

Olive Drab

By Steve Zaloga

A look at getting the 'right' colour by Steve Zaloga. First published in Military Modelling magazine back in 2002.

In recent issues of this magazine, there has been discussion about the best paint to use to depict US World War II Olive Drab. I have been digging through the archives over the past few years to try to solve several of the questions related to this subject, so I thought an article on the subject would be in order.

What its not

Before describing what Olive Drab is, I'd like to describe what its not. Probably the most common mistake I see at model shows is the tendency to paint US World War II tanks in various shades of dark green. This stems from a lot of artwork that depicts US armoured vehicles in dark green shades. The old Tamiya kits from the 1970s such as their Stuart, M4A3 Sherman, and others, are one of the causes for this misconception. But this mistake goes back much further.

Many of the old references such as the Profile publications, and even newer publications showing US World War II armour show it some form of dark green. A popular variant of this mistake is that pre-war US armour of the 1930s was painted in dark green, but that this changed at the beginning of the war to Olive Drab. For example, one of the standard old references on US armour colours, Terence Wise's venerable *American Military Camouflage and Markings 1939-1945* from Almark in 1973 shows an M3 Lee painted in Dark Green 320. (*I was one of the people personally responsible for that mistake in the Almark book. KJ.*) Many popular hobby references such as the older Squadron Signal books also show US armour in a dark green colour. To make a long story short, Dark Green and Dark Olive Green is inappropriate for US armoured vehicles in World War II (or before World War II for that matter). The colour of US vehicles was Olive Drab, not Olive Green.



The history of Olive Drab

Olive Drab has been used on US Ordnance since before The First World War. Some accounts claim that it originates with commercial Pullman railroad colours. This may be, though I have never seen an official reference to any such connection. Many countries adopted an Olive Drab colour as a standard military shade, as it represents a compromise between earth colours and foliage colours in temperate climates.

Olive Drab was established as the standard colour for tactical vehicles in Bulletin No. 90 of the General HQ of the American Expeditionary Force (AEF) on 11th November, 1918 a practice which would remain in place through the end of World War II. The World War I Quartermaster Olive Drab was described by Charles Lemons, curator of the Patton Museum at Fort Knox, as the colour of pig slop, that is a very muddy olive brown. The colour for this Olive Drab was established by the Manual for the Quartermaster Corps, 1917, Par. 3964. The pigments used to mix Olive Drab were very simple: black and ochre.

What was lacking was a reliable colour specification that could be issued to industry for the formulation of commercial paint, so in 1920, the Army released Specification 3-1 which depicted Olive Drab as one of 24 standard colours for US Army use. The Spec. 3-1 Olive Drab was a darker shade of Olive Drab than the wartime Quartermaster colour, and would remain the standard for Olive Drab through World War II and beyond. Although the paint formulation changed several times during this period, the basic colour specification did not. Through this entire period, US Army armoured vehicles officially were finished in the same shade of lustreless (flat) Olive Drab.

Problems cropped up during the inter-war years for a variety of reasons. Due to its matt finish, the lustreless Olive Drab scuffed easily, looked beat up, and in a peacetime army, officers dont like scruffy-looking equipment. Army administrative vehicles were finished in gloss Olive Drab, which certainly looked a lot smarter than the dull and dirty tactical vehicles. As a result, in many units, the practice began of either painting the tanks in gloss or semi-gloss Olive Drab, or of coating them with spar varnish or polishes to get a more acceptable peacetime finish. The second problem with the paint used in the mid-1930s was that it had a very long drying time, and it was difficult to use to obtain an even finish. Vehicles that had patches of paint applied looked sloppy as the new paint didnt blend well with the old paint which was not durable enough and tended to fade.

Due to pressure from the spit-and-polish crowd, in 1935, the Ordnance Department began studying a long oil (enamel) paint which was faster drying and because of its finish, resisted scuffing and wear. In November 1937, the Ordnance recommended that this new formulation (R1XS58A) be adopted as substitute standard for peacetime, while the normal lustreless formulation be retained for wartime use. This Olive Drab appeared darker to the human eye than the lustreless Olive Drab even though they both shared the same colour specification. Gloss finishes of dark colour paints generally have a darker appearance than flat finishes of the same colour and the gloss tends to enhance the colour saturation, making the colour more vivid.

With war clouds gathering in Europe, the Army began to take steps to move towards a wartime footing. On 14th July 1940, the Adjutant General shifted all responsibility for protective coloration and

camouflage to the Corps of Engineers, and on 18th July shifted decisions on the paint formulation and procurement (but not the colours) to the Quartermaster Corps. In view of the likelihood of US combat involvement, on 12th October 1940, the Quartermaster Corps issued orders that all new material under procurement be painted with a new lustreless enamel under the tentative specification ES No. 474, the colour being Colour No. 22 from the Colour Card Supplement to US Army Specification No. 3-1 (also known as Quartermaster Colour No. 22 or QM Colour 22.) In other words, all new armoured vehicles procured starting in fiscal year 1941 would be painted (again) in lustreless Olive Drab of the same colour as established in 1920. This revised paint formulation had a lighter appearance to the human eye than the gloss Olive Drab used on tanks produced in the late 1930s, even though they nominally matched the same colour specification.



As a related issue, it is worth a brief mention about what was happening in the US Air Force at the time. There are a lot of myths about the relationship between US Army Air Forces (USAAF) paint and US Army Ground Forces (AGF) paint during World War II and the reason for this description will become evident later. Although the USAAF started using Olive Drab Colour No. 22 Olive Drab on their aircraft, it was felt that this colour was too light. As a result, starting in 1932, the USAAF began to adopt a dark Olive Drab, that is,

darker than the AGF Olive Drab. This dark Olive Drab was first known as Colour Number 31 for the water based camouflage paints. In October 1940, it was standardised as Dark Olive Drab 41 for dopes, enamels, and lacquers.

A number of changes occurred to army Olive Drab paint during the war, though not to the colour itself. According to Ordnance records, a shortage of colour charts in 1942 led to some manufacturers using paint that did not precisely match the Specification 3-1. These vehicles were accepted for service in spite of this cosmetic problem. The problem was brought under control later in 1942 by wider dissemination of the colour specifications and stricter enforcement of Government standards. Scarcity of cadmium pigment led to reformulation of paints in the early war years, though these paints were supposed to stick with the colour established in the 1920 Spec. 3-1. To confuse matters, the Corps of Engineers adopted a parallel set of colour numbers during the war, Olive Drab being called Colour No. 9. This was the same colour as Quartermaster Colour No. 22 of Spec. 3-1.

Custodianship for paint shifted back to Ordnance on 21st October 1942, and an effort was begun to modernize the old 1920 Spec. 3-1. The old specifications listed only 24 colours, all with gloss finish, while the services were now interested in specifying lustreless, semi-gloss, and gloss finishes. In

addition, the various branches of the armed forces were ordering 175 different colours of paints, most based on commercial paints without Government specifications. So the services tried to reduce the number of colours they were employing. On 16th March 1943, Specification 3-1F/Colour Card Supplement (Rev.1) to was recommended by Ordnance which established 72 standard colours and the three basic finishes. This became official on 21st April 1943.

As part of this process, in January 1943, Major A.I. Totten Jr. of the Army Resources and Production Division proposed to consolidate the two shades of Olive Drab in use at the time, the USAAF dark Olive Drab and the AGF Olive Drab, into a new colour Army/Navy (AN) 319, that was the same colour as the AGF Olive Drab. The Air Force went a bit nuts over this, as in 1942, they had developed a new paint formulation of their dark Olive Drab that would not show up well on infrared film. The AGF Olive Drab paint did not have this characteristic. As a result, the USAAF studiously avoided use of the new 319 Olive Drab. This issue may seem irrelevant to tank modellers. But it is an important issue since it helps demolish a popular myth amongst some modellers and vehicle restorers. A legend has developed over the years that the light 319 Olive Drab was also adopted by the AGF, so that after 1943, the Army began painting their tanks and tactical vehicles in a lighter shade of Olive Drab. This was not the case, as the aeronautical 319 Olive Drab was identical in colour to standard AGF Olive Drab, and was only light in comparison to the USAAF dark Olive Drab.

Indeed, in talking with people who have had frequent contact with actual vehicles and vehicle parts, like Charles Lemons of the Patton Museum, the Olive Drab paint used on new tanks later in the war was darker than that seen in 1942-43, not lighter. Although the colour specification never changed, the paint formulation did, not only including a change in pigment, but improvements in the paint itself which made them more durable and less subject to fading.

Another source of confusion over the precise shade of Olive Drab occurred after the war. When the new Federal Specification TT-C-595 was first issued on 12th January 1950, Olive Drab was designated as 3412. When the new Federal Standard (FS) was adopted on 1st March 1956, lustreless Olive Drab became (FS) 34087. The gloss and semi-gloss versions were respectively 14087 and 24087. At this stage, the reader might well ask what all this mumbo-jumbo means to somebody modelling World War II tanks? The problem is that the colour FS 34087 changed when FS 595A was released in 1968. The colour shown as 34087 was lighter and browner than the lustreless Olive Drab used to that date, and didnt even match the supposedly identical gloss and semi-gloss 14087 and 24087. And guess what? Model paint companies, and many modellers never noticed the change, since the hobby didnt really pick up steam until the late 1960s, by which time the new Olive Drab 34087 was shown in the contemporary Federal Standards.

As a result, many modellers, and paint manufacturers, although appreciating that the wartime lustreless Olive Drab corresponded to the post-war FS 34087, didnt appreciate that there was more than one post-war FS 34087. I have colour chips from wartime sources, 1956, 1960 (pre FS 595A) and from the first edition of FS-595A, and the difference in the later colour is obvious when the chips are compared. The Army was not amused by this slip-up, as the gloss Olive Drab on administrative vehicles was different (and darker) than the flat Olive Drab on tactical vehicles. As a result, in Change 7 of FS 595A in 1984, the-4087 colours were deleted and replaced. However, in the 1990s under FS 595B, they were revived with all three-4087 colours standardized as a single colour. However, the old FS14087

became 14084 and the old 34087 became 34088. In other words, extreme care should be taken when assessing the shade of wartime Olive Drab based on the various post-FS-595 colour specs!

Hallucination, alien visitation, and other forms of advanced research

Anyone who has been around the hobby long enough has heard plenty of old wives tales about wartime painting based on supposition, hearsay, myth, speculation, and the ingestion of ample quantities of beer and pretzels. This is certainly more common among aircraft modellers than armour modellers, because its pretty hard to weave a good yarn about something as dull and boring as Olive Drab paint. A typical yarn is something along the lines of: my neighbour Fritz was a 12 year-old volunteer in the Eva Braun Blonde Assault Battalion and he told me that they painted their King Tiger tanks with lozenge shaped patches of *Luftwaffe* purple brown RLM 069, etc., etc. The more common tale follows the pattern, My neighbour (uncle, granddad, etc.,) was in the Army during the War and he said...



I am extremely sceptical of any accounts of precise paint shades recalled a half century after the war. Both my dad and grandfather were in the US Army during the war and, like most soldiers, the last thing on their minds was the colour of the military equipment they were using. They can tell you in vivid detail how the chow tasted, but couldnt care less about paint colours. I have never interviewed a GI who had any interest or knowledge about camouflage paint, and all that I have spoken to didnt have the technical vocabulary to describe the colour. Your average person does not distinguish the subtle differences represented by terms like Khaki Drab, Olive Drab, Field Drab, Olive Green, and dark brown. Most tankers I have interviewed dont remember the colour their tank was painted, and those few that had some recollection usually described it as some dark colour or dark brown.

Another popular myth follows the pattern. Well I saw a TV show, (colour photo, etc.,) that showed the colour to be... This is complete bunk. I worked in the TV business for a number of years, and I can assure you that the image you see on your TV set has little to do with the original object that was filmed. Nearly all TV documentaries using World War II colour footage are created using video tape that was transferred from colour film. I have worked with honest-to-goodness original WW II colour film, and the condition and colour quality of the film varied considerably. To begin with, wartime colour film was notoriously subject to colour shifting due to chemical instability. Secondly, if extreme care with colour balance is not taken during the film-video transfer process, changes result in the colours. During the editing of the tape, further colour variations are introduced unless colour balance is precisely set. And finally, the same situation applies when the master video edit tape is dubbed for dissemination. This says nothing about commercial VHS copies which are often several generations removed from the original film stock. Many of the same sorts of problems exist with colour photos. By the time they are printed in a book or magazine, they are several generations removed from the original, and with all the

care in the world they will differ from the original. The colour photos reproduced here are for general reference only and are not intended for colour matching!

Another popular modellers yarn is, Well, when I was in the army (or at an army base, etc., etc.,) when we painted our vehicles there was a lot of difference between one can of paint and another so any shade of Olive Drab is acceptable... There is a measure of truth in this, but more often than not it is an excuse by a lazy modeller who cant be bothered trying to get the colour right. There is no evidence about variation in paint beyond hearsay, and much of this discussion confuses variation in fresh paint with the variation evident when fresh paint is applied over faded paint. During the war, the US Army had inspectors at the paint plants whose job was to ensure that colour specifications were followed. There were only a handful of plants which manufactured Olive Drab paint for Ordnance. No doubt there was some variation in the colour, but it was not likely to have been too great.



Variation in colour is more likely to come from fading, poor mixing, or poor application than pigment variation. Tanks are not repainted when they are brand new; they are painted after being in service for a while and needing repairs. So, by the time new paint is applied fresh out of the can, the original paint on the tank is likely to have faded and weathered. Contrary to modellers lore, US tankers seldom had any paint on hand to satisfy their artistic whims. Unlike the German army, the US Army seldom issued camouflage paint to tactical units like tank battalions. Painting was done by ordnance battalions during depot maintenance, and

camouflage painting was done by camouflage engineer battalions. I am not a stickler for exact paint matching, but modest variations in wartime paint is no excuse for modellers to use any old green or brown shade of paint they have on the shelf.

Modelling wartime Olive Drab

This stupefying account of the intricacies of paint and colour begs the obvious question: So what do I paint my World War II US Army tank model? Now that we have some handle on the historical issues, its time to test paint. I spayed a number of common Olive Drab hobby paints and compared them under natural sunlight, fluorescent light, and incandescent light, to see how they matched up to the original colour chips I have of the original TT-C-595 colour 3412/FS 34087. The results are summarised in the accompanying chart.

Basically, the only colour that comes close to the wartime colour is the Tamiya acrylic XF62, with the Poly Scale acrylic a distant second. Two colours fell for the old FS-595A snag, Gunze Sangyo and Model Master which are too light and vivid for wartime Olive Drab. The two Model Master paints intended to represent AN 613 dark Olive Drab are both too grey for the army colour. Humbrol 155 is too green for US Olive Drab.

Having matched the colours to actual colour chips, how about use on models? There has been a long running argument between two contending camps, who I shall dub the scientists versus the artists. The scientists argue that a colour is a colour is a colour, and that hobby paint should exactly match the official colour chip. The artists argue that the use of an exact match creates an unrealistic looking model due to scale effect. A full-size vehicle painted in Olive Drab viewed from some distance away will appear to be a lighter colour than a small chip examined at close quarters. I tend to side with the artists over the scientists on this issue, as I think that models painted in precise matches of dark colours like Olive Drab look unrealistically dark.

To test this theory, I primed and painted a 2 foot x 3 foot panel of Plexiglas (Perspex) using Tamiya Olive Drab. This is not intended to be scientific proof, but to provide at least some rough evidence on the controversy. After establishing a proper white balance for the camera, I photographed the test panel from a distance of 15 feet using a high-resolution digital camera (Nikon Coolpix 995) under direct sunlight on a day with low humidity. I then transferred the image to my computer along with the Olive Drab colour chips and the various hobby paint colour chips. Using Adobe Photoshop for measuring the colours, I compared the sample panel with the colour chips. This supported the scale effect argument. The Olive Drab on the panel when photographed from a distance had the appearance of a colour about 15-17% lighter than the Olive Drab colour chip, and with slightly less colour saturation. This effect changes with lighting conditions, the angle of the panel to the sun, reflectivity, etc.

Added to this issue is the matter of paint fading and weathering effects. Dark coloured paints fade. Remember that many US tanks deployed in Normandy in 1944 had been manufactured and painted one or two years before and had been sitting out in the sun for most of that time. To make matters worse, the colour fades in different ways depending on the paint formulation. For example, wartime US Olive Drab tended to fade towards the ochre as will be evident to anyone who saw a lot of wartime vehicles. Likewise, the changed paint formulations of the post-war years led to different fading effects with some of the paint fading towards a greyer shade, and some to a reddish-purplish tinge, evident to anyone who has visited Aberdeen Proving Ground over the years! Weathering also tends to lighten the colour since most dust and dirt is lighter in colour than Olive Drab.

From a modelling standpoint, these issues are further complicated by popular painting methods, especially washes. If a modeller begins with a close match to wartime Olive Drab like the Tamiya colour, and then applies a wash of raw umber, the resulting colour is going to be darker than wartime Olive Drab.

At this point, it becomes a matter of artistic judgement. To begin with, it depends on the subject. If you are modelling a mid-production M4A1 built in mid-1943 and depicted in the markings of a tank from late 1944, the colour is apt to be more faded than a M4A3E2 Jumbo from the same time frame which was manufactured in February 1944 and so less subject to fading.

My recommendation is to start with a reliable colour match and then tinker with it to get suitable results. If you are planning to use a very dark wash, plan on starting with a lighter shade of Olive Drab. I like Tamiya Olive Drab, but when applying it to models of wartime US armoured vehicles, I always lighten it with dark yellow (Panzer Yellow) since Olive Drab is by its nature ochre mixed with black. I would strongly recommend avoiding the use of white to lighten Olive Drab since this tends to make it greyer when lightening it, robbing it of chroma/colour saturation. Ironically, scale effect can be obtained instantly by using the colours that have been slightly mismatched to the FS-595 standard. The Poly Scale colour closely matched the test panel right out of the bottle, and the Model Air was close. The Gunze Sangyo acrylic and Model Master enamel appear to have been matched to the mistaken FS-595A Olive Drab. This brings them closed to scale effect Olive Drab, though a bit too vivid due to greater colour saturation, but this can be reduced with a bit of weathering. In the chart below, Ive included some notes on suitability for models in the table here, but this is only my opinion and does not purport to be some sort of grand scientific validation.

Acknowledgements

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Polly Scale 505370



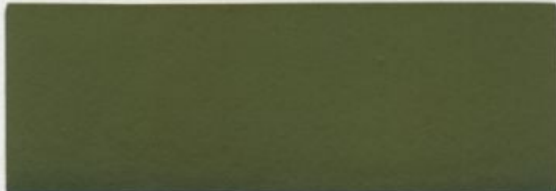
Model Air (Vallejo) 043



Tamiya XF-62



Gunze Sangyo H52



Model Master 4728



Model Master (613)



Model Master 1711



Model Master 2050 (613)

Model Paint	TT-C-595/FS-595 match	Suitability for models
Acrylics		
Poly Scale 505370	Lighter than wartime colour	OK for wartime OD
Model Air (Vallejo) 043	Lighter, greyer than wartime colour	OK for wartime OD
Tamiya XF-62	Best match for wartime colour	Should be lightened a bit with ochre
Gunze Sangyo H52	Matches 1968 FS-595A	OK for wartime OD, a bit vivid
Model Master 4728	Very light, too grey-green	Too light
Model Master (613)	Lighter, greyer than wartime colour	Too grey
Enamels		
Model Master 1711	Close to 1968 FS-595A	OK for wartime OD, a bit vivid
Model Master 2050 (613)	Lighter, greyer than wartime colour	Too grey
Humbrol 155	Lighter, greener than wartime colour	Too green

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