

**Volume 3
Fall 2023**

New items have been acquired by the museum and the staff at the museum has been participating in many public events this fall. Check them out under “What’s New at the Museum”

Scientists have found that animals have been provided camouflage protection for thousands of years to protect them from predators. Insects that used debris for camouflage date back to the Cretaceous Period, between 145 and 66 million years ago.

In nature, there are a number of creatures that have taken the art of camouflage to its highest point. Can you spot them?

LEAF-TAILED GECKO



PINK PYGMY SEAHORSE



So when, in warfare, did humans start using camouflage to hide them from their enemy and who designed the patterns. In this issue of Boots, you will find the history of this “art” as well as what worked and what didn’t and the bizarre.

“Honor and Preserve Delaware’s Military Heritage”
www.delawaremilitarymuseum.org





WHAT'S NEW AT THE MUSEUM

By Ken Wiggins, Curator

JIM STAUFFER PATCH COLLECTION



Jim and Mimi Stauffer

Jim retired from the US Army after 31 years of service.

On Saturday September 9 the Delaware Military Museum was blessed with a gift from Jim Stauffer of his extensive patch collection. We are in the process of acquiring an appropriate case to display this unique collection. In the meantime we have plans to digitize this collection and make it available on line.

WASHINGTON MEMORIAL BRIDGE



The Delaware National Guard partnered with The Friends of The Furness Railroad District to kickoff the Washington Memorial Bridge Restoration Project in Wilmington that includes the veteran led team and local volunteers. The ceremony was supported and attended by the Delaware Military Heritage and Education Foundation. The ceremony celebrated the start of the effort to restore the historical structure of the bridge, the connection with the local community, and the Delaware National Guard.

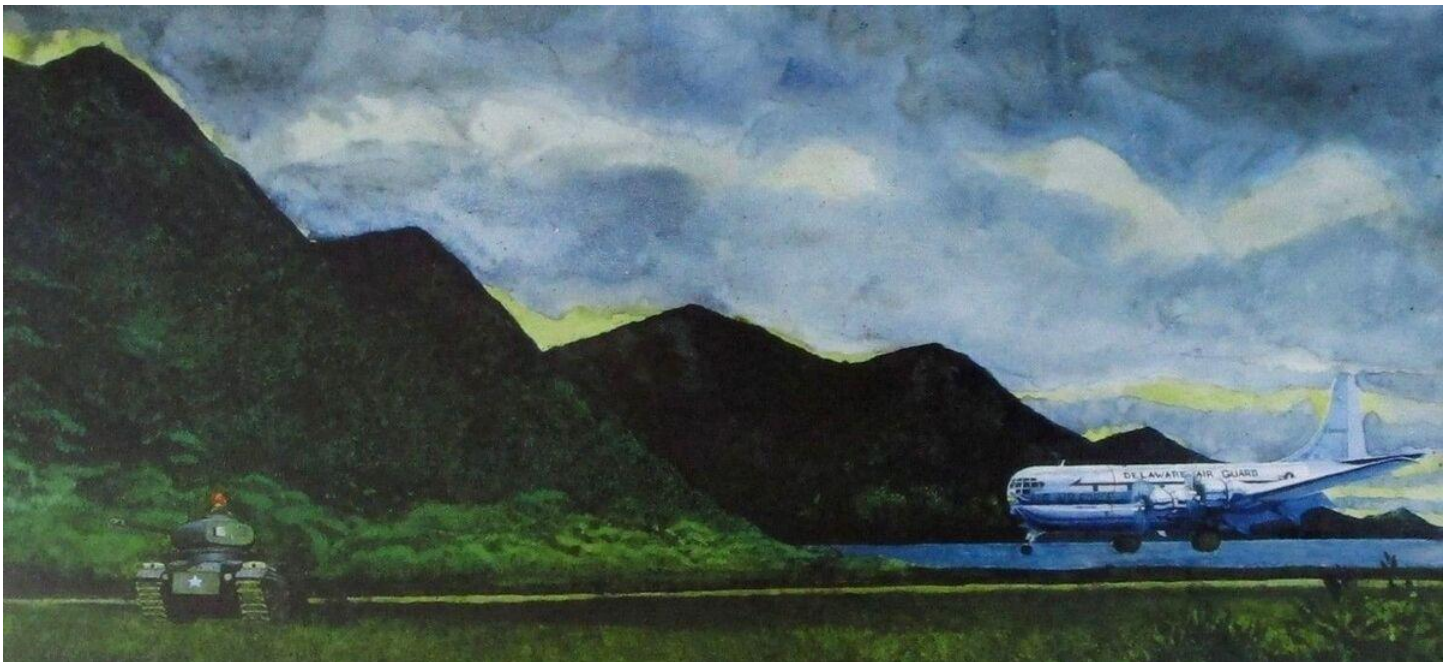
The bridge was originally built a century ago in 1922 and was designed to commemorate the veterans of World War I, many of whom marched to inaugurate the structure.

The project is working to restore the bridge's history, monumentality, architectural beauty, and most importantly the connection that exists with our military veterans, their families, and our Delaware community. The motto is: RESTORATION, EDUCATION, CELEBRATION!

AIRMAN JAMIE WYETH

The Museum possesses a Jamie Wyeth watercolor depicting a DE ANG C-97 landing at Da Nang in Vietnam. That painting will go on loan to the Biggs Museum until March when their Wyeth show will close.

On Veteran's Day at 1100 museum curator Ken Wiggins will be giving a presentation at the Biggs Museum discussing Jamie Wyeth's work for the Delaware Air Guard. The public is invited.



Editors Note: To attend this presentation at the Biggs Museum in Dover, please go to the following website to register.

<https://prod5.agileticketing.net/websales/pages/info.aspx?evtinfo=328242~03e13765-2c69-4555-9f98-2b887bde4199&epguid=fc1f4dd0-df82-42d8-a9c1-4ae1dcadab31&>



THE EVOLUTION OF CAMOUFLAGE

I am sure that in times past, Ice Age hunters used camouflage to hunt animals and it continued into modern times (*think safari clothes*). But when did it start to apply to military operations?

It is interesting to note that two British zoologists and an American painter were involved with creating camouflage for the military. In 1890, Sir Edward Poulton wrote a book on camouflage that was based on Darwin's study of animal coloration.

During the French and Indian Wars, **Rogers Rangers** from New Hampshire had uniforms of gray or green to let them blend into the northeast forests.



<https://www.military-history.org/feature/warrior-rogers-rangers.htm>

Now think about the British military, for example, especially during the Revolutionary War. They wore bright red uniforms – “*THE REDCOATS ARE COMING*”!!! Our regular Continental Army wore uniforms of Red, White and Blue. However, **marksmen** during that period would try to disguise themselves by wearing gray or a dun green like Morgan's Sharpshooters.



<https://www.shootingtimes.com/editorial/morgans-sharpshooters-revolutionary-war/457069>

It was the British Indian Army that converted over to khaki, because it was impossible to keep their white uniforms **White**.

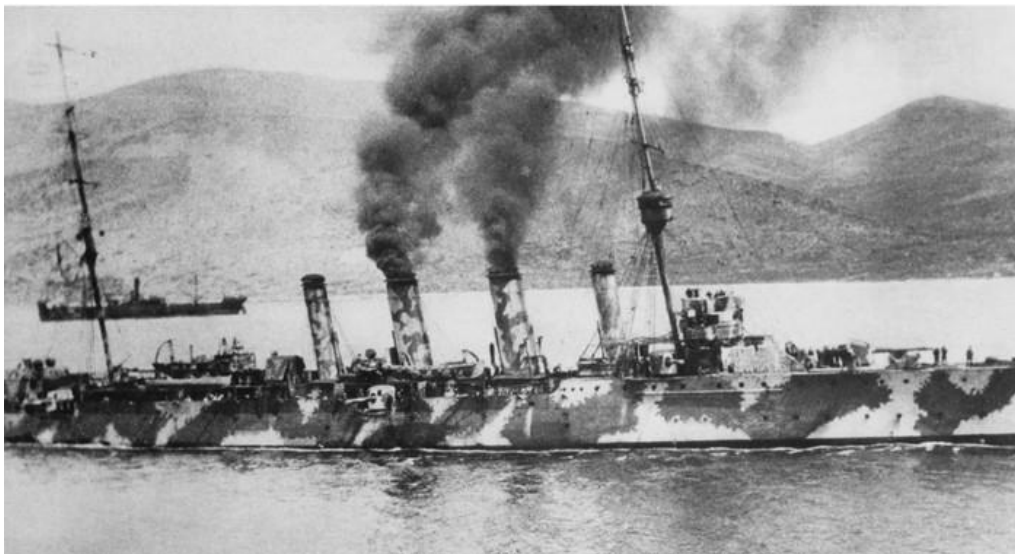
In 1898, snipers in the Spanish-American war would shoot at US troops because they had blue uniforms on. These troops quickly learned to rub mud on their uniforms.



<https://www.usatoday.com/story/news/nation-now/2014/08/01/history-camouflage-military-united-states/13485491/>

Up until the 20th Century, military units had bright uniforms to identify their units, especially when marching in formation **and warfare was basically close combat**. But new warfare demanded something different.....disguise for anything that was military - vehicles, weaponry, ships, airplanes and yes the soldiers.

The French were first to use it in 1914 by using netting with leaves to hide fortifications. Paper-Mache heads were created to be mounted on sticks so that the soldiers could raise them in trench warfare. They actually placed false trees on a battlefield that was hollow so that a soldier could hide inside of it. In 1917, the British decided to camouflage ships with a black and white zigzag scheme so that the enemy couldn't calculate its size, speed or distance. Whether it worked or not, is unknown.



A Royal Navy cruiser painted in dazzle camouflage in the Dardanelles, 1915. Original publication: The Illustrated War News, 26 May 1915. (Photo by Hulton Archive/Getty Images)

WORLD WAR I

During World War I, special camouflage units (*camoufleurs*) made up of artists and fabric designers were created and became part of the Women's Camouflage Reserve Corps of the National League for Women's Service.



<https://www.propper.com/blog/a-brief-history-of-us-military-camouflage-uniforms>

When needed, soldiers could adapt what they were wearing into something akin to a modern *ghillie* suit making it look like rocks or moss.



<https://www.propper.com/blog/a-brief-history-of-us-military-camouflage-uniforms>

WORLD WAR II

When World War II started, this became a topic again, on how to protect the troops and deceive the enemy. A Top-Secret "Ghost Army", also known as the 23rd Headquarters Special Troops, was created and had 82 officers and 1023 men, some of whom were artists, engineers and professional soldiers (including West Point graduates), along with draftees. Their mission was to simulate two Army divisions by using visual, radio and sonic deception. One of the visuals was inflatable tanks. It wasn't until 1996 that its records were declassified. More can be read about this unit using the following websites.

<https://www.nationalww2museum.org/visit/exhibits/traveling-exhibits/ghost-army-combat-con-artists-world-war-ii>

<https://worksthatwork.com/6/ghost-army>



Mock-up of an artillery piece

As for uniforms, new patterns being printed with mechanical machines on fabric was the norm, for snow, desert, jungle and forest and you knew who the enemy might be by the pattern they wore. But therein lay another problem! One camouflage pattern (HBT) looked like a German Waffen-SS uniform, resulting in deaths by friendly fire.

In the South Pacific, Marines were wearing camouflage uniforms that had a green and brown “frog” pattern that was designed by a California horticulturist, Norvell Gillespie. Airborne units in the Normandy landing did a DIY design by painting splotches on their jumpsuits. Some uniforms were two-sided, brown on one side and camouflage on the other, but proved to be too hot to wear.



<https://www.propper.com/blog/a-brief-history-of-us-military-camouflage-uniforms>

After WW II, into the 50's, camouflage uniforms were not worn but helmets and shelters still used the patterns and the pattern changed to twigs and leaves.

KOREA

The Korean War had our troops wearing uniforms that were surplus from WW II and basically, no camouflage uniforms were used....and during the winter of 1950, the uniforms they did have, were not adequate for the severe cold that occurred (*Battle of Chosin Reservoir*).



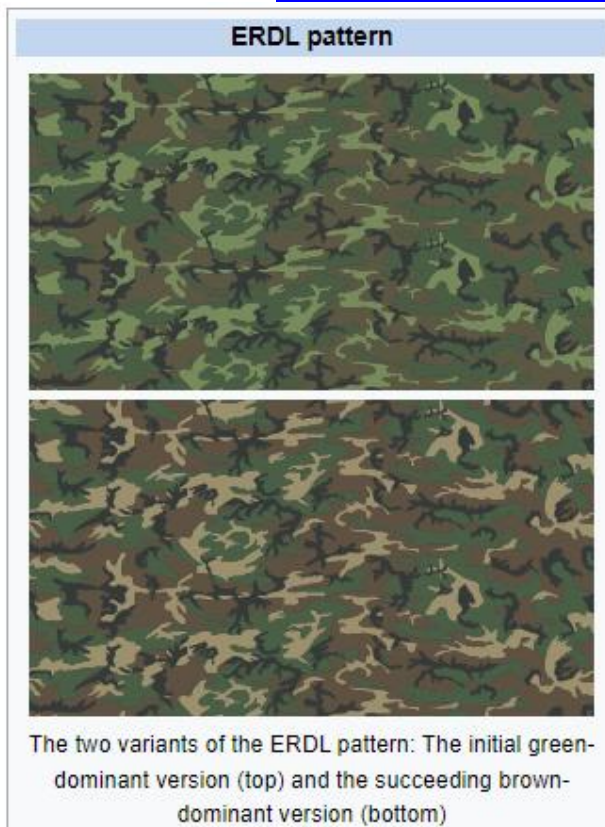
<https://www.globaltimes.cn/page/202106/1225568.shtml>

VIETNAM

Vietnam saw no new camouflage uniforms with the military preferring to wear solid green “boonie” uniforms. An exception to this was a pattern called “Tigerstripe” that had black horizontal stripes of a green background that went from dark to light green. Special ops teams wore the Tigerstripe both on an off duty, but then a non-Tigerstripe pattern was developed in 1967, that simulated an early woodland style leaf pattern (ERDL).



<https://thehundreds.com/blogs/content/just-design-choice-brief-history-tigerstripe-camo>



https://en.wikipedia.org/wiki/ERDL_pattern

POST-VIETNAM

A new BDU, M81, was developed that had a woodland pattern and was first used during the Grenada Invasion (1983) and subsequently used during the 1989 invasion of Panama. It was so popular that 24 countries adopted it and modified it according to their needs.

GRENADA



<https://militaryarmament.tumblr.com/post/173647750333/the-us-invasion-of-grenada-a-1983-united>

PANAMA



U.S. Army soldiers universally wore the M81 woodland camo pattern during 1989's *Operation Just Cause*. (U.S. Army Photo)

GULF WARS

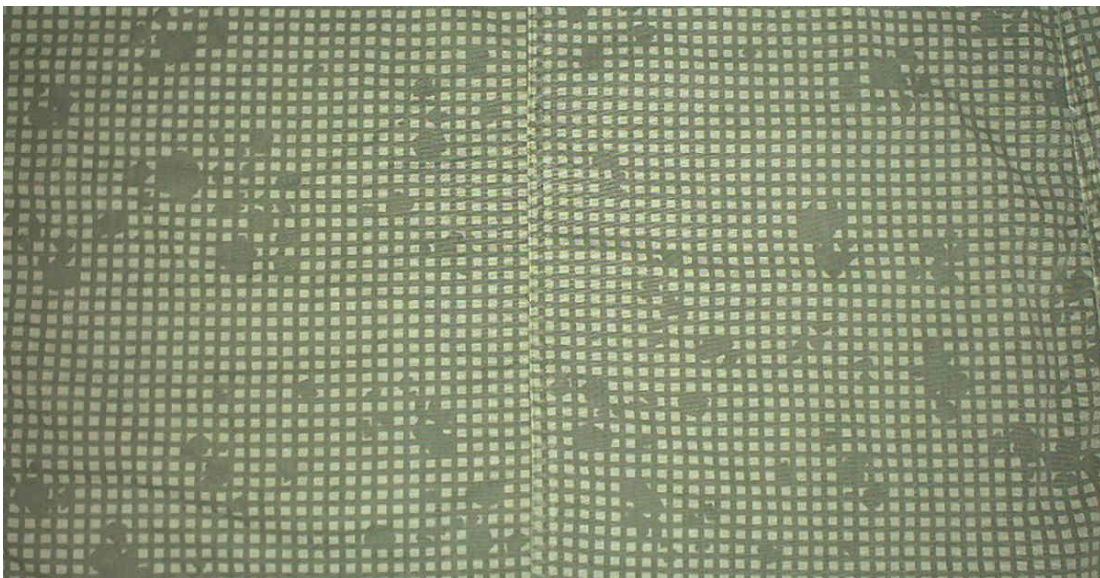
Everything changed starting with the Gulf wars when a 6-color, desert shaded uniform, called “chocolate chip”, started to be worn (DBDU – Desert Battle Dress Uniform). It was dark brown and had gray and black and other colors in the pattern, so that the troops could blend in with the surrounding terrain. It gave way to a new blend of new subdued colors of tan, brown and light khaki green.



https://military-history.fandom.com/wiki/Desert_Battle_Dress_Uniform

But the DBDU had its flaws! It did not blend into the terrain because the design contrasted too much. Also parts of it heated up too much (the dark areas) because of the desert heat and it was very expensive to manufacturer so a new 3 color uniform was developed – the DCU.

There was even a nighttime DCU camouflage pattern with little B&W squares to obstruct night vision devices.



<https://www.propper.com/blog/a-brief-history-of-us-military-camouflage-uniforms>

IRAQ AND AFGHANISTAN

These wars brought about a new camo pattern called Universal Camouflage Pattern (UCP). Now patterns were generated via computers instead of fabric designers and artists. The colors are a mix of green, tan and gray and are supposed to be a universal pattern for any type of environment BUT it had a flaw that was an optical effect known as "isoluminance". Isoluminance causes the human eye to interpret the pattern and color as a single mass and didn't camouflage our military.

The cost of this flaw - \$5 billion dollars!

Today our military wear a standard design called Operational Camouflage Pattern (OCP) that is muted green, beige and dark brown (Scorpio W2) It is supposed to be a great replacement but only time will tell.



<https://www.propper.com/blog/a-brief-history-of-us-military-camouflage-uniforms>

AIRCRAFT

The first use of camouflage on aircraft was in WW I and since then, painting the planes in a camouflage color depends upon its use and the conflict.

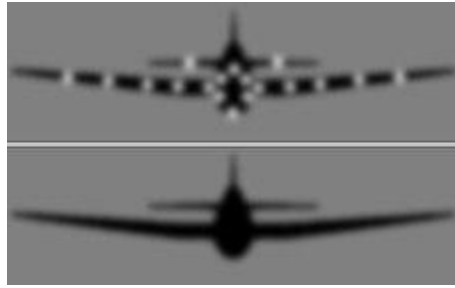
Aircraft are viewed from different directions – looking up (match the sky) and looking down (match the ground – and are painted accordingly. Heavy bombers use counter shading because they are flying straight and level but even then, the painting can be in various shades especially non-reflective matte finishes.

Night flying military aircraft can be black, dark grey, dark green or any other dark color that is needed and is usually applied to the undercarriage. Think about search lights used by the Nazi's when we were bombing Germany and planes that did not want to be illuminated. Planes can use a matte paint but that can impede their performance.

Then you had the issue of camouflage planes sitting stationary on the ground – sand (desert), blue/grey (sea) and green/brown (forest). This was fine while they were sitting on the ground but as soon as they started to move, things changed. The US Air Force decided on a solid neutral color.

Today's high speed aircraft don't need camouflage but they do need paints that will help them absorb electromagnetic radiation for heat seeking missiles. Stealth aircraft use a whole new type of camouflage that is black with small graphite pellets that helps them disperse heat.

ACTIVE CAMOUFLAGE



YEHUDI LIGHTS

During WW II, German U-boats could spot an Allied aircraft at a distance because it was a black dot against the sky and could dive quickly, to avoid being bombed. The US Navy, in 1943, had a secret experiment called “*Yehudi*” that was a counter-illumination technique with forward facing sealed beam lights mounted under the leading wing end on a TBM-3D-Avenger and around its engine cowlings. The lights could be adjusted to match the background of the sky and it was 2 miles before a surface ship could identify it as an aircraft. Improvement in radar detection stopped it from being put into production until Vietnam. *Editor’s note:* There is more info about Yehudi lights on a Russian website than on any other. <https://en.topwar.ru/172734-sistema-aktivnogo-svetovogo-kamufljazha-yehudi-lights-ssha.html>



https://en.wikipedia.org/wiki/Yehudi_lights

During the Vietnam War, the military launched a research project called “Compass Ghost”. It was to use an enhanced *Yehudi* light system on the F4 Phantoms but on different areas of the aircraft. The plane was also colored blue and gray but it was just a research project.



Aircraft and how they were camouflaged provided some interesting photos.



Disruptively camouflaged **A-7D Corsairs** on a disruptively painted concrete surface, Thailand, 1972
USAF photo



A-10C Warthog has been rolled out of the paint barn at Davis-Monthan Air Force.

<https://www.thedrive.com/the-war-zone/39496/a-10-warthog-emerges-painted-in-green-and-tan-camouflage>

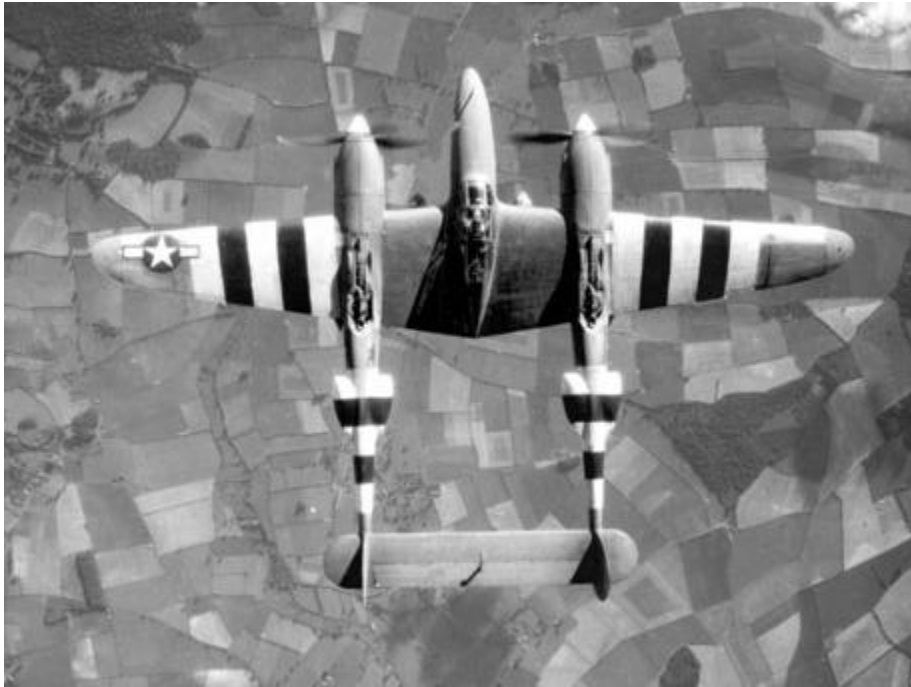
F-4G - Vietnam



https://commons.wikimedia.org/wiki/File:F-4G_VF-213_camouflaged_Vietnam_1966.jpg



Underside of **A-10 Thunderbolt II** with false canopy painted in, as if the plane was the right way up
U.S. Air Force photo/Master Sgt. William Greer



A **Lockheed F-5 Lightning** (P-38 Lightning reconnaissance version) with invasion stripes used so that allied planes would not be mistaken for the enemy during the 1944 Allied invasion of France.

http://www.maxwell.af.mil/au/afhra/photo_galleries/merhar/Photos/01097628_047.jpg (archive)

F-16



https://www.autoevolution.com/news/f-16-fighting-falcon-with-enemy-camo-is-almost-invisible-over-nevada-179315.html#aqal_1

F-15EX



<https://www.airandspaceforces.com/app/uploads/2022/04/F15EX.jpg>

F-22



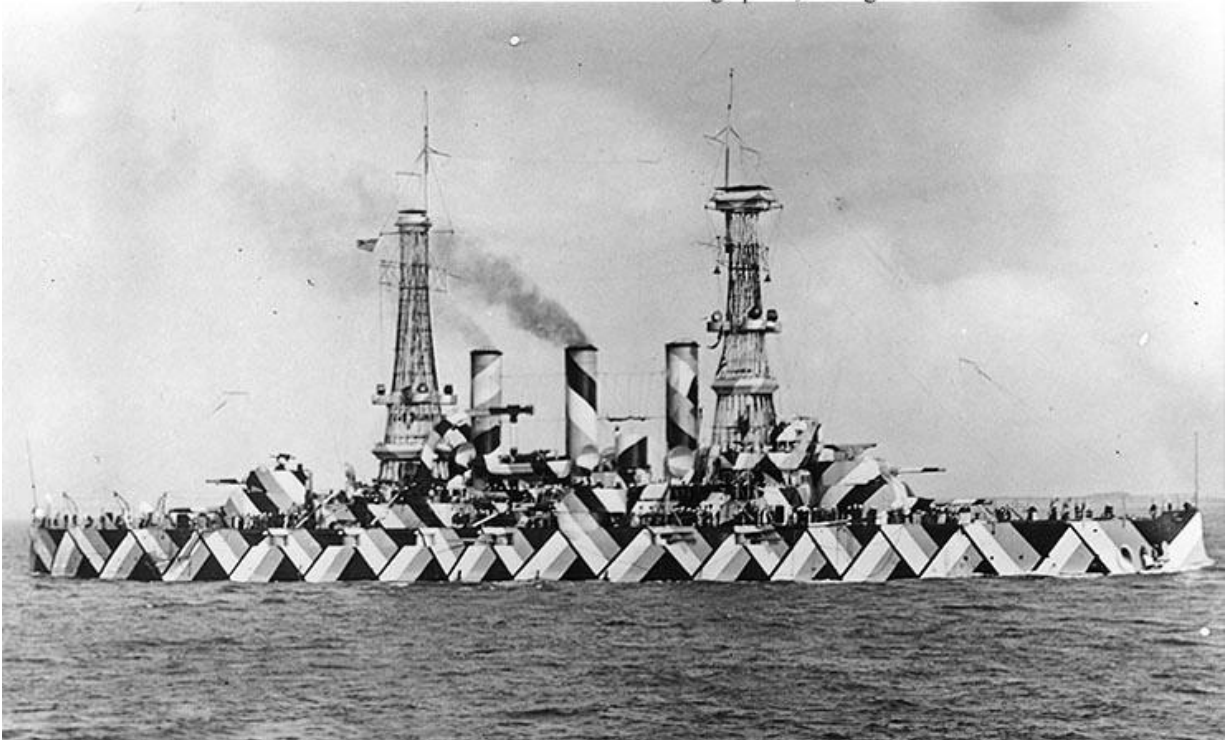
<https://www.military.com/equipment/f-22-raptor>

In summary – paint slows the speed of the aircraft and while it was useful in the past, today's combat aircraft are flying so fast they are on the enemy, way before they are seen from the ground. As for cargo and helicopters, they will be painted any color that is needed to protect them.

SHIPS

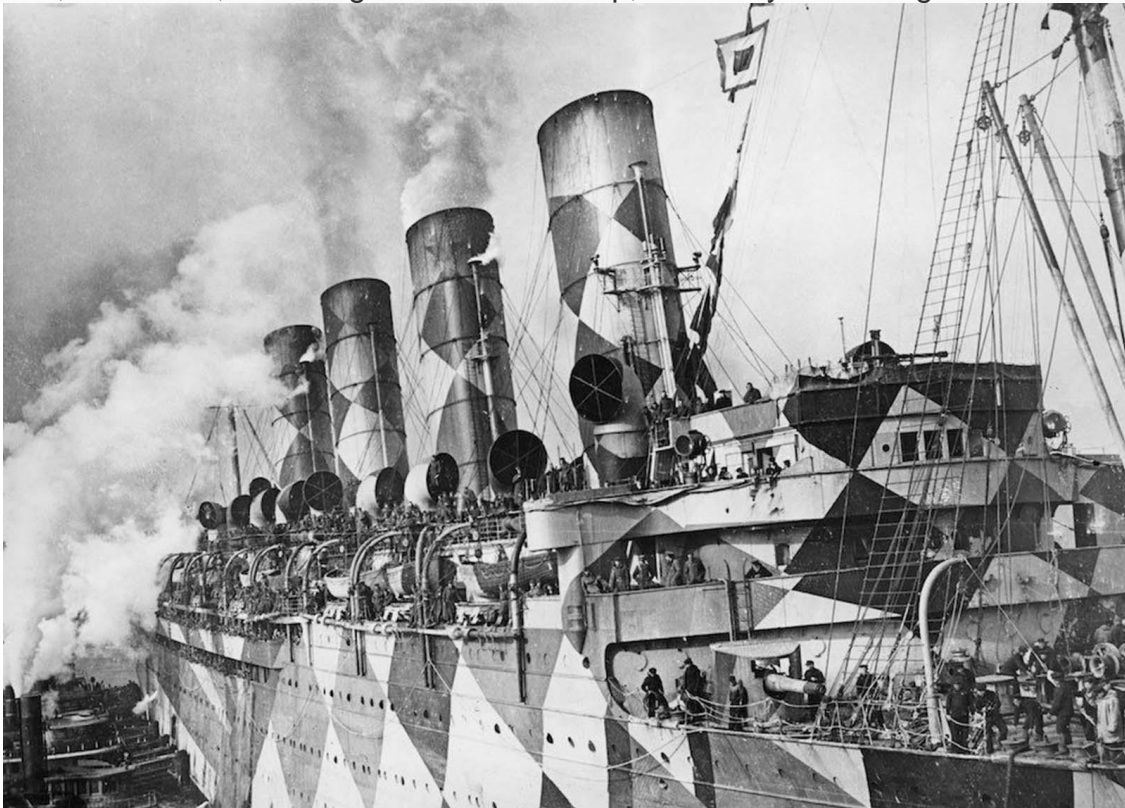
World War I had some experimental camouflage paint designs that would raise some eyebrows today.

Photo # NH 101208 USS Nebraska in camouflage paint, during World War I



<https://news.usni.org/2013/03/01/camouflaged-ships-an-illustrated-history#p-carousel-2088>

The troopship USS Leviathan in a 'dazzle' camouflage pattern. The Leviathan was formerly the SS Vaterland, a German, Hamburg America Line ship, seized by the U.S. government in 1917.



<https://rarehistoricalphotos.com/dazzle-camouflage-photographs-world-war-i/>

During WW II (1941-1945), The US Navy had a camouflage database for paint schemes called "Measures". They range from **Measure 1** to **Measure 33**. Here are some examples of how they were painted. *Editors note: Not too many pictures in color.*

Measure 1 has all horizontal surfaces painted Dark Gray while all vertical surfaces are painted Light Gray.



USS Louisville (CA-28) in MS1 - Dark Gray System

https://www.shipcamouflage.com/measure_1.htm

Measure 12 applied to aircraft carriers. From the waterline to the hanger deck, the carrier was painted a sea blue. Above the hanger deck the ship was painted Ocean Gray or Haze Gray depending upon the area.



U.S.S. CV-3 "Saratoga" in Puget Sound, 7 September 1944. 

<https://naval-encyclopedia.com/ww2/us/aircraft-carriers.php>

Measure 21 had all vertical surfaces a Navy Blue and all horizontal surfaces a Deck Blue



USS Drayton (DD-366) also known as the “Blue Beetle”

<https://www.hullnumber.com/DD-366>

Measure 31 had a pattern of Haze Gray, Ocean Gray and Black



USS Yarnall (DD-541)

https://www.shipcamouflage.com/measure_31.htm

Measure 32 had a pattern of Light Gray and Ocean Gray



USS Francisco (CA-38)

https://www.shipcamouflage.com/measure_33.htm

Photo # 80-G-294131 "Murderers' Row" -- USS Wasp & other carriers in Ulithi atoll, December 1944



<https://news.usni.org/2013/03/01/camouflaged-ships-an-illustrated-history>

In the South Pacific, there were no standard design or color for landing craft, PT Boats, Tank Landing Ship and other inshore ships so they were painted a tropic green color or green and brown – basically whatever color paint could be found. BuShips in 1943 tried to standardize the colors (using green combinations to go along with the blue gray for surface warships) but it took too long so amphibious ships were to be painted a dark tropic green with “tiger stripes” in a lighter green color.

But after WW II, US Naval ships were basically painted gray. But some ships are now being built with variations of camouflage paint. But one thing for sure – US Submarines will be black because it reflects little light and it is always camouflaged whether on the surface or submerged.

USS DELAWARE (SSN-791)





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2nd Saturday of the month

12:00 – 3:00

Program – 1:00 PM

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