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**Evolution of National Insignia, Coloration
and Markings on USAF Aircraft**

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Numerous styles of national insignia, markings, and color schemes have been displayed on aircraft used by the U. S. Air Force and its predecessor organizations during the half century following the appearance of the JN3 "Jennies" along the Mexican border in 1916. The use or discontinuance of these designs has been prompted by a variety of circumstances including technological improvements, mission changes, and wartime crises. The details of these changes are necessary to the historian, the model builder, and the aircraft "buff", but many of the facts are buried in obscure official specifications. Magazine articles which dealt with coloration and markings have appeared in leading aviation journals, but these frequently are limited in scope and often specific in their coverage. It is the purpose of this paper to clarify the historical evolution of the subject.

Beginning with the Army's first airplane, Wright Flyer Signal Corps Airplane No. 1 in 1909, until our nation's entry into World War I, the Army ordered and received only a few hundred planes. These aircraft appeared in clear finish and were usually marked with consecutive serial numbers allotted by the Signal Corps' Aviation Section. These serials were the only official markings and were displayed conspicuously in black in various positions. For example, on No. 28, a Burgess "H" model, the number was located well forward on the fuselage, but on airplane No. 30, a Curtiss JN1, it appeared on the rudder. Understandably, Signal Corps Airplane No. 1 did not carry a number, although the crossed flag

insigne of the Signal Corps was painted on its rudders after it arrived at Fort Sam Houston in Texas in February 1910.¹

The next use of a distinguishing mark on Army aircraft apparently occurred during Pershing's Punitive Expedition into Mexico in 1916. Since the service's activities prior to the Mexican campaign had been limited to intra-country operations, little need for an identifying insigne for Army planes had previously existed. Various photographs of some of the Jennies used by the 1st Aero Squadron on the border prove that a five-pointed star was painted on their rudders.

Colonel H. H. H. Clark (USAF, retired) recalled some details of origin of this star marking. He relates that in early 1916 at North Island, California, Sgt. Jacob Kunts and associates named Mackie, Sears, and Barney Barnhill were assigned to the Experimental and Repair Department under Capt. Bryon Q. Jones where they designed and first began using a star marking on the rudder or vertical stabilizer of some new aircraft they were assembling. However, they soon were ordered to cease using the design. Sergeant (later Lieutenant) Sears and others were transferred from North Island to the Mexican border later in the year and began using this insigne on planes stationed there. The star, as Col. Clark recalled, was red. When a circle or "border" was added later, the circle was white to duplicate the colors of the Signal Corps piping and hat cord, red and white. The Chief Signal Officer later ordered this "mutilation" of government property halted immediately.²

There were variations in position and details of the star design. Some aircraft were marked only with a plain star while others bore a star within a light colored circle. This marking appeared at the very

top of the rudder on some planes and a foot or more from the top on others. A similar rudder marking appears in photographs of JN4 aircraft stationed at the Signal Corps flying school at Driving Park, Memphis, Tennessee, early in 1917. Several former aviators who trained at the school recall the tail marking as a white star within a blue circle.³

The Aviation Section had neither sufficient war material nor an official national marking for its meager inventory of airplanes at the outset of American participation in the European war in April 1917. Colonel Edgar S. Gorrell, who served as Chief of Staff with the A.E.F.'s Air Service, related the story behind the adoption of the first official national insigne. The creation of an appropriate design was one of the tasks assigned to the small group of air officers in Washington in the spring of 1917. Using wrapping paper from a neighborhood grocery and children's water paints and colored pencils, Colonel Gorrell and his associates prepared sketches of various combinations of colors, circles, and stars, finally choosing one which ultimately received official approval.⁴

The design, approved in War Department Stencil No. 2 on 19 May 1917, consisted of a white five-pointed star centered in a circumscribed blue circle, equal in diameter to the chord of the wing on which the insigne was placed. A red circle occupied the center of the star but missed touching the inner star points "by an amount equal to 1/24th of the diameter of the circumscribed circle." Colors used were to be the same as those appearing in the American flag. The stencil also

prescribed the location for the newly-adopted insigne. It was to be placed on the upper surface of each upper wing, positioned so that the circumference of each circumscribed circle just missed contact with the wing aileron. Lower wings bore similar markings on their undersurface.⁵

A specification dated 15 October 1917 directed that the insignia be placed on the wings so that one point of the star faced directly forward. Fuselage sides were to be left unmarked except for those airplanes designated as trainers. These were to bear Signal Corps serial numbers on each side behind the pilot's seat in black figures 14 inches high.⁶

Both sides of that section of the rudder behind the rudder post on Air Service planes after the 19 May 1917 order were to be painted with three equally wide vertical bands; red, white, and blue. The blue band was adjacent to the rudder post while the band at the rudder tail was red. The serial number for each Army plane was painted in black figures three inches high on each side of the rudder at the top of the white band.⁷

Objections to the new insigne design came from Colonel William "Billy" Mitchell, named by General Pershing to command the A. E. F.'s Air Service, Zone of the Advance. Colonel Mitchell recommended the use of three concentric circles, similar to the national insignia on British and French aircraft, but with a different sequence of color.⁸

The suggestion had merit since quick, certain identification of airplanes in combat was a life and death matter, particularly during periods of poor visibility. The adoption of Colonel Mitchell's idea

would standardize Allied markings as tri-color cockades, while color variations would serve as distinguishing marks for the various Allied nations. German airplanes and those of her allies, Bulgaria and Austria, were identified by formée and Greek crosses.

On 11 January 1918, the Joint Army and Navy Technical Aircraft Board did adopt a new insigne for aircraft manufactured in the United States for the Army and Navy. Wings were to bear a red circle with a diameter approximately equal to the chord length, an inner blue circle two-thirds the length of the chord, and a center white circle one-third the chord length in diameter. General Order No. 299 dated 8 February 1918, specified that the wing marking should appear on the upper wing so that the outer circle "just misses contact with the wing flap." Insignia were to be placed in a corresponding position on the underside of the lower wing. In March, the size of these wing markings was limited to a maximum diameter of 60 inches.⁹

Wing markings normally were placed inboard of the aileron on all United States-produced airplanes, but during the war they appeared at the wing tips on British and French craft. Some planes produced by France, including early Nieuport 28's, carried rudder markings with the white stripe at the front and red at the trailing edge, according to one authority. The fuselage on American combat aircraft remained unmarked except for insignia placed there in the field.¹⁰

Under the terms set forth in General Order No. 299, rudders retained the three vertical bands, although the red stripe was relocated at the rudder post and the blue moved to the rear position. Not all the

foreign-made aircraft used by United States' forces in Europe were repainted with American markings and the use of spare parts with one type of marking on an aircraft having another type of marking was not unknown. Serial numbers continued to appear at the top of the white band in three-inch high numerals. Temporary use of the former star design was permitted on training planes already in service and in production, but the new cockade emblem was to be applied immediately to American aircraft being shipped to Europe.¹¹

The location of the wing marking was altered on 22 April 1918. On upper wings, the center of the roundel was to be one chord length from the wing tip. The lower wing's chord length marked the proper distance from the lower wing tip. Serials now appeared in figures limited to a height of four inches on both sides of the fin in front of the rudder post and above the stabilizer. During 1918, the letters "SC" were added as a prefix to the serial to identify the Signal Corps as the using organization. On aircraft with no fixed vertical tail area or with insufficient space, the serial number was painted on both sides of the fuselage with the rear element of the markings on a line with the front edge of the stabilizer surface. Serial markings on trainers were made more conspicuous, appearing in 14-inch high numerals on each side of the fuselage behind the pilot's seat. (All aircraft were to carry the serial number and prefix in 14-inch letters on the fuselage after a 30 August 1919 specification appeared. This same document changed the prefix from "SC" to "AS" for Air Service.)¹²

A bulletin issued by the Air Service on 7 May 1918 outlined other standard markings that were to be applied to combat aircraft in Europe.

All planes in a squadron were to be numbered serially, from one to 19 in black on both sides of the fuselage near the stabilizer, on the upper right wing's top surface, and on the underside of the lower right wing. A later memo dated 28 June 1918 stated: "All planes in a squadron shall be numbered in yellow or red." Each squadron would have an official insigne painted on the middle of each side of the fuselage. Squadrons were to design their own insigne during the period of organizational training. In addition, the planes in some squadrons displayed on the upper side of the top left wing and underside of bottom left wing a stripe or series of stripes of any color as specified by the group commander to facilitate recognition by pilots of the same squadron from above and below.¹³

Squadrons newly arrived in the combat zone were prohibited from arbitrarily adopting and using an insigne, however. No unit was permitted to place any distinctive insignia on its craft without written authorization from the Office of the Chief of the Air Service. Before applying for this authority, certain requirements had to be met. An observation squadron must first have served one month at the Front or have received a citation for distinguished services in orders from higher authority. Bombing squadrons also were required to serve a month at the Front before making application to adopt their insignia. Pursuit squadrons were required to receive official credit for three enemy planes brought down in aerial combat or earn a citation similar to that demanded of observation groups before applying.¹⁴

Distinguishing marks also were authorized for flight commanders and their deputies. A plane flown by a flight commander had distinctive streamers attached to the tips of the lower wings and one from the rudder. A squadron commander's craft was painted with two bands of red, white, and blue stripes running diagonally from the rear of the cockpit to the rear of the fuselage at the foot of the rudder post. (Some World War I photos show a single band of red, white, and blue although the specification called for two.) Officers who commanded groups and higher organizations were permitted to mark their planes at their own discretion.¹⁵

On 15 July 1918, AEF Headquarters approved the adoption of the French balloon service's practice of placing air service insignia on all captive balloons. Each was to be marked with the familiar red, blue, and white cocarde on each side about one-third of the length of the balloon from its nose. The insigne was placed on the 11th panel from the front, equidistant from each seam, with the lower edge tangent to the suspension band. Two weeks later on 2 August, the cocardes were ordered placed with the lower edges two meters above the suspension band.¹⁶

Six months after the signing of the Armistice, the Secretaries of the Navy and War agreed to resume the use of the original national insigne on United States military aircraft, the star in the circle. On each upper and lower wing, the circumference of the blue circle was to be tangent to the wing tips. One point of each star would point

forward and unless otherwise specified, the insigne diameter would be 60 inches. Rudder markings would be the familiar three vertical bands, with blue nearest the rudder post.¹⁷

A 1920 Air Service report noted that the use of the star marking was based more on an emotional or patriotic impulse than on scientific observation. Tests had shown that at a short distance, the star's outside points began to merge with the surrounding color while the inside corners tended to lose their sharpness and become rounded off. As the distance increased, the blending became more pronounced until the insigne couldn't be distinguished from the former concentric circle design. The report recommended the adoption of three parallel bands of red, white, and blue as a national insigne, positioned across the upper and lower wing surfaces.¹⁸ The suggestion was not approved.

The return to the star insigne was not immediate. All aircraft already constructed would continue to employ the "three circle" design, but all planes delivered after 17 May 1919 which were not already marked would carry the star insigne. The change would be effective on all planes not later than 1 January 1920. Although the Armistice had been signed six months earlier, the order contained the restriction that under no circumstances would the star be used on aircraft stationed in Europe "until after the end of hostilities."¹⁹

The colors used on American aircraft during World War I presented a varied array of patterns and hues. Prior to the war, fabric-covered aircraft generally were left unpainted and merely had a coating of

clear dope or varnish, giving them a cream-colored appearance. After the U. S. entered the war, however, planes purchased from Britain and France for the A.E.F. often carried the color scheme used by that particular nation. Colors on British craft varied, with olive drab, green, or brown fuselage sides frequently encountered with clear or silver undersides. France employed a number of color schemes including irregular brown, green, and beige patterns for the top and sides with clear undersurfaces for some of their camouflaged aircraft. Some French planes were finished with a solid cream color throughout while others tested the merits of light blue, sky blue, or silvery gray undersides. Some of the French Nieuports and SPAD Scouts used on the Western Front were a silvery-gray scheme. The initial American-built De Havilland 4's sent to Europe were unpainted or painted olive drab only on the upper surfaces of the wing and tail, and on the top quarter of the fuselage. Later, American-built planes arriving in Europe were painted an olive drab shade all over. This scheme was retained until 1927.

During the years of uneasy peace between 1918 and 1941, no change in the basic star insignia appeared, although succeeding Air Corps specifications frequently noted minor changes in position and size. On 21 January 1926, the diameter of the wing insignia was fixed at three-fourths of the available chord length at the location of attachment, with a maximum size of 60 inches. Available chord length was defined as the whole chord on wings without ailerons and the chord length from the aileron cut-out to the leading edge on wings with ailerons. The insignia were positioned tangent to the cut-out on wings with ailerons;

on those without, the insigne center fell midway of the chord. Later specifications required that the marking on fabric and metal covered wings be placed on the metal covering, tangent to the point between the two materials. Subsequently, the location for the emblem's center was specified as a distance from the wing tip equal to one-sixteenth of the wing span on straight wings and one-eighth of the wing span on tapered wings. The outside edge of the blue circle was not to approach the wing tip closer than six inches.²¹

National insignia adopted for heavier-than-air craft were also applied to non-rigid airships after 25 May 1920. The standard Air Service ensign was painted on a single ply of balloon fabric cemented to the envelope at the upper and lower extremities of a vertical plane passing through a point two-fifths of the distance back from the ship's nose or eight feet forward of the "N" nationality marking, assigned to the United States by the International Air Navigation Convention. One point of each star pointed forward and a 60-inch circle was specified. Each rudder and elevator bore the insignia used on aircraft, with stripes on the elevators at right angles to the airship's longitudinal axis and applied on both the upper and lower surfaces.²²

Army airships and spherical balloons took on a distinctive appearance after 20 January 1923 with the addition of the marking "U. S. ARMY"; observation or kite balloons were ignored in the specification. Two national insignia were to be mounted on each airship at the top and bottom. The upper marking was positioned at the envelope's greatest diameter while the center of the bottom emblem appeared three feet back

of a point midway between the front of the car and the tip of the envelope's bow. "U.S. ARMY" preceded three sets of registration markings on the envelope, one on each side and one under the bow. On spherical balloons, only two insignia appeared, one at each end of the diameter inclined 45 degrees to the vertical axis of the ship. "U.S. ARMY" markings also were used on these vehicles, centered on each end of a horizontal diameter. Observation kite balloons carried one star insigne on top and another at the bottom of the envelope.²³

It had been advantageous during World War I for the rudder insigne on American planes to resemble those of the other Allied nations. Following the war, each of these countries modified its insigne to a more distinctive design to permit nationality identification. Credit for the American Army design adopted in January 1927 appears to belong to Mr. Charles N. Monteith, a former World War I aviator working for the Boeing Airplane Company in Seattle at the time of his suggestion in 1926. Monteith recommended a rudder marking which more closely resembled "Old Glory." One blue stripe was placed parallel to and just behind the rudder post. Its width equalled one-third the maximum width of the rudder to the rear of the post. The remaining area behind the post was divided evenly into 13 parallel horizontal stripes, seven red and six white, alternating colors.²⁴

Other alterations in Army aircraft markings were approved during the 1920's and 1930's. On 31 January 1925, a two-part serial number marking was adopted consisting of two digits representing the fiscal

year the plane was ordered followed by a hyphen and the number representing the sequence of purchase during that year. 26-140 would identify the 140th plane ordered during fiscal year 1926. Serial numbers were moved to a location on the fuselage immediately in front of the leading edge of the stabilizer at the same time for reasons of economy. The numerals were reduced to a four-inch size to reduce labor and cost. The "U. S. ARMY" marking appeared on the fuselage in four-inch letters above the serial number after authorization on 15 October 1926.

On 2 July 1926, the Air Corps Act became law and redesignated the Army's Air Service as the Army Air Corps; this necessitated a change in serial number prefix from "A. S." to "A. C." The letters and number designating the aircraft model together with the manufacturer's name had been authorized on 31 January 1925 for placement on each side of the rudder about one-fourth the height of the rudder from the top and in figures no larger than three inches high. The words "corporation" and "company" were not to be used. After 18 October 1927, the maker's name and type designation were moved to the fuselage as a separate line of four-inch letters to preclude the transfer of the markings each time the rudder was changed.

Example:

U. S. ARMY
(Manufacturer's name—Model designation)
A. C. 27-461

The second and third lines were transposed in a specification issued on 25 January 1929.

Use of this marking was brief, for after 3 December 1930 the manufacturer's name was eliminated and the other data reappeared on the left side of the fuselage near the cockpit in one-inch letters in an

information block which was still in use in 1968. (During World War II, "W" or "Q" was stenciled beneath the type, model and series designation on the fuselage in two-inch letters to identify war-weary aircraft returned permanently from service in an overseas theater; "S" identified aircraft which had been designated as excess or surplus property.)²⁵

The appearance of "U. S. ARMY" on the undersides of wings resulted from some confusion the general public experienced in identifying Army planes and those belonging to other executive departments, commercial concerns, or private individuals. Station commanders at first were given the option of adding "U. S. ARMY" to the lower wings and fuselage sides, in a technical order dated 4 February 1924. "U. S." would appear on the right wing, and "ARMY" on the left with the top of the letters toward the wing's leading edge. Bold, white letters 24-inches high were to be used on dark surfaces, and black letters on light backgrounds. On 15 October 1926, the wing marking had become mandatory.²⁶

Demands for increased aircraft visibility sparked a series of changes in the over-all color scheme of Air Corps aircraft as the olive drab finish gave way to ones promoting greater safety. In 1927, yellow wings and tail varied the coloration, although the fuselage, landing gear, and struts retained the familiar olive drab finish. A light blue color three years later replaced the olive drab on observation planes and on primary and basic trainers. However, more efficient maintenance and overhaul practices were possible through the standardization of one color for all fuselages; such a move also would simplify distribution of aircraft from the manufacturer's plant and the repair depot, eliminating concern over whether the plane was scheduled for use for training or tactical purposes.²⁷