A Beginner's Guide to Aircraft Identification

Features and Labeling to look for that help identify a particular aircraft.

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This guide has been developed to help an individual that has an interest in aviation and aviation history, but is relatively inexperienced in distinguishing one aircraft from another, other than they look different. The latter comes with experience and exposure, but struggles on where to begin?

This guide is intended to cover the basics and point out various resources that can aid in aircraft identification.

Registration Numbers

Like all licensed automobiles, almost every individual aircraft has a "registration" number. With this number, it is possible to find the make, model, manufacturer's serial number (think VIN number), and other relevant information. The challenge is finding and interpreting this registration number because they are different for civilian and military aircraft, and even different for various military branches of service (USAF, USN/USMC, Coast Guard). We'll take a specific look at the U.S. registration forms, and mention some of the foreign ones you might likely encounter.

U.S. Civil Registrations

U.S. law requires all aircraft operating in U.S. controlled airspace to "prominently" display their registration number on the fuselage or vertical tail. Over the years the size and location of this display has been from 3 inch to 12 inch high lettering. For the most part, 12 inch lettering is too large to be displayed anywhere other than the side of the fuselage.

U.S. civil registrations can appear almost anywhere on the aft fuselage or vertical tail. The FAA mandates the size of the lettering, which has changed over the years. In the 1960s and 1970s, billboard-size, 12 inch lettering was required and normally painted on the fuselage in order to fit on the aircraft. The 1980s on saw 3" lettering being approved and this offerred more locations to display the registration - and makes it harder to locate and read from the photos.

Often called an "N" number because all U.S. registered aircraft's license begins with "N". For example, valid "N" numbers can be any of the following: N1, N12, N123, N1234, N12345, N1A, N12A, etc., N1AB, N12AB, N123AB). In other words, any combination of numbers and letters up to but not to exceed 5 characters. There are a couple of exceptions as well, the letter "I" and "O" cannot be used as letters – they look too much like numbers. So, if you see a registration number that looks like "N1234O" or "N1234I", these are really N12340 and N12341.

The hard part about "N" numbers is that since about 1947, the FAA (the issuing authority) has allowed for the recycling of the numbers. So you might find in searching that N12PC is registered to a Boeing 737 commercial jet, but the image you are looking at is of a Piper J-3 Cub. Also, you may find registrations like NRxxx, NLxxx, NXxxx and NCxxx, which stood for Restricted, Limited, Experimental and Commercial. Though the requirement to used these prefix letter codes was dropped in the late 1940s, you will still find aircraft today displaying them – mostly with older general aviation, warbirds, and racing aircraft. In the FAA database, these prefixes can be ignored in looking up aircraft registrations.

REFERENCE: **FAA Aircraft Registration Database**

Golden Age (1920-1940) Aircraft

When the U.S. initially started registering civil aircraft (~1927) they issued a license to an aircraft that was permanent to the aircraft. By 1947, the FAA realized that they would run out of numbers based on this procedure and the number of aircraft being brought online. An aircraft was only required to display the "N" if it was used on international flights. The "C", "R", "X" prefixes could be displayed by themselves, so you might find a photo where the registration number is something like "C123".

Golden Age aircraft displayed their registration numbers in three locations: Bottom of the lower left wing, Top of the right wing and on the vertical stablizer. When all or part of the vertical stablizer is obscured in the photo, you might be able to obtain the rest of the identification from the other locations. Golden Age aircraft can have their identification display without the "NC" or "N" being displayed (I.e. "1234" or "C1234" might be the only identifier in some cases).

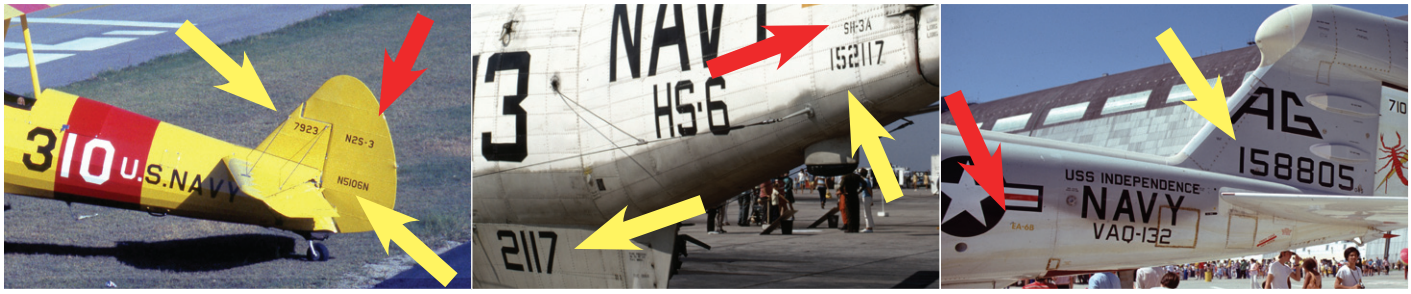
With Golden Age aircraft, the license number had to be displayed on the lower left wing and upper right wing as well as on the vertical tail. Sometimes it is possible to make out all or enough parts of the number on the lower wing where the tail is obscured in the photo.

Reference: [AAHS Golden Age Database]

U.S. Navy/U.S. Marine Corps Registration Numbers

Of all the registration numbers, those used by the U.S. Navy are the simplest and most logical. Starting in 1940, the navy started giving their aircraft sequential "Bureau Numbers" (or BuNos) starting with 0001 and currently running up to 170000+. This number is generally displayed on the vertical fin/rudder or on the aft fuselage often under the horizontal stabilizer. The Navy also helps out by frequently (almost always) displaying the aircraft model along with the BuNo.

Reference: [Joe Baughers USN/USMC BuNos],



Each U.S. Navy aircraft is assigned a Bureau Number (BuNo) that is applied to the aircraft (yellow arrows). They generally, but not always, have the aircraft model number painted on the aircraft as well (red arrows). These two identifiers are often located close together (center picture) but can be applied otherwise (right picture). On most modern (current) Navy aircraft, you will find these identifiers on the fuselage below the horizontal stablizer. Note: The N2S-3 (left picture) has both a civil registration, N5106N, and a military BuNo, 7923, because it is an ex-military warbird now in private hands. Capturing both of these registration numbers is important.

U.S. Air Force Numbers

Starting in 1922, USAAC/USAAF/USAF assigned aircraft registration numbers based on contract year and a sequential number: example - 33-253, is the 253 aircraft ordered in 1933. From 1927 forward, the registration number display has had numerous changes and modifications. Taking from Joe Baugher's description of this history is the following:

> The three-line fuselage data block was reduced in size to one-inch characters in 1932 and placed on the left hand side of the fuselage near the cockpit. This is known as the *Technical Data Block* (TDB). The data block not only displayed the full serial number, but also the exact model type and sometimes the aircraft's home base or the branch of the military with which it served. The TDB eventually became the only place on the aircraft where the serial number was actually displayed. It was often true that the only other sort of identification shown was a unit and

[1] All USAF aircraft have a datablock located on the leftside of the fuselage in the area of the cockpit. This clearly displays the aircraft type and serial number. [2 & 3] During WWII and the 1950s, the registration number was painted on the vertical tail in a combination of five or six digits. The first digit represented the year and the remaining the serial number (90028 = 1939 + 0028 and 322200= 1943 + 22200). [4] In the 1960s the AF change to a five digit code (2 + 3) where the first two digits are the year and the three digits are the last three digits of the serial number. This example shows a 1956 aircraft that has been painted to reflect the new style designation. [5] Up until the 1960s, aircraft still in service had ther registration number prefixed with a 0- indicating it was over 10 years old. [6] This example illustrates a typical problem in decyphering USAF serial numbers. AF 10195 could be either the year and four digits or a two digit year plus three sequence number. In this case we have the latter - 2010 plus 195.

base identification code displayed on both sides of the fuselage or on the fin. This made it difficult to identify the actual serial number of the aircraft, leading to a lot of confusion.

The TDB is still used today, although it is now called the Aircraft Data Legend, and by the early 1990s it was reduced in size to letters only 1/2 inch high and moved to a new position near the ground refueling receptacle. T.O 1-1-4 states that the TDB can be either on the fuselage side or near the ground refueling receptacle.

The lack of a readily-visible serial number on Army aircraft began to be a serious problem, and on October 28, 1941, shortly after the USAAF had been formed, an order was given that numbers of no less that 4 digits would be painted on the tail fin of all Army aircraft (where feasible) in a size large enough to be seen from at least 150 yards away. This was officially called the radio call number, but was almost universally known as the tail number. Since military aircraft were at that time not expected to last more than ten years, the first digit of the fiscal year number was omitted in the tail number as was the AC prefix and the hyphen. For example, Curtiss P-40B serial number 41-5205 had the tail number 15205 painted on its tail fin, Curtiss P-40K serial number 42-11125 had the tail number 211125 painted on the fin, and P-51B 42-106559 had 2106559 painted on the tail. Since the Army (later Air Force) used the last four digits of the tail number as a radio call sign, for short serial numbers (those less than 100), the tail number was expanded out to four digits by adding zeros in front of the sequence number. For example, 41-38 would have the tail number written as 1038.

Consequently, in most situations for a WWII-era aircraft where the tail number is visible, you can deduce the serial number simply by putting a dash after the first digit, prefixing a 4, and you automatically have the serial number. Unfortunately, there were many deviations from these rules--there are examples in which only the last 4 or 5 digits were painted on the tail, which makes identification of the aircraft particularly difficult.

In the 1950s, many airplanes left over from the WWII era were still in service, exceeding their expected service lives of less than 10 years. In order to avoid potential confusion with later aircraft given the same tail number, these older aircraft had the number zero and a dash added in front of the tail number to indicate that they were

over 10 years old. It was hoped that this would avoid confusion caused by duplication of tail numbers between two aircraft built over ten years apart. However, this was not always done, and it was not always possible uniquely to identify an aircraft by a knowledge of its tail number. This practice was eventually discontinued when people started referring to the number 0 as being a letter O, standing for Obsolete. The requirement for the 0- prefix was officially dropped on April 24, 1972.

In 1958, a regulation was promulgated which decreed that that the tail number should be expanded to a minimum of 5 digits in length. Sometimes the tail number was cut down in length to five digits by deliberately omitting both of the fiscal year digits--for example 64-14841 would be presented on the tail as 14841. Sometime, one or more of the first digits of the sequence number would also be omitted. This practice lead to a lot of confusion.

Camouflage began to reappear on USAF aircraft during the Vietnam War, and this led to a change in tail number presentation. The letters "AF" were added directly above the last two digits of the fiscal year, followed by the last three digits of the sequence number. The three-digit sequence number has a height of the AF and fiscal year letters combined and is sometimes called the "large" component of the tail number. For example, F-4E serial number 67-0288 had the tail number 67(small) 288 (large). This could of course lead to confusion, since aircraft 67-1288, 67-2288, etc would have exactly the same tail numbers as 67-0288 under this scheme. This would not ordinary cause a whole lot of difficulty unless of course some of these larger serial numbers also happened to be F-4Es (which they were not). Unfortunately, the system was not always consistent--for example F-4D serial number 66-0234 had a tail number that looks like this: 60(small) 234(large). It appears as if this number was obtained by omitting the first digit of the fiscal, and combining the remaining "6" with the "0234". Consequently, one often has to do a lot of educated guessing in order to derive the aircraft serial number from a knowledge of its tail number, and a knowledge of the aircraft type and sometimes even the version is required. I would appreciate hearing from anyone who has noted different tail number presentations on recent USAF aircraft.

However, Air Mobility Command and USAF Europe aircraft still display the previous format for the tail number, with all digits being the same size and the first digit being the last digit of the Fiscal Year and the remaining 4 digits being the last 4 digits of the sequence number. There is no AF displayed, just the name of the command a couple of feet above it. AMC regulations state that the tail number must be the last five digits of the serial number. If the serial number does not have five significant characters at the end, the last digit of the fiscal year becomes the first character, and zeroes are used to fill up the space to make five digits. This would make 58-0001 appear as 80001. The Technical Order refers to radio call numbers on the fin, the full serial number only appearing within the Aircraft Data Legend block. In those rare cases in which the Air Force purchased more than 10,000 aircraft in a single fiscal year (1964 was such a year), aircraft with serial numbers greater than 10,000 would have both digits of the fiscal year omitted--for example the tail number of 64-14840 is 14840, not 44840. An exception was the tail number of EC-130H serial number 73-1583, which had its tail number displayed as 731583, i.e., the full serial number without the hyphen.

Reference: **Joe Baugher's USAAC/USAAF/USAF registrations**

Coast Guard Registrations

Joe Baugher's site provides a history of USCG aircraft registrations. It says, in part:

On October 13, 1936, all Coast Guard aircraft ever acquired (including those already withdrawn from service or written off) were reserialled with a three-digit number prefixed with a V. On December 28, 1945, the V prefix was deleted. From Jan 1, 1951 onwards, a 1 prefix was added in front of the three-digit serial number. Beginning in the 1980s, serials were assigned in blocks for each type, usually with gaps between adjacent blocks.

For a brief time during the 1930s, Coast Guard seaplanes were assigned names, much like ships. This usage became so common that many official Coast Guard communications, and many press releases and newspaper stories, referred to the aircraft by name only. From 1933 to 1936 the aircraft were all named for stars. Their names appeared on each side of the nose of the aircraft and served as an accurate means of identification for the planes.

The Coast Guard acquired a lot of its aircraft as transfers from the Air Force or the Navy. Nearly all of the aircraft

Here we see examples of three styles of USCG registration numbers. Left is a 1930s era V- number, center a four digit number which represents an aircraft within a block of id's, and right a registration number prefixed by a "1" followed by the serial number. Confusing to say the least, but because there are not a lot of USCG aricraft, easily to quickly look up in the reference given.

that were transferred to the Coast Guard from the U.S. Navy or from the U.S. Air Force served with the Coast Guard under their original serial numbers, not being allocated a separate USCG serial number. However, the system was not always consistent, and sometimes aircraft transferred from the Navy or the Air Force were indeed assigned separate Coast Guard serials. Some aircraft types (e. g. the CASA C-212, the MH-65A, and the MH-90 used truncated construction numbers as their USCG serials, and displayed a truncated version of the MSN to produce a four-digit serial number. This system can be quite confusing, and unlike the USAF or the U.S. Navy, the Coast Guard serial numbers are not necessarily in the same sequence as they were ordered into service.

Refernece: Joe Baugher's USCG registrations

Foreign Aircraft Registrations

We'll not spend a lot of time on this subject, though there is the possibility that you may encounter foreign registered aircraft – both civil and military. On the civil side, every country has an assigned registration prefix that identifies the registration authority followed by the license "number". We emphasize number because many countries use an alphabetic code sequence in place of numbers. For example, Great Britain's civil aircraft have registration numbers like "G-ABCD" while France's are "F-ABCD". In most countries, the registration number assigned to an aircraft is permanent to that aircraft regardless of ownership. Below is a short list of some of the more common country code prefixes:

C-/CF-	Canada	RA-/CCCP-	Russian Federation
G-	Great Britain	XA-	Mexico Commercial
F-	France	XB-	Mexico Private
D-	Germany	XC-	Mexico Government
I-	Italy	VH-	Australia
OO-	Belgium	EC-	Spain
OY-	Denmark	EI-	Ireland

Here are a couple examples of different country registrations. From left to right an Aeromexico MD-80, XA-SFO, British Airways Concorde, G-B0AA, and an Air Canada L-1011, C-FTNG.

Foreign Military Registrations

These, too, vary from country to county. For example, the British military has used a system dating back to the before WWII of a registration number composed of two or three letters and three numbers (XM 123). These are normally displayed on the fuselage close leading edge of the horizontal tail or just underneath it. Germany Luftwaffe aircraft use a unit and aircraft numbering scheme that is painted on the side of the aircraft generally around the cockpit area. It is composed of two numbers, the "Iron Cross" logo, followed by two numbers. This is generally transcribed as 23+13 as an example.