to be approximately 1/2 inch (1.27 cm) in width, placed as closely to the area as possible. Each segment of the band was to be approximately one inch (2.54 cm) in length with the segments 12 inches (30.48 cm) apart. The words CUT HERE FOR EMERGENCY RESCUE were to be painted or stenciled on the outside of the aircraft, inside of, and parallel with, and immediately adjacent to each broken band, thus identifying a secondary passage. The words CUT HERE FOR EMERGENCY RESCUE were to be painted or stenciled on the inside of the aircraft inside of, parallel with, and immediately adjacent to each broken band. Lettering, both inside and out, was to be one inch (2.54 cm) in height.





Left: A Bell HTL-4 provides a good example of tail rotor warnings and the problem of where to locate markings on some helicopter models. Bottom: This Douglas AD-3E of VX-1 well illustrates the numerous service markings on the exterior of the airplane and radar fairing.

Other emergency escape areas were usually areas of a type which could be cut through to provide a means of rescue when entrance or exit could not be readily made in any other manner. These areas were to be determined by visual inspection of each affected aircraft, since relocation and reinstallation of equipment, furnishings, oxygen, fuel, oil lines and battery leads may have been made which would not be indicated on the original installation drawings of the aircraft. These areas were to be as close as possible to the normal stations for personnel, except where personal injury to occupants might result from forced entry at that point.

These areas were to be marked on both the inside and outside of the fuselage only by the use of corner markings. The horizontal and vertical bars of the corner markings were to be approximately three inches (7.62 cm) in length and one inch (2.54 cm) in width. In the approximate center of the area indicated by the four corner markings the words CUT HERE FOR EMERGENCY RESCUE were to be painted or stenciled on the outside of the aircraft, and the words CUT HERE FOR EMERGENCY EXIT were to be painted or stenciled on the inside. Lettering was to be approximately one inch (2.54 cm) in height.



Right: Notice the propeller warning stripe around the fuselage of this Martin P4M-1 Mercator, and the numerous service decals applied to the aircraft.

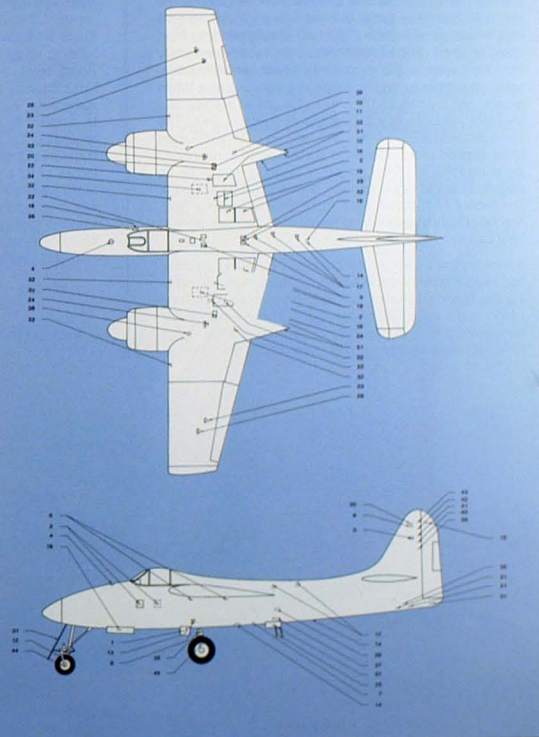
TYPICAL MAINTENANCE INSTRUCTIONS

- 1 Access Door
- 2 Ammunition Boxes
- 3 Approach Light Sighting Marks
- 4 Auxiliary Fuel
- 5 Bore Sight
- 6 Bureau Number
- 7 Catapult Holdback
- 8 Defueling Drain
- 9 Disconnect Fuel Fittings Before Removing Cover
- 10 Emergency Battery Disconnect
- 11 Fill Hydraulic Tank
- 12 Front
- 13 Fuel Strainer
- 14 Fuel Tank
- 15 F7F-1
- 16 Gasoline Vent or Intake (circle)
- 17 Grip
- 18 Gun Access
- 19 Guns
- 20 Hydraulic Tank
- 21 Jack on Hook or Bumper
- 22 Jack Pad
- 23 Jury Strut
- 24 Jury Strut —

Lift Here
Do Not Lift With Motor or
Outer Panel Assembly Attached
Lift Panel in Horizontal Position Only

- 25 Ladder
- 26 Ladder Release
- 27 Left Foot First
- 28 Lift Here
- 29 Main Fuel
- 30 NAVY
- 31 No Push
- 32 No Step
- 33 Oil
- 34 Oil Cooler Drain
- 35 Push
- 36 Push Hood Release
- 37 Radio Access
- 38 Water Injec
- 39 10"
- 40 12"
- 41 14"
- 42 16"
- 43 18"
- 44 105 PSI For All Operations
- 45 112 PSI For All Operations

TYPICAL MAINTENANCE INSTRUCTIONS





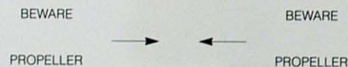
Left: In late 1949, this Grumman FBF-2 was assigned to NATC Patuxent River. Maintenance instructions such as TIRE PRESSURE 100 POUNDS on the landing gear fairing as well as instructions on the Mk-12 external fuel tank are visible. Below: A FJ-1 assigned to a fleet squadron still carries a variety of service markings along with its unit and individual markings.

SR-2f, with an effective date of January 2, 1947, expanded the instructions for warning stripes on float planes. The area of the float which was in the plane of the propeller path was to be marked with a glossy Insignia Red stripe, three inches (7.62 cm) wide extending from chine to chine. The word PROPELLER, reading vertically from the center of the deck to the chine, on both sides, was superimposed on this stripe in glossy Insignia White letters two inches (5.08 cm) in height at sufficiently frequent intervals to indicate the dangerous area. The symbols DANGER → and ← DANGER were to be applied perpendicular to and centered in relation to the word PROPELLER. One set of symbols was to be on each side of the stripe with the arrows pointing toward it. The letters and arrows were to be glossy Insignia Red. The height of the letters and length of the arrows were to be 2 inches (5.08 cm).

A warning line to indicate the plane of the rotating propeller had been required on float planes for years. Now, the marking was finally required on all multiengine aircraft on both the interior and exterior fuselage surfaces. These areas were to be marked with a glossy Insignia Red stripe three inches (7.62 cm) wide extending completely around the fuselage.

The word PROPELLER was to read vertically from top to bottom. All dimensions and regulations for the marking of floats also applied to this marking on the fuselage.

There was always the danger of personnel walking into rotating propellers when boarding or exiting an aircraft. Bomb bays, hatches and other openings within six feet (182.88 cm) of the propeller disc were particularly vulnerable. Warning stripes and danger symbols were to be applied to all aircraft to serve as a definitive warning regarding the proximity to this danger area. On interior surfaces of the fuselage a glossy Insignia Red stripe, three inches (7.62 cm) wide, was to extend from the top center of the fuselage down both sides to the lowest point of each exit in its open position. Superimposed vertically on the stripe in glossy Insignia White, in letters two inches (5.08 cm) high, at frequent intervals would be the word PROPELLER. The symbols



Right: The second North American FJ-1 Bureau Number 120347, at Patuxent River in December 1947 for evaluation, well illustrates the numerous service markings that were applied to some airplanes. Below: The XF3D-1 assigned to the Naval Air Test Center Patuxent River late in 1949. The steps and handholds to climb the fuselage for entry through the top of the cockpit are boldly marked with a White stripe.

were to be applied perpendicular to the stripe and centered in relation to the word PROPELLER, with the arrows pointing toward the stripe. The height of the letters and length of the arrows were to be 2 inches (5.08 cm) in glossy Insignia Red.

Though helicopters had been in use for several years, it was not until SR-2f, Amendment 3, issued May 1, 1948, that special marking requirements for helicopters were directed. These first instructions concerned the painting of the main rotor blades. The blades were to be painted glossy Sea Blue, except for the tips. Glossy identification

stripes were to be painted on both sides of the blades from the tip to 2 inches (5.08 cm) from the tip. One blade was to be Insignia White, the second was to be Insignia Red, and the third blade was to be Light Green. The area two inches (5.08 cm) from the tip to eight inches (20.32 cm) from tip on all three blades was to be painted glossy Orange Yellow on both sides of the blades.

The arresting hook was to be painted with alternate Black and Insignia White bands 4 inches (10.16 cm) wide to provide maximum visibility. The point of the hook was never painted.



SECTION 5

MERITORIOUS RECOGNITION MARKINGS

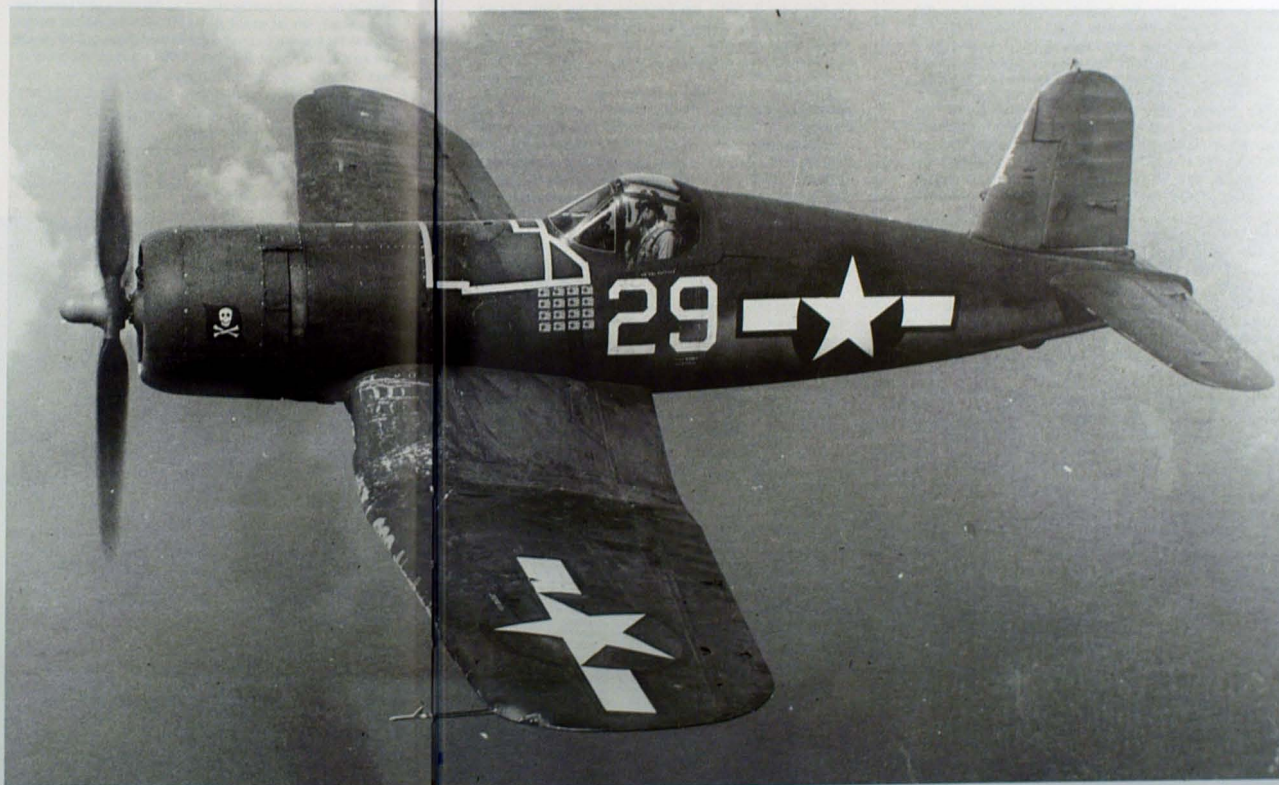
CHAPTER 5 1940-1949

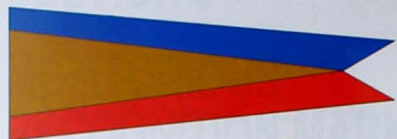
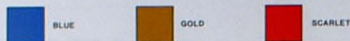
The use of gunnery pennants and the Navy "E" on Navy and Marine Corps aircraft to show the unit's or individual's proficiency with specific weapons was well-established before the expansion for World War II. Some of these markings were strictly controlled by Navy directives. However, the use of a hashmark to designate subsequent awards has been a source of confusion, not only to historians, but to those in Naval aviation as well. An official request for clarification was finally submitted by a squadron to the Bureau of Aeronautics in 1940. The Bureau's answer, in part, was: "Specific authority to wear hashmarks under 'E' painted on aircraft does not exist at the present time. As in the case of ship gunnery, the practice of painting them 'just grew'. Not until last year were specific instructions issued for painting hashmarks for ship gunnery 'E's. Next revision of Orders for Gunnery Exercises will contain instructions for painting hashmark under 'E's on aircraft.

"In the case in question, a plain 'E' is the proper marking for the airplane which qualified in bombing, torpedo, and machine guns. If the next year the same airplane qualifies for less than the maximum number of awards, hashmarks under the small letter designating the arm are suitable for such awards as are continuous repeaters."

No such directive was issued due to the commitments of World War II and the elimination of such markings on Naval aircraft. The 1940 issue of Orders for Gunnery Exercise directed the dimensions of the "E" on aircraft to be one-half of the standard fuselage markings prescribed by the Bureau of Aeronautics.

Right: The F4U-1 Corsair flown by Lieutenant jg Ira C. Kepford of VF-17 showing the sixteen Japanese flags representing his sixteen aircraft victories.





PRESIDENTIAL UNIT CITATION PENNANT

Bottom: One of the few squadrons to display the E for excellence at the beginning of WW II was VS-41 aboard the USS RANGER (CV-4) while on the neutrality patrol. The top of the cowl of this Vought SBU-1 is True Blue. Opposite: This SBD-5 of VMSB-231 was among the few aircraft to carry a record of bombing missions. Twenty-three missions in addition to the squadron insignia are shown on the fuselage.

The conversion from the brightly painted aircraft of the 1930's to the wartime painting of the 1940's affected the Navy "E" as well. If this award was applied to the aircraft it was to be located forward of the designated fuselage markings, but was to be no larger than three inches (7.62 cm) in height. Bureau of Aeronautics letter Aer-E-25-HY, dated February 26, 1941, eliminated the use of the Gunnery Trophy pennant on aircraft. Whether or not the awarding of the Navy "E" was discontinued during the later part of World War II is not known. However, the specification as to where it was to be applied on the aircraft was dropped when SR-2e was issued on June 26, 1944.

On February 3, 1943, the Secretary of the Navy issued General Order No. 187, *Regulations For The Award of The Presidential Unit Citation*. This directive not only specified who was authorized to wear the citation, but also the form and dimensions of the insignia representing the citation. This insignia was to be in the form of a burgee pennant of blue, gold and scarlet. It was to be 27 units on the hoist by 57 units on the fly, with the gold measuring 13 units on the hoist and 48 units on the fly centered between the blue above and the scarlet below. "After any Naval or Marine Corps unit is so cited on two or more separate occasions for outstanding performance in action occurring

on or after October 16, 1941, such insignia . . . was to become a permanent part of the uniform of such unit. . . ." Individual aircraft of a cited unit was authorized to have the design of appropriate size painted in a suitable place upon the aircraft.

The painting of symbols on the aircraft fuselage to denote enemy aircraft and other targets destroyed, or missions completed, was not authorized by Navy painting specifications until near the end of World War II. The practice was not widespread and was condoned in the cases where it was done as a publicity gimmick. A typical symbol in red was the Japanese flag, which was used to denote number of aircraft destroyed. The use of red in this marking was in violation of Air Force Pacific Fleet Letter No. 12L-43, dated September 9, 1943, which prohibited the use of red in an insignia applied to aircraft in the Pacific Theater.

As the war in the Pacific drew to a close there appears to have been less concern for the restrictions on the color red being applied to the exterior surface of US Naval aircraft. The application of designs representing aircraft or vessels

destroyed was finally approved on July 10, 1944, by the Commander in Chief, United States Pacific Fleet. The Task Group or Unit Commander in command during the action was responsible for the evaluation of all such claims and could authorize the display of the appropriate insignia.

Miniature silhouettes of national insignia for enemy craft destroyed in combat could be painted near the pilot's cockpit. Silhouettes of enemy craft destroyed could not exceed 12 inches (30.48 cm) in length. Miniature flag insignia could not exceed six inches (15.24 cm) maximum dimension. These insignia were to be as follows:

Enemy surface craft or submarine destroyed were to be represented by a red silhouette of the type. If desired, the nationality could be indicated by a miniature man-of-war flag superimposed on the silhouette. Silhouettes were to be in the form of battleships, carriers, cruisers, destroyers, submarines, auxiliary craft or merchant vessels. Small craft such as barges, lighters, etc., were not credited as combat craft. Enemy aircraft destroyed were to be represented by a miniature man-of-war flag. Hashmarks could be used to



Bottom: VMF-214 in 1947 painted their aircraft with the Presidential Unit Citation, Navy E. and Gunner Trophy Pennant awards. In addition, the squadron insignia as well as the pilot and plane captain names were applied. This was the full complement of meritorious markings that could be applied. The author is the Technical Sergeant on the end of the rear row.

indicate repeated destruction of enemy craft of identical type.

Similar instructions were issued on September 6, 1944, in Atlantic Fleet Letter 11L-44. The insignia was to consist of a single red miniature silhouette of the approved type for each surface craft or aircraft destroyed. The nationality was to be indicated by a miniature enemy man-of-war flag superimposed on the midship section of the insignia. The insignia for each enemy aircraft destroyed was to be a miniature enemy man-of-war flag. In the event the US Naval aircraft was destroyed the insignia could be transferred to a new aircraft of the same squadron, provided the pilot and majority of the crew served in the new aircraft. Only silhouettes for destruction of the following ships were authorized.

Battleships
Carriers
Cruisers
Destroyers
Submarines
Auxiliary craft or merchant vessels

One type was to represent all types.

Commanding Officers of squadrons in the Atlantic Fleet, or who were attached to the Atlantic Fleet at the time of destruction could request authorization to display the insignia for destructions prior to September 1, 1944, and after December 7, 1941.



Right: The Rising Sun victory marking was a representation of the Japanese Naval Ensign first adopted by Japan in 1889. However, the size of the sun within the Japanese Naval Ensign is slightly greater than half the distance of the flag's breadth.



Air Force Atlantic Fleet Letter 21L-44 dated November 15, 1944, specified the size and location for these insignia. On Carrier, Scout Observation, and Observation Scout aircraft the insignia for surface vessels destroyed was to be 6 inches (15.24 cm) in length with a superimposed flag 1 1/2 by 2 inches (3.81 by 5.08 cm). For each enemy aircraft destroyed the miniature flag was to be 2 by 3 inches (5.08 by 7.62 cm).

The insignia was to be red except for the superimposed enemy man-of-war flag which was to be the appropriate colors. These insignia were to be located on both sides of the fuselage 4 inches (10.16 cm) below the edge of the cockpit. The leading edge of the insignia could not extend forward beyond the after edge of the windshield.

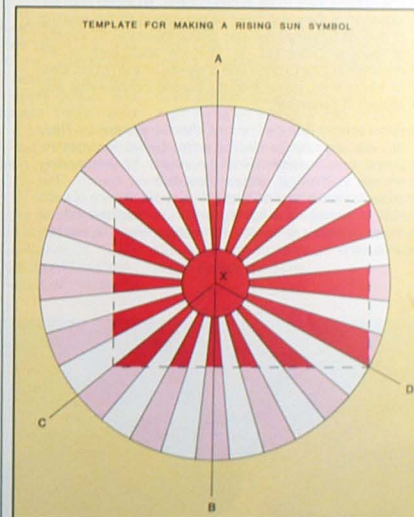
On Patrol Bomber types of aircraft the insignia for destroyed surface vessels was to be 9 inches (22.86 cm) in length with the superimposed flag 2 1/4 by 3 inches (5.72 by 7.62 cm). For each enemy aircraft destroyed the miniature man-of-war flag was to be 3 by 4 1/2 inches (7.62 by 11.43 cm).

These insignia were to be located on both sides of the fuselage 4 inches (10.16 cm) below the lower margin of the pilot's side window frame. The leading edge of the first insignia could not extend forward of the leading edge of the windshield. Colors were the same as for Carrier, Observation Scout, and Scout Observation aircraft.

The design most often seen on Navy/Marine Corps aircraft during World War II was a small Japanese Rising Sun flag to denote a destroyed aircraft. This was a rather complex design and difficult to layout. I have developed the following diagram to make this a simple construction job. Regardless of the size required, this procedure will produce an insignia in the correct proportions. When made as a stencil, a small gap must be left between the periphery of the Rising Sun and the inboard ends of the sun rays.

Using the diagram shown for creating a Rising Sun flag insignia, first determine the desired height of the flag. Using point X on the diagram as the midpoint of the flag, plot the height on line AB. From the lower point just plotted, draw a horizontal line to intersect with lines XC and XD. These points respectively represent the lower left and lower right corners of the flag. Draw the upper horizontal

line through the point plotted on line AB. Vertical lines drawn up from the intersection of the lower horizontal line with lines XC and XD complete the outline. The circle for the Rising Sun in the center is approximately one-half the height of the flag. This diameter and the inboard end of the rays can be adjusted to give adequate tie strips in the stencil.



The reason for not using red in aircraft insignia that was set forth in Air Force Atlantic Letter 54L-43 was eliminated by the surrender of Japan. Air Force Atlantic Fleet letter 11476 dated October 16, 1945 cancelled this restriction.

With the war over and the size of Naval aviation down to its peacetime level, the practice of displaying meritorious decorations on the aircraft was brought back. SR-21, dated January 2, 1947, authorized the painting of decorations

Bottom: Martin AM-1 of VA-174 aboard the USS KEARSARGE (CV-33) showing the Gunnery Trophy pennant.

and campaign ribbons on the side of the aircraft. These were to be located on both sides of the fuselage, two inches (5.08 cm) below the position specified for the squadron insignia. The individual ribbons were to be six inches (15.24 cm) long and two inches (5.08 cm) high with a one inch (2.54 cm) vertical separation between ribbons. The ribbons were to be in one column, arranged from top to bottom in the same order as prescribed for the wearing of ribbons by personnel. This instruction made no mention of General Order No. 187 for the application of the Presidential Unit Citation and a replica of the ribbon worn on the uniform, rather than the burgee pennant that was applied to the aircraft.

Fiscal year 1948 is the first time after the war that the Navy "E" was awarded to aviation units. Twelve Navy/Marine Corps squadrons received the award for outstanding records in the first postwar fleet training contest. The contests were based on the intratype performance of each ship or aircraft as a fighting unit in competition with all other squadrons of its type in the same fleet. The winning units were:

VP-HL-11 (VP-21)
VP-HL-13 (VP-25)
VP-MS-9 (VP-49)

VP-MS-7 (VP-47)
VA-17A (VA-174)
VA-2B (VA-25)
VA-5A (VA-54)
VF-71
VF-21
VF-11A (VF-111)
VMF-212
VMF-214

(Squadron designations in parenthesis are the new designations after July 20, 1948).

These squadrons were awarded the Battle Efficiency pennant as a squadron award and not the Gunnery Trophy pennant as had been the previous practice. All aircraft in the squadron now were authorized to carry the "E."

The policy remained the same as it had been prewar as far as the time the award could be used. This was an annual award and could only be carried until the issue the following year of the award to the new winners. In the event of a subsequent award, a hashmark was to be placed beneath the "E."



APPENDIX A RESEARCH AIRCRAFT

Research aircraft were developed for the US Navy or were built in conjunction with a Navy project. Consequently they were not subject to normal painting and marking regulations.

The unusual aircraft shown below manufactured by Vought, the V-173, nicknamed Flapjack, was the culmination of years of research and development by Charles H. Zimmerman. Painted an overall Orange Yellow, the nearly circular lifting surface was constructed of wood and fabric to provide for a light structure. The aft tailplane was also Orange Yellow, while the two vertical tailplanes were painted Aluminum. Two 80 hp Continental engines drove two large-diameter wood propellers which carried tip warning colors of blue, yellow and red. Flapjack was flown successfully for 131 hours. A further development, the XF5U-1, was built basically to the same configuration but powered by two 1,350 hp P&W R-2000-7 engines driving so-called "flapping" propeller blades. Fitted with retractable undercarriage, the aircraft was undergoing taxi tests on March 17, 1947, when the project was terminated and the prototype scrapped. Note that the national insignia appeared twice on the upper surface with its orientation along the axis of flight.

Another research aircraft, the Douglas D-558-1 Skystreak, shown above, was built in conjunction with a specification evolved by the National Advisory Committee on Aeronautics (NACA) and the Bureau of Aeronautics. These called for an aircraft capable of high subsonic speeds to obtain air-load measurements in free flight which were not attainable in existing wind tunnels.

Painted an overall gloss scarlet red and highly polished, the first Skystreak flew on April 15, 1947. On August 25, 1947, Major Marion E. Carl, USMC, (shown above on the left with Cdr. Turner F.

Caldwell, USN) with a speed of 650.7 mph (1047.17 km/h) broke the speed record established by the aircraft only four days earlier. While the Skystreak never attained supersonic speed in level flight, it slipped through the sound barrier easily in a shallow dive. Three Skystreaks were built by Douglas. However, the number two aircraft which broke the speed record was lost in a crash. The number one and three aircraft survive at the National Museum of Naval Aviation in Pensacola and the Marine Corps Air/Ground Museum at Quantico respectively.





APPENDIX B MISSILES

The aircraft shown above, an interstate TDR-1 target assault drone, was the first type of missile deployed into a combat situation by the Navy. Between September 26 and October 26, 1944, some forty-six TDR-1s were operated in the Northern Solomons against targets on Bougainville and around Rebaul. These plywood covered, pilotless airplanes carried an RCA television in the nose and a 2,000 lb (907 kg) GP (General Purpose) bomb under the fuselage. Guided to the target by a mother plane, they met only with limited success. Each TDR-1 was painted Dark Gray over all upper surfaces with Light Gray on all lower surfaces including the leading edge of the flying surfaces, forward nose and engine cowling. Standard American insignia was carried in the appropriate locations. In addition, operational models carried a hand painted white three-digit number (e.g. 878) on the lower portion of the fin. Cockpits were provided for test flights.

The Navy's Bat, shown suspended under the wing of a Consolidated PB4Y-2 Privateer, was a controlled free-fall weapon deployed against Japanese shipping during the closing months of the war. Known as Special Weapon Mk. 9 (ASM-2), the 1,000 lb (454 kg) GP bomb was attached to a glider type

airframe equipped with radar transmitter and receiver along with control surfaces. Most were painted Light Gray over all top surfaces including the complete nose while the remainder of the missile was a dark color, possibly Olive Drab. No national insignia was applied.

However, it was the Navy's Loon which brought the missile into the realm of a full-fledged weapon system. This missile was developed in Germany as the Fi 103 (V-1) and was popularly known to American forces as the Buzz Bomb. Developed in the USA after parts of the

German V-1 had been recovered, the American copy was virtually indistinguishable from the German bomb aside from slight differences in equipment and weights. The major external difference between the two was the shape of the forward engine support fairing. The German fairing was of parallel taper, slightly swept aft, while the American copy featured a fairing with a near vertical leading edge followed by a forward-sloping rear edge. The Navy's Loon was manufactured by Republic (airframes) and Ford (pulsejet) with the



official designation KUW-1 which was later changed to LTVN-2. Delivery of Loons to the USN began early in 1945, but by the time the weapon was fully tested, the war in the Pacific was drawing to a close and no Loons were used operationally. The Navy conducted

a number of launch tests on land and at sea. The above photograph shows LTVN-2, number 526, being readied for a test launch from a SL3 Jetevator at the Naval Air Missile Test Center, Point Mugu, California early in 1946. The paint scheme carried by this Loon is

typical. The entire missile is painted an overall coat of Orange Yellow apart from a small portion of the nose cone which is in Insignia Red. The missile's number, 526, is in Black. American national insignia is applied to the fuselage and appropriate wing positions.



APPENDIX C BLUE ANGELS

This volume would not be complete without mention of the Navy's Blue Angels, formed in 1946 to further the cause of naval aviation recruiting. The mission of "the Blues" has always been to promote US Naval aviation by participating in selected public air

shows. Initially from April 1946 to August 1946, the Blue Angels flew the venerable Grumman F6F-5 Hellcat. Blue Angel's aircraft number one, shown above, was painted in the standard camouflage color Semi-Gloss Sea Blue overall, apart from the forward portion of the spinner which was Orange Yellow. All national insignia was removed and, in its place, the letters for

US NAVY (without periods after the U and S), were applied along the fuselage and the under side of the port wing in Orange Yellow. Centered on the fin was the individual aircraft number which also was painted in Orange Yellow. In the photograph to the left, the number 1 appears to be darker than the adjacent color of the fuselage letters. This is an illusion since the fin is in the shade. Finally, the whole aircraft was highly polished and waxed. During August 1946 the Blue Angels traded in their Hellcats for the new Grumman F8F-1 Bearcat. These aircraft, unlike the earlier Hellcats, were painted in a unique shade of blue overall with an equally unique application of yellow-gold lettering and aircraft numbering. Across their fuselage and under the port wing the U.S. NAVY identification was applied while the individual aircraft number was again centered on the Bearcat's fin. The Blue Angels continued to fly the Bearcat until July 1949 when these were handed in for the jet-powered Grumman F9F-2 Panther.

APPENDIX D AIRCRAFT MODEL DESIGNATION SYSTEM

The system used to designate naval aircraft during the period covered by this book was a continuation of that explained in detail in Volume I. Numerous small changes were made to keep pace with the changes in naval aircraft and their mission. The tables contained in this appendix show only the letters necessary to develop a designation for aircraft that were operational between January 1940 and December 31, 1949.

In January 1940, there were four major elements in the system as follows:

1. Aircraft Type/Class
2. Manufacturer Type Sequence
3. Manufacturer
4. Modification

Aviation Circular Letter No. 121-45 (ACL No. 121-45) dated October 17, 1945, added the letter K as the type designation for pilotless aircraft. Naval aircraft now were divided into four distinct types which were designated as follows:

Heavier-than-air (Fixed wing)	V
Heavier-than-air (Rotary wing)	H
Pilotless Aircraft	K
Lighter-than-air	Z

The letter V is omitted in the model designation, but H, K, and Z are used where applicable. The letter X as a prefix designated an experimental model.

Aviation Circular Letter No. 43-46 dated March 11, 1946, separated the Type/Class into two distinct headings of Type and Class. The four types were further subdivided into classes in accordance with their basic mission as follows:

Heavier-than-air (fixed wing)

Class	Mission	Designation
1 Fighter	Destroy enemy aircraft in the air	VF
2 Attack	Destroy enemy surface or ground targets	VA
3 Patrol	Search for enemy	VP
4 Observation	Observe and direct ship and shore gunfire	VO
5 Transport	Transport purposes	VR
6 Utility	Utility purposes	VU
7 Training	Training purposes	VT
8 Glider		VG

Heavier-than-air (rotary wing)

Air-sea rescue	HH
Observation	HO
Training	HT
Transport	HR
Utility	HU

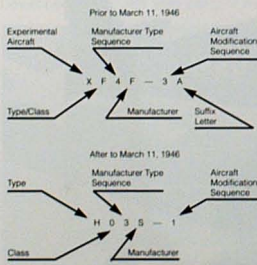
Pilotless Aircraft

For attack on aircraft targets	KA
For use as target aircraft	KD
For attack on ground targets	KG
For attack on ship targets	KS
For utility purposes	KU

Lighter-than-air

Patrol and rescue	ZP
Air-sea rescue	ZH
Training	ZT
Utility	ZU

In designating the first model of a class produced by a given manufacturer, the first number (1) is omitted in the Manufacturer Type Sequence position, but is shown in the Modification Sequence position. Thus, in the VJ class, the first utility aircraft produced by Grumman Aircraft Corporation was the JF-1. When a major alteration, not of a character to change the model was made in the JF-1, the modified aircraft became the JF-2. The second modification was the JF-3. However, the second utility aircraft built by Grumman was the JF-2-1 and successive modifications to this aircraft became JF-2-2, JF-2-3, etc. It must be remembered that the aircraft Modification Sequence Number is always one digit higher than the actual modification number. This can be expanded to show additional characteristics as demonstrated below.



In some cases, two letters had been combined to show the Type/Class of the aircraft such as SB for Scout Bomber as in the SBD-6; and PB for Patrol Bomber as in the PB4Y-2. ACL No. 43-46 directed that only one letter was to be used to designate the class for each model designation.

No changes were to be made in accordance with ACL No. 43-46 in the model designation of aircraft already produced or in production, except that the mission letter of all BT class aircraft was to be changed to A. Of the aircraft not in production,

only those which were to be produced were to have their designation changed.

Special purpose suffixes have been added from time to time to designate changes which were not significant enough to be deemed a modification which would raise the modification sequence number. Unfortunately, the same letter was frequently used to designate different characteristics causing considerable confusion over the designation.

Suffix letters came into a more general use during the period of rapid expansion immediately prior to the entry of the United States into World War II. At that time, the letter A was commonly used to indicate a Navy aircraft built for the Army and B served the same purpose in identifying aircraft built for the British. Early confusion existed, however, particularly with the letter A. At the same time it was used to identify Army aircraft, it also meant amphibian as in the PBV-5A and JFV-2A, while the JFV-2A meant the addition of an armament, in the TBD-1A it meant twin float landing gear, and in the F4F-3A a different engine.

The modification of the early F4U-1s was done in the field by the Marine Corps ABG-2, NAS San Diego, in order to configure the first Corsairs to enter combat. This field rework continued until the production line was changed. This was not considered by the Navy to be significant enough to be a modification. Nor was the letter A ever assigned as a suffix to designate these changes. The designation F4U-1A was an attempt, by those outside the Navy, to force the system to identify this change and has been carried on in error. There is no Navy directive that shows this designation. However, there was a FG-1A model with fixed wings built for shore based Marine Corps use.

This confusion with suffix letters increased when an SOC carrying the suffix A was one fitted for carrier operations, and was further compounded when the C came into use to indicate carrier adaptation as well as a number of other things. At this time, for example, the PBM-3C was a British-American Standardized version of the PBM-3. By late 1942 and early 1943, the C in SO3C-2C indicated a 24 volt electrical system, hydraulic brakes, and improved radio, and in the TB-1C indicated two 50 caliber wing guns.

The apparent random use of letters during this early war period indicates that they may have developed from the convenience of abbreviation rather than from any official act or decision. The first publication of suffix letters and their meanings appeared in the Bureau of Aeronautics publication of *Model Designation of Naval Aircraft* in April 1943. Although this was the first and was probably intended to sum up the suffix letter situation, it hardly covered the subject. Its complete statement was:

"Suffix letters are used where an airplane has a minor modification of not enough importance to change the modification number or where the airplanes have been diverted to another service

or for a special purpose. No fixed rule has been established for the suffix letter to identify the aircraft. The following suffix letters are used only for the purpose stated."

- (a) Letter "A" indicates either amphibious version or that the airplane was built for the Army Air Force.
- (b) Letter "B" indicates airplane was built for the British.
- (c) Letter "N" indicates night fighter version of the basic airplane.
- (d) Letter "R" indicates the basic airplane has been converted to a transport.
- (e) Letter "P" indicates that the airplane has fixed provisions for photographic missions."

Other additions soon appeared, such as F for patrol bomber and transport aircraft which were converted to flag configuration, H for hospital, S for antisubmarine patrol and E for special radar installation. Official designation lagged far behind usage. Neither the C, which by this time had acquired the new meaning of cannon, nor the D indicating pylons capable of carrying drop tanks, are defined in the directives of the period. Yet both were being used to designate aircraft such as the F4U-1C and F4U-1D.

Use of the suffix F was shortened. Aviation Circular Letter 86-45 of July 27, 1945, discontinued it as well as use of the terms "flag aircraft, flag plane and flagship" in referring to this type of modification. Instead, it established the letter Z and the term "administrative."

The January 1946 issue of Model Designations was a summing up of developments during the War. However, it offered no explanation for the C and D which were used so extensively during the war and, in fact, were used in the very issue in which the summation appeared. It made several changes in past usage, omitted the B, and added J, K, L, Q, and W.

Some models that were obtained from Army contracts retained the Army suffix letter as in the case of the PB-1C, -1D, -1G, -1H, -1J which was the same aircraft as the B-25 with the same suffix letters. In other cases, the suffix defies explanation and only knowledge of the aircraft tells the meaning. As an example the TBM-3L was a TBM-3, -3D, or -3E equipped with a searchlight mounted in the bomb bay. These problems are readily apparent in Table II which gives some of the more common suffix letters in use up to March 11, 1946. By this time the list had assumed proportions to warrant the publication of a special Aviation Circular Letter, ACL 43-46, to specify the suffix letters that were officially approved. Only the letters shown, and for the purpose stated, could be used. These suffix letters authorized by ACL No. 43-46 (and its supplements) are indicated by an asterisk in Table II. Of course, aircraft designations assigned prior to the release of ACL 43-46 continued to be used.

In spite of the publication of these lists, or perhaps because of it, confusion still existed, particularly in some of the resulting curious applications. For example, an R4D-6R, which designation appears regularly in aircraft listings during this period and years following, is literally a support/transport version of a transport aircraft. Since all transport aircraft have a "support/transport" mission, the designation hardly contributes much to the understanding. ACL 138-46, dated September 17, 1946, defined the designation as a "transport version of R4D aircraft in which twenty-one individual passenger seats are installed." Six months later that definition was qualified in ACL

27-47, dated March 7, 1947, by the insertion of "... and soundproofing and insulation equivalent to commercial airline standards."

Transport aircraft designations contain another exception that is confusing in the use of the letter C. By official definition C meant a carrier operating version. While transport aircraft have flown from carrier decks, they have not operated and as yet are not equipped to operate from carriers in the sense implied by the definition. In this instance, an R5D-1C is an R5D-1 aircraft in which the R5D-2 type of fuel system is installed.

On September 9, 1947 ACL 87-47 added an additional letter.

D Drone control version JD-1D

Aviation Circular Letter 65-48, dated July 22, 1948, again modified the system. The five classes of pilotless aircraft were now reduced to the single pilotless drone designation KD for aerial targets. The lighter-than-air ZP type mission was now Patrol and Escort. The mission of fixed wing aircraft was modified to:

Class	Mission	Designation
Fighter	Air defense and escort	VF
Attack	Surface and ground attack	VA
Patrol	ASW reconnaissance and attack	VP
Observation	Gunfire and artillery spotting	VO
Transport	Air logistic support	VR
Utility	Fleet utility support	VU
Training	Basic and fleet training	VT
Glider		VG

In order to decrease the number of letters assigned to manufacturers and reduce the multiple use of a letter by more than one manufacturer, ACL No. 65-48 directed that the manufacturer letter in the aircraft designation be assigned to the company which designed the aircraft. Aircraft manufactured by companies other than the designer were to carry the designation of the original designer. The approved list of manufacturer letters is indicated by a # before the letter in Table III.

It is not possible to place exact dates on the period that a specific manufacturer's aircraft have been in service as some linger on in odd jobs. The dates in Table III are generally the time period in which each manufacturer's aircraft was being used by naval aviation. Entries which have no dates indicate that it was in effect for the entire period covered by Volume II.

The changes and additions shown in Table IV were made in the authorized suffix letters by ACL 65-48.

ACL No. 65-48 authorized a suffix number to be added after the suffix letter when an aircraft configuration was modernized with different equipment without changing its special mission such as the F3D-2T2. The numeral 1 indicates the first configuration of the series with succeeding numerals following in consecutive order for additional configurations.

A change was also made in the model designation of lighter-than-air craft to show the designer's series number. A numeral following the class letter indicated the order number of the designer's airship in the same class, except that for the first design the numeral 1 is omitted. For example — ZNP2K indicates that this is a modernized version of the ZNPk type airship.

The entry of guided missiles into naval aviation

was signaled by the letter M being introduced in ACL No. 65-48 as the fifth type of aircraft. While the pairing instructions in this volume only apply to missiles with an aircraft configuration, the entire missile family identification system is included.

The sequence of letters for missiles was completely different than that used to designate aircraft and was composed of the following components:

1. Prefix letter
X Experimental model
Y Service test model
Z Obsolete model
2. Class letter

A two letter combination of the letters — A (Air), S (Surface), U (Underwater) — in which the first letter designates the launch point and the second the impact point of the missile.

3. Type letter
The type letter M indicating missile followed the class letters.

4. Service letter
Each basic designation was followed by a service letter — A (Air Force), G (Army), N (Navy). After approved for joint use, the service letter was dropped and the designation was preceded by ANG.

5. Model Number
The service letter was followed by a number to indicate the model number. These numbers were issued in sequence for each model.

6. Modification letter
The model number was followed by a small lower case letter to indicate the modification; a indicates the first modification, b the second and so on.

7. Designer's letter
There was no designer letter used in the designation of guided missiles.

This system generated designations such as the example below for the Regulus II surface to surface weapon.



TABLE I

<-----Denotes in existence prior to January 1, 1940

-----> Denotes in existence as of December 31, 1949

Type/Class	TYPE/CLASS DESIGNATION	Period	Type/Class	TYPE/CLASS DESIGNATION	Period
A	Attack	1946 ----->	L	Glider	1941 - 1945
A	Ambulance	1943 - 1946	O	Observer	1941 - 1946
B	Bomber	<----- 1946	OS	Observation Scout	<----- 1945
BT	Bomber Torpedo	1942 - 1946	P	Patrol	<----- 1946
D	Target Drone	1946 - 1947	PB	Patrol Bomber	<----- 1946
F	Fighter	<----->	R	Transport	<----->
GB	Glider	1946 ----->	S	Scout	<----- 1946
GB	Transport, Single Engine	<----- 1946	SB	Scout Bomber	<----- 1946
G	Attack on ground targets (pilotless aircraft)	1946 - 1948	SN	Scout Trainer	<----- 1946
H	Hospital	<----- 1942	SO	Scout Observation	<----- 1946
H	Air-sea rescue	1946 ----->	T	Training	1946 ----->
H	Helicopter	1943 - 1946	TB	Torpedo Bomber	<----- 1946
J	Utility	<----- 1946	TD	Target Drone	1942 - 1946
JR	Utility Transport	<----- 1946	U	Utility	1946 ----->
K	Drone	1945 ----->			

TABLE II

Suffix Letter	SPECIAL PURPOSE SUFFIX	Example	Suffix Letter	SPECIAL PURPOSE SUFFIX	Example
A	Target towing and photography	JRF-1A	F	Converted for use as a flagship	PB27-3F
A	Nonfolding wings and no carrier provisions	SB2C-1A	G	Air-sea rescue version	TBM-5G
A	Armament on normally unarmed aircraft	J2F-2A	H	Hospital version	SNB-2H
A	Arresting gear on normally noncarrier aircraft	SOC-3A	H	Air-sea rescue version	PB27-5H
*A	Amphibious version	PBY-5A	L	Target drone version	F6F-5L
A	Land based version of carrier aircraft	F4F-3A	M	Search light version	P2V-5L
A	Built for the Army Air Force	SBD-3A	N	Weather reconnaissance version	PB4Y-2M
B	Special armament version	PB4Y-2B	P	Night operating version (all weather)	F6F-5N
B	British lend lease version	JRF-6B	Q	Photographic version	SBD-3P
B	Carrier operating version of a noncarrier aircraft	SNJ-2C	R	Countermeasure version	TBM-3Q
C	British-America standardized version	PBM-3C	R	Transport version	PBM-3R
C	Equipped with two Cal. 50 machine guns	TBF-1C	S	Antisubmarine version	PSM-2S
C	Canon armament	TBM-1C	T	Training version	R4D-5T
D	Drop tank configuration	F4U-1D	W	Special search version	PB-1W
D	Special search radar	TBM-3D	Z	Administrative version	R4D-5Z
E	Special electronic version	SB2C-4E			

This list was further modified on April 16, 1946, by ACL 60-46 which

added:

J

U

TABLE III

<-----Denotes in existence prior to January 1, 1940

-----> Denotes in existence as of December 31, 1949

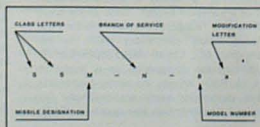
Letters	MANUFACTURER'S DESIGNATION	Period	Letters	MANUFACTURER'S DESIGNATION	Period
A	Brewster Aeronautical	<----- 1943	M	General Motors Corp. (Eastern Aircraft Div.)	1942 - 1945
B	Noorduyn Aviation, Ltd. (Canada)	1946 - only	N	Naval Aircraft Factory	<----- 1948
B	Beech Aircraft Co.	<----- 1945	N	Naval Air Development Station (target drones)	1948 ----->
B	Boeing Aircraft Co.	<----->	O	Lockheed Aircraft Corp. (gliders)	<----->
B	Budd Manufacturing Co.	1942 - 1944	P	Pittsford Aircraft Inc.	<----- 1940
C	Cessna Aircraft Corp.	1943 ----->	P	Passick Helicopter Corp.	1946 ----->
C	Culver Aircraft Corp.	<----- 1946	P	Spartan Aircraft Co.	1940 - 1941
C	Curtis-Wright Corp.	1948 ----->	Q	Sinclair Aircraft Corp.	<----- 1944
C	Curtiss Aeroplane and Motor Co.	<----- 1946	Q	Bristol Aeronautical Corp. (gliders)	1941 - 1943
D	Douglas Aircraft Co.	<----->	R	Fairchild Engine and Airplane Co.	1948 ----->
D	McDonnell Aircraft Corp.	1942 - 1946	R	Ryan Aeronautical Co.	1942 - 1946
D	Radioplane Co. (drones)	1943 - 1948	R	Aeronca Aircraft Corp. (gliders)	<----->
D	Frankfort Sailplane Co. (target drones)	1945 - 1946	R	Interstate Aircraft and Engineering Corp. (drones)	1942 ----->
D	Edo Aircraft Corp.	1943 ----->	R	Radioplanes Co. (target drones)	1948 ----->
E	Gould Aeronautical Corp. (gliders)	1942 - 1945	S	Schweizer Aircraft Corp. (gliders)	1941 - only
E	Heller Aircraft Corp. (helicopters)	1948 ----->	S	Sikorsky Aviation Corp.	1943 ----->
E	Piper Aircraft Corp. (helicopters)	1941 - 1945	S	Sperry Gyroscope Co. (target drones)	1948 ----->
E	Pratt-Read (gliders)	1942 - 1945	S	Vought Sikorsky Aircraft	<----- 1943
F	Fairchild Aircraft, Ltd. (Canada)	1942 - 1945	S	Stearman Aircraft Co.	<----- 1945
F	Columbia	1943 - 1944	T	Northrop Aircraft Inc.	1944 ----->
F	Grunman	<----->	T	Raycraft Aviation Corp. (gliders)	1942 - 1946
G	Globe Aircraft Corp. (target drones)	1946 - 1948	T	Timm Aircraft Corp.	1941 - 1943
G	Goodyear Aircraft Corp.	1942 ----->	U	Chance Vought Aircraft	1943 ----->
H	Hall Aluminum	<----- 1945	V	Vultee Aircraft Inc.	1943 - 1945
H	Howard Aircraft Co.	1941 - 1944	V	Lockheed Aircraft Corp.	1942 ----->
H	McDonnell Aircraft Corp.	1946 ----->	W	Willys-Overland Co. (target drones)	1948 ----->
J	North American Aviation Corp.	<----->	W	Waco Aircraft Corp. (gliders)	<----- 1945
K	Fairchild Aircraft Corp.	<----- 1942	W	Canadian Car and Foundry Co. Ltd.	1942 - 1945
K	Kaiser Cargo Inc. Fleetwings Div.	1946 ----->	Y	Consolidated Vultee Aircraft Corp.	<----->
L	Columbia	1944 - 1946			
L	Bell Aircraft	<----->			
M	Glenn L. Martin Co.	<----->			

TABLE IV

Suffix Letter	Meaning	Example
G	Search and rescue	TBM-5G
H	All weather operating version	F7F-2H
W	Air warning version	PB-1W

* Class designation authorized after March 11, 1946.

Indicates manufacturer letters approved by ACL No. 65-48.



APPENDIX E CAPTURED AIRCRAFT

When Petty Officer Tadayoshi Koga of the Imperial Japanese Naval Air Force took off on Wednesday, June 3, 1942, to engage American forces in the Aleutian Islands, he had no idea that

this aircraft would become the first worthy example of the Zero to fall into Allied hands. P.O. Koga's Zero, a Mitsubishi A6M2, serial number 4593, had made an emergency landing on a remote area of Akutan Island, but after touch down, the Zero flipped on its back as the main wheels engaged the soft, marshy soil. Although the aircraft was not badly damaged, P.O. Koga's neck was broken and he died instantly.

When the Zero was recovered in August 1942 by the US Navy and shipped home to NAS North Island, San Diego, California, it was repaired to flight status. As part of its restoration, the aircraft was painted in standard USN colors of nonspecular Blue Gray over all upper surfaces with nonspecular Light Gray on all lower surfaces as shown in the photograph above.





During the course of the war dozens of Japanese aircraft were acquired, but following V-J Day (August 14, 1945), American forces collected even more former Japanese aircraft. In many cases, once these aircraft reached the US, they were stripped of their original camouflage and insignia. The current American national aircraft insignia was applied to the fuselage and wings in the usual locations.

In March 1944, a former German Focke-Wulf Fw 190 G-3, W.Nr. 160051, shown at the base of page 187, was evaluated by the USN. Stripped of its German weapons, bomb rack and camouflage, it was repainted in the Navy's triple color camouflage complete with American national aircraft

insignia displayed on the wings and fuselage according to regulations.

Although the US Navy did not capture former German aircraft from the ETO, several types were made available to the Navy after they arrived in the States. Two examples are shown above. At the top left is a Messerschmitt Me 262 A-1 shown here at Patuxent River NAS where it was flown for over 10 hours for test flights. The nickname "Screamin Meemie" across the nose as well as the American insignia were applied while the aircraft was still in Europe. The camouflage is German applied. Similarly, the ex-Luftwaffe Arado Ar 234 B-2 above right with its engines running prior to takeoff, retains its original German paint apart from the

American national insignia. Both German aircraft were evaluated by the USN after the war. It is not believed that either German aircraft was ever repainted in US Navy camouflage during their flight test program.

It is interesting to note that only one of the four former Axis aircraft shown in this Appendix still survives. The German Me 262 A-1a has been fully restored by the USAF and is currently on public display at the Air Force Museum, Wright-Patterson AFB, Dayton, Ohio. The former German Ar 234 B-2 was discarded by the Navy during the 1950s. The German Fw 190 was apparently scrapped while the first captured Zero was involved in a landing accident in 1944 which left the aircraft unrepairable.

APPENDIX F OVERHAUL ACTIVITIES

In order to create complete doping codes, it is necessary to know the letter codes used to identify the overhaul facilities authorized to perform this work.

<---- Denotes in existence prior to April 15, 1941

-----> Denotes in existence as of July 20, 1945, the last known listing for overhaul activities doing fabric work.

No later directives specified when these facilities stopped doing fabric work. It came about as the types of aircraft being worked on at the various bases changed and the requirement for fabric work decreased.

Activity	Designation	Period
Base Air Detachment 2,	ADT	Sep 28, 1943 - Apr 15, 1944
NAS San Diego, Calif.		
NAS Alameda, Calif.	AL	Apr 15, 1944 ----->
Naval Reserve Air Base,	ANA-RB	Apr 15, 1941 - Sep 28, 1943
Anacostia, D.C.		
NAS Anacostia, D.C.	ANA	Apr 15, 1941 - Sep 28, 1942
Naval Reserve Air Base,	ATL-RB	Apr 15, 1941 - Jan 07, 1943
Atlanta, Georgia		
NAS Atlanta, Georgia	ATL	Jan 07, 1943 ----->

Activity	Designation	Period
NAS Antigua, B.W.I.	ANT	Apr 15, 1941 - Sep 28, 1943
NAS Argentina,	ARG	Dec 05, 1942 - Apr 15, 1944
Newfoundland		
NAS Banana River,	BAN	Dec 05, 1942 - Apr 15, 1944
Florida		
NAS Bermuda, B.W.I.	BER	Dec 05, 1942 - Apr 15, 1944
NAS British Guiana	BG	Dec 05, 1942 - Apr 15, 1944
NAS Burke Hill,	BNK	Sep 28, 1943 ----->
Indiana		
NAS Brunswick, Georgia	BR	Dec 05, 1942 - Apr 15, 1944
NAS Barber's Point,	BRP	Dec 05, 1942 - Apr 15, 1944
Territory of Hawaii		
Navy Yard, Cavite,	CAV	Apr 15, 1941 - Mar 02, 1942
Philippine Islands		
NAS Charleston,	CHN	Dec 05, 1942 - Sep 28, 1943
South Carolina		
NAS Cape May,	CM	Dec 05, 1942 - Sep 28, 1943
New Jersey		
NAS Canton Islands,	CNT	Dec 05, 1942 - Jan 07, 1943
Territory of Hawaii		
NAS Corpus Christi,	COR	Apr 15, 1941 - Apr 15, 1944
Texas		
MCAS Cherry Point,	CP	Sep 28, 1943 - Apr 15, 1944
North Carolina		
NAS Coco Solo,	CZ	<----->
Canal Zone		
Naval Reserve Air Base,	DAL-RB	Apr 15, 1941 - Jan 07, 1943
Dallas, Texas		
NAS Dallas, Texas	DAL	Jan 07, 1943 ----->

Activity	Designation	Period
NAS Daytona Beach,	DAY	Dec 05, 1941 - Sep 28, 1943
Florida		
NAS Deland, Florida	DEL	Dec 05, 1942 - Sep 28, 1943
NAS Elizabeth City,	ELZ	Apr 15, 1941 - Sep 28, 1943
North Carolina		
NAS Eureka, California	EUR	Apr 15, 1941 - Sep 28, 1943
Naval Reserve Air Base,	FLB-RB	Apr 15, 1941 - Dec 05, 1942
Floyd Bennett, New York		
NAS Guantanamo Bay,	GAN	Apr 15, 1941 - Sep 28, 1943
Cuba		
Naval Reserve Air Base,	GLV-RB	Apr 14, 1941 - Jan 07, 1943
Glenview, Illinois		
NAS Glenview, Illinois	GLV	Jan 07, 1943 ----->
NAS Grimaud, Illinois	GRX	Dec 05, 1942 - Sep 28, 1943
(Great Exuma)		
Naval Reserve Air Base,	HCH-RB	Apr 15, 1941 - Jan 07, 1943
Hutchinson, Kansas		
NAS(LTA) Hitchcock,	HIT	Sep 28, 1943 - Apr 15, 1944
Texas		
NAS Houma, Louisiana	HOU	Apr 15, 1941 - Apr 15, 1944
NAS Jamaica, B.W.I.	JAM	Apr 15, 1941 - Sep 28, 1943
NAS Jacksonville,	JAX	Apr 15, 1941 - Apr 15, 1944
Florida		
NAS Johnston Island,	JL	Apr 15, 1941 - Sep 28, 1943
Territory of Hawaii		
NAS Kaneohe Bay,	KAN	Apr 15, 1941 ----->
Territory of Hawaii		
Naval Reserve Air Base,	KC-RB	Apr 15, 1941 - Jan 07, 1943
Gardner, Kansas		
NAS Gardner, Kansas	KC	Jan 07, 1943 - Sep 28, 1943
NAS Key West, Florida	KEY	Apr 15, 1941 - Sep 28, 1943
NAS Kodiak, Alaska	KOD	Apr 15, 1941 - Apr 15, 1944
Naval Reserve Air Base,	LAL-RB	Apr 15, 1941 - Jan 07, 1943
Los Alamitos, Calif.		
NAS Los Alamitos,	LAL	Jan 07, 1943 ----->
California		
NAS Fort Lauderdale,	LAU	Apr 15, 1941 - Sep 28, 1943
Florida		
Naval Reserve Air Base,	LB-RB	Apr 15, 1941 - Dec 05, 1942
Long Beach, Calif.		
NAS Lake City, Florida	LC	Apr 15, 1941 - Sep 28, 1943
NAS Livermore,	LIV	Sep 18, 1943 - Apr 15, 1944
California		
NAS Lakehurst,	LK	Apr 15, 1941 - Apr 13, 1944
New Jersey		
NAS Maui,	MAU	Apr 15, 1941 - Sep 28, 1943
Territory of Hawaii		
NAS Melbourne, Florida	MEL	Apr 15, 1941 - Sep 28, 1943
Naval Reserve Air Base,	MEM-RB	Apr 15, 1941 - Jan 07, 1943
Memphis, Tennessee		
NAS Memphis, Tennessee	MEM	Jan 07, 1943 ----->
Naval Reserve Air Base,	MI-RB	Apr 15, 1941 - Dec 05, 1942
Miami, Florida		
NAS Miami, Florida	MI	Apr 15, 1941 ----->
Naval Reserve Air Base,	MIN-RB	Apr 15, 1941 - Jan 07, 1943
Minneapolis, Minnesota		
NAS Sunnyvale, Moffett	MOF	Dec 05, 1942 - Apr 15, 1944
Field, California		
Naval Aircraft Factory	NAF	<-----> Sep 28, 1943
Philadelphia, Pennsylvania		
Naval Air Material Center,	NAMC	Sep 28, 1943 ----->
Philadelphia, Pennsylvania		
Naval Reserve Base,	NO-RB	Apr 15, 1941 - Jan 07, 1943
New Orleans, Louisiana		
NAS New Orleans,	NEO	Jan 07, 1943 ----->
Louisiana		
Naval Reserve Air Base,	NOR-RB	Apr 15, 1941 - Jan 07, 1943
Norman, Oklahoma		
NAS Norman, Oklahoma	NOR	Jan 07, 1943 - Apr 15, 1944
NAS Norman, Oklahoma	NMN*	Apr 15, 1944 ----->
NAS Norfolk, Virginia	NOR	<----->
NAS New York, New York	NY	Apr 15, 1941 - Sep 28, 1943
Naval Reserve Air Base,	OAK-RB	Apr 15, 1941 - Jan 07, 1943
Oakland, California		
NAS Oakland, California	OAK	Jan 07, 1941 - Sep 28, 1943

Activity	Designation	Period
NAS Olathe, Kansas	OLA	Jan 07, 1943 ----->
Naval Reserve Air Base,	OTT-RB	Apr 14, 1941 - Jan 07, 1943
Ottumwa, Iowa		
NAS Ottumwa, Iowa	OTT	Jan 07, 1943 ----->
NAS Palmyra Island,	PAL	Apr 15, 1941 - Sep 28, 1943
Territory of Hawaii		
Naval Reserve Air Base,	PAS-RB	Apr 15, 1941 - Jan 07, 1943
Pasco, Washington		
Naval Reserve Air Base,	PER-RB	Apr 15, 1941 - Jan 07, 1943
Peru, Indiana		
NAS Peru, Indiana	PER	Jan 07, 1943 - Sep 28, 1943
NAS Pensacola, Florida	PEN	<----->
NAS Pearl Harbor,	PH	<----->
Territory of Hawaii		
NAS Patuxent River,	PAX	Apr 15, 1941 - Apr 15, 1944
Maryland		
NAS Puunene, Maui,	PUU	Jan 07, 1943 - Sep 28, 1943
Territory of Hawaii		
NAS Quonset Point,	QON	Apr 15, 1941 - Apr 15, 1944
Rhode Island		
Fleet Air Detachment,	QUA	Apr 15, 1941 ----->
Quantico, Virginia		
NAS Richmond (South	RCH	Apr 15, 1941 - Apr 15, 1944
Miami), Florida		
NAS Roosevelt Roads,	RR	Apr 15, 1941 - Jan 07, 1943
Puerto Rico		
NAS Santa Ana,	SAA	Apr 15, 1941 - Apr 15, 1944
California		
NAS Sanford, Florida	SAN	Apr 15, 1941 - Sep 28, 1943
NAS San Diego,	SD	<----->
Naval Reserve Air Base,	SE-RB	Apr 15, 1941 - Dec 05, 1942
Seattle, Washington		
NAS Seattle, Washington	SE	<----->
NAS San Juan,	SJ	Apr 15, 1941 - Apr 15, 1944
Puerto Rico		
NAS Sitka, Alaska	SK	Apr 15, 1941 - Sep 28, 1943
NAS St. Lucia, B.W.I.	SLA	Dec 05, 1942 - Sep 28, 1943
NAS San Pedro,	SP	Apr 15, 1941 - Jan 07, 1943
California		
Naval Reserve Air Base,	SQN-RB	Apr 15, 1941 - Apr 15, 1944
Squantum, Massachusetts		
NAS Squantum,	SON	Apr 15, 1944 ----->
Massachusetts		
NAS St. Simon's Island,	SSI	Dec 05, 1942 - Sep 28, 1943
Georgia		
Naval Reserve Air Base,	STL-RB	Apr 15, 1941 - Jan 07, 1943
St. Louis, Missouri		
NAS Lambert Field,	STL	Jan 07, 1943 ----->
St. Louis, Missouri		
NAS South Weymouth,	SW	Dec 05, 1942 - Apr 15, 1944
Massachusetts		
Naval Reserve Air Base,	TER	Dec 05, 1942 - Sep 28, 1943
California		
NAS Tillamook, Oregon	TIL	Dec 05, 1942 - Apr 15, 1943
NAS Tongue Point,	TP	Dec 05, 1942 - Sep 28, 1943
Astoria, Oregon		
NAS Port of Spain,	TRI	Dec 05, 1942 - Apr 15, 1944
Trinidad		
NAS Tutuila, American	TUT	Dec 05, 1942 - Jan 07, 1943
Samoa		
NAS Unalakleet, Alaska	UNA	Apr 15, 1941 - Sep 28, 1943
NAS Vero Beach, Florida	VER	Dec 05, 1942 - Sep 28, 1943
NAS Vieques Sound,	VS	Dec 05, 1942 - Sep 28, 1943
Puerto Rico		
NAS(LTA) Weeksville,	WEK	Sep 28, 1943 - Apr 15, 1944
North Carolina		
Naval Reserve Air Base,	WG-RB	Apr 15, 1941 - Jan 07, 1943
Willow Grove, Pennsylvania		
NAS Willow Grove,	WG	Jan 07, 1943 - Sep 28, 1943
Hatboro, Pennsylvania		
NAS Whidbey Island,	WHI	Dec 05, 1942 - Sep 28, 1943
Pudget Sound, Washington		

NMN* changed from NOR to eliminate the conflict with NAS Norfolk, Virginia.

APPENDIX G COLORS FOR US NAVAL AIRCRAFT

Appendix C of Volume I explained in detail how the various color numbers and names evolved from the first color master 3-1 to the current Federal Standard 595a. The colors shown in this appendix are those that would have been in use between January 1, 1940 and December 31, 1949, and show the relationship from one color master to another as was done in the previous volume.

When ANA Bulletin No. 166 was first issued on December 4, 1943, the porcelain enamel on steel panels described in Volume I were still in use. Due to the rapid expansion of US naval aviation, it was not practical to make the high volume of porcelain masters required. Therefore, a new series was produced on high quality cardboard. It was not until ANA Bulletin No. 166a, dated June 6, 1946, was issued that these cardboard masters were mentioned. Therefore, the Munsell numbers as shown in Volume I are used for the early years of this volume, while the later years are covered by the 1943 cardboard masters identified in the chart opposite.

Brightly colored aircraft were still in use in 1940 when this volume begins. However, some of the early glossy colors have been dropped from the chart since they were no longer being used. Wartime requirements changed most colors to a matte finish for camouflage purposes. Then, as the war drew to a close, a shift back to glossy finishes began with the introduction of glossy Sea Blue, Lemon Yellow, True Blue and Willow Green also succumbed to the wartime expansion and became Light Yellow, Light Blue, and Light Green respectively. While the names changed, the colors remained basically the same within the variations always present in mixed paints.

The Munsell numbers for the flat (camouflage) colors were determined from the *Army-Navy Aircraft Camouflage Standard Colors* set, number 53, dated June 1943. The Light Gull Gray, Dark Gull Gray, and glossy Sea Blue were added in June 1944. There is no explanation as to why glossy Sea Blue was assigned ANA Number 623 which should mean it was a camouflage or flat color. ANA Bulletin 157d, dated March 11, 1959, transferred it to ANA Bulletin 166d, but it retained its 623 designation. Color Number 514, Instrument Black, was transferred from Bulletin 166d to Bulletin 157 at the same time. The Munsell numbers for the glossy colors were determined from the *Army-Navy Aircraft Color Standards Glossy* set number 3780 dated March 1945.

The Munsell numbers for colors in these two color master sets were determined by the Munsell Company in February 1986.

These color masters remained in effect through the period covered in this volume.



Right: Such items as this arrangement of the original Navy Color Cards within the author's collection, make possible the matching of the color chips found on page 193 and 194 of this volume.

COLORS FOR U.S. NAVAL AIRCRAFT 1940 — 1949

Fed Spec 595a	Munsell 595a Series	Color Name	Munsell ANA Series	Fed Spec TT-C-595	ANA Bulletin 157/166	Munsell 1933 Series	Remarks
11136	5.6R 3.9/10.1	Insignia Red	7.66R 3.13/11.55	1105	509	7.5R 3.23/11.7	
12197	8.6R 5.0/12.9	International Orange	9.3R 4.49/13.7	1205	508	9.3R 4.87/12.5	
13538	9.6YR 7.7/13.3	Orange Yellow	1.2Y 7.13/13.05	1310/1315	506	1.4Y 7.72/15.05	
13655	2.8Y 8.2/12.8	Light Yellow	5.4Y 7.74/11.8	1350	505	4.4Y 8.17/13.5	
14087	6.0Y 3.0/9.9	Olive Drab	6.8Y 2.88/11.95		504		
14187	9.3GY 5.0/11	Light Green	8.5GY 4.67/8.15	1460	503	2.5GY 5.20/4.7	
15042	8.0B 2.8/8.8	Sea Blue	0.55PB 2.59/1.45	1505	623		
15044	6.0PB 2.6/16	Insignia Blue	4.9PB 1.25/2.95	1510	502	5.8PB 1.16/3.9	
15102	4.3PB 4.0/7.3	Light Blue	3.7PB 3.54/8.15	1520	501	4.6PB 3.60/9.2	
16081	1.2BG 3.8/10.2	Engine Gray	2.7B 3.10/3.35	1610	513	7.6B 3.14/10.5	
16473	8.8BG 6.9/10.6	Aircraft Gray	2.4B 6.68/10.8	1645	512	0.4PB 6.82/10.9	
17038	3.8Y 2.4/10.1	Black	0.9PB 1.34/10.45	1770/1775	515	2.0PB 6.68/10.6	
17875	2.0BG 9.3/10.3	Insignia White	4.2GY 8.93/10.6	1755	511	4.5GY 9.34/10.5	
25042	7.7B 2.7/10	Sea Blue	1.0PB 2.94/1.5	2505	606		
27038	3.2B 2.5/10.1	Instrument Black	2.4PB 2.30/4.4	2710	514		
30109	9.4R 3.8/5.5	Dull Red	9.3R 3.71/5.5	3105	618		
31136	5.5R 3.9/11.7	Insignia Red	5.2R 4.16/10.65	3115	619		
33538	9.6YR 7.8/13.4	Orange Yellow	0.5Y 7.16/11.0	3305	614		
34079	3.5GY 3.0/14	Medium Green	0.3G 3.57/1.85	3406	612		
34087	4.7Y 3.6/12.1	Olive Drab	7.0Y 3.62/1.5	3412	613		
34151	1.1GY 4.2/3.5	Interior Green	3.3GY 4.55/3.6	3430	611		
35042	8.6B 2.4/14	Sea Blue	0.3PB 2.67/1.4	3510	607		
35044	7.7PB 2.4/1.7	Insignia Blue	5.7PB 2.47/1.55	3505	605		
35164	2.6PB 4.7/2.9	Intermediate Blue	0.3PB 4.86/2.45	3525	608		
35189	10B 5/4 (1)	Blue Gray					
35231	5.6PB 5.4/6.4	Azure Blue	5.3PB 5.36/6.35	3535	609		
36118	3.3PB 4.1/1.1	Sea Gray	3.7PB 3.94/0.95	3610	603		
36231	9.9BG 5.3/10.4	Dark Gull Gray	7.3B 5.36/10.5	3615	621		
36440	4.2GY 7.1/10.3	Light Gull Gray	4.55GY 7.08/10.27	3635	620		
(2)		Light Gray	2.4GY 6.51/10.5		602		
37038	2.7G 2.3/10	Black	3.2PB 2.28/1.1	3725	604		
37875	8.0GY 9.4/10.2	Insignia White	8.3Y 9.17/10.6	3715	601		
		Blue Gray					(3) 5.5PB 2.6/3.3 (4) 9B 3.5/1.5

1. Found by Grumman Aerospace during restoration of National Air and Space Museum FM-2. 35189 is the closest equivalent in 595a.
2. Not carried over to FS 595 — combined with AN 620 Light Gull Gray.
3. Listed in text but believed to be an interim color in the preparation of the three tone scheme and not as used for the two tone scheme.
4. This color chip was located in a classified camouflage publication of the period and believed to be the correct color originally intended — not necessarily as used. The Munsell number was visually determined at the National Bureau of Standards.

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Vultee

Weather

Weather

Twenty-six of the color chips shown below and on the next page are precise duplications of original US Navy standards. Both hue and surface finish follow the original standards issued in May 1943 and March 1945. The three Blue Gray paint chips with footnotes are nonstandard colors and correspond to footnotes in the chart found on pages 190-191 of volume two. A few of the listed colors were used by the British RAF and Royal Navy. These include Azur Blue 609, Middle Stone 615 and Dark Earth 617. Additionally, colors Sand 616 and Glossy Sea Blue 623 may have been intended for British use. The application and general usage of all these colors is described in THE OFFICIAL MONOGRAM US NAVY & MARINE CORPS AIRCRAFT COLOR GUIDE, VOLUME 2, 1940-1949. The application and general use of many of the colors is also relevant to subsequent volumes in this series.



LIGHT GREEN 503



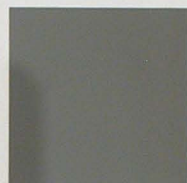
OLIVE DRAB 504



MAROON 510



INSIGNIA WHITE 601



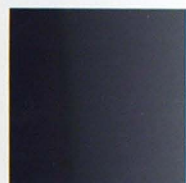
LIGHT GRAY 602



SEA GRAY 603



BLACK 604



INSIGNIA BLUE 605



SEMI-GLOSS SEA BLUE 606



NON-SPECULAR SEA BLUE 607



INTERMEDIATE BLUE 608



AZUR BLUE 609



SKY 610



INTERIOR GREEN 611



MEDIUM GREEN 612



OLIVE DRAB 613

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ORANGE YELLOW 614



MIDDLE STONE 615



SAND 616



DARK EARTH 617



DULL RED 618



INSIGNIA RED 619



LIGHT GULL GRAY 620

34392



DARK GULL GRAY 621



JET 622



GLOSSY SEA BLUE 623



BLUE GRAY¹



BLUE GRAY²



BLUE-GRAY*

