


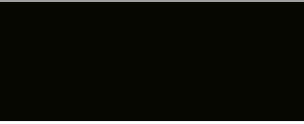



## Soviet Digital Color Chips, VVS, 1935-47

The following table is a digital representation of the various aviation lacquers of the 1930-50 period. It is expressed with an ENORMOUS caveat when examining this chart-- *it is intended for representative purposes ONLY*. It is *not* currently possible to guarantee the exact color or shade of anything drawn on a computer monitor. These samples are to be regarded only as a general familiarization, particularly for those new to the subject, and should *not* be accepted 'as such' with the value shown on your screen.

Here is an updated page showing the latest in VVS color chip research. The known lacquers are now shown by family, and include some newly discovered paints. This 2019 Update incorporates new material published by researcher Mikhail Orlov.

## A-x Family Primers *for internal use*

These primers were intended for use in the cockpit and engine bay. Both pipes/ducting/tubes and the corresponding flight instruments or gauges were color coded as noted below. The 'F' designation indicated a formulation of the lacquer which could solve in alcohol. The finish upon application was matte.

	A-6, A-6F ' <i>yellow</i> ' (fuel lines & system)		A-12 ' <i>black</i> ' (air system)
	A-7, A-7F ' <i>green</i> ' (cooling system)		A-13, A-13F ' <i>red</i> ' (anti-fire system)
	A-8, A-8F ' <i>brown</i> ' (oil system)		A-14, A-14F ' <i>steel</i> ' (cockpit finish)
	A-9, A-9F ' <i>dark blue</i> ' (supercharger system)		
	A-10, A-10F ' <i>blue</i> ' (oxygen system)		

## ALG Family Primers *for internal or external use*

These paints were durable multi-purpose surface primers which could be sanded when dry. The finish upon application was matte.

	ALG-1		ALG-5 (1)
?	ALG-2 (described as 'yellow')	?	138A (2)

1. After 1943 the NKAP recommended ALG-5 as the preferred cockpit finish for all aircraft.
2. Primer 138A is newly described by researcher Orlov. Its appearance is known only from the corroded chips of the 1948 *Albom Nakrosok*, and therefore the author regards the appearance as entirely unreliable. No sample of a brick red colored primer such as this has yet been found on a period airframe to the author's knowledge.

## AEh-x Family Lacquers *for external use*





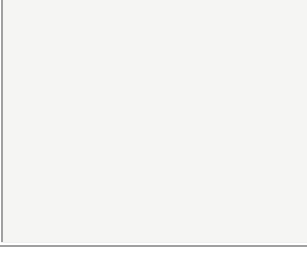
These were cellulose acetate finishes with a high potassium content to reduce flammability. They were most suitable for fabric surfaces, either as a dope or surface covering. The finish upon application was semi-gloss.

	AEh-4 'blue'		AEh-10 'dark grey'
?	AEh-7 ("protective", unknown, possibly green)		AEh-11 'black'
	AEh-8 'grey' (2)		AEh-14 'light blue'
	AEh-9 'light grey'		AEh-15 'dark green' (1)

1. AEh-15 was issued in a full gloss finish only. Both VIAM and the NKAP strongly recommended the use of this paint for hydroplane aviation to cover the hull surfaces, inside and out.
2. Lacquer AEh-8 is shown in the 1948 *Album Nakrasok* as a bright aluminum finish. Its name is indeed given as "AEh-8 Aluminum". AEh-8 is **not** described this way in documents prior to 1948-- it is specifically called "**Grey**". The author is certain that the appearance of AEh-8 was changed after the war and by the time of inclusion in the *Album*. Many samples exist of AEh-8 from SBs in Spain and Finland; all are grey in color as shown in the relevant chip above.

## All (A2) Family Lacquers *for external use*

These were cellulose acetate butyrate lacquers with a rather complex chemistry (possibly including zinc chloride, which is mentioned periodically). These finishes were renowned for their superior durability and reduced flammability. They were most suitable for wooden or fabric surfaces, either as a dope or surface covering, and could be used over metal surfaces (in which case priming with ALG was recommended). The finish upon application was satin.

	All Light Blue (1)		All Brown
	All Green (or <i>Yellow-Green</i> ) (7)		All Red (5)
?	All Light Brown (or <i>Sand Brown</i> ) (2)		All White (5)

	All Dark Green (3)		All Black
	All Aluminium (4)	?	All Light Grey (6)

1. The NKAP recommended the use of All Lt Blue as a cockpit finish, "where desirable". The archaeological record shows that this was done often during 1938-41, and in particular aircraft built at Factory No 1 show the wide-spread use of this paint as an over-all cockpit finish.

2. All Lt Brown is also called "Sand Brown" (*pesochnii*) in various documents; it is unclear which was the preferred nomenclature. Alas, the single example I had of this paint turned out-- following chemical tests-- to be a highly contaminated sample of ALG-1. As a result, I do not currently know the correct appearance of this color.

3. The camouflage evaluation documents produced by the Scientific-Test Institute of Technical Engineering (NIIT), from which we obtain the description of this paint, are rather confusing. A *dark green*, *black green* and *black* color are all mentioned, and in such a way that it quite unclear whether the documents are referencing one paint, two or three?

4. All Aluminum was the standard dope used on fabric covered control surfaces before, right through, and even after the war. It was equally widely used over other fabric areas, and the Government indicated that this paint could be used in cockpit interiors. Remarkably, Polikarpov biplanes built in Moscow show evidence of this unusual finish. The use of 'satin' to describe this paint's surface is meaningless-- the finish was so bright and reflective that even "extra gloss" is inadequate to describe it.

5. All Red and, later, White were the standard colors employed for Soviet national star insignia.









6. Reference to this finish was only recently uncovered, and its appearance is unknown.
7. Some researchers maintain that this paint was officially known as *Yellow-Green*, as identified during the NIIT's colouration experiments.

Researcher Orlov has added many descriptive names to the All paint system. These indeed can be seen in period documents, but in a somewhat haphazard manner. If we compare the material from the NIIT to that used by the NKAP, UVVS and other State organs, the descriptive names do not match. Mr Orlov has located the descriptive names "All Tobacco", "All Cream", "All Light Green", "All Orange" and repeats the often quoted "All Protective". This author has never seen any reference to the latter, *All Protective*, in any documentation and is thus skeptical about its use. It seems highly probable that these descriptive names were just that: descriptive. The exact description used might therefore have changed over time, or even might have been informal. For example, surely *All Pesochnij* (Light Brown) was the same paint as All Cream. There was, after all, only one such color in the All range. Moreover, of what possible use was an orange color for external camouflage? And what color is "tobacco", exactly? A sort-of red brown... if so, is this All Brown from the NIIT?

The most debated color, of course, is All Green. We know what this paint looks like (through copious evidence), but no one can agree what to call it. To the NIIT this was "Yellow-Green", or later just "Green". "Light Green" was known and used by them, and was clearly defined as another color. Orlov suggests that this paint was called "All Protective". Other researchers have insisted that this paint is in fact "All Light Green" as described by VIAM. The author can only say that at the time of this update that we just don't know. The paint was of the All family (proved by chemical testing) and was green; ergo *All Green* seems to fit.

## AMT-x Family Lacquers *for external use*

AMT were organic (linseed based) alkyd finishes with an iron-calcium catalyst. They were suitable for use over any material, and even without the employment of a surface primer. The finish upon application was satin, although with exposure to the elements that became semi-matte fairly quickly. Upon very close inspection, this family of paint appears to be irregular and slightly "bumpy", contributing to its matte appearance.





	AMT-4 ' <i>green</i> '		AMT-12 ' <i>dark grey</i> '
	AMT-6 ' <i>black</i> '		AMT-1 ' <i>brown</i> ' (1)
	AMT-7 ' <i>blue</i> '		AMT-1 ' <i>brown</i> ' (alternate version)
	AMT-11 ' <i>grey-blue</i> '		AMT-16 ' <i>blue-grey</i> '

1. It is not known why AMT-1 appeared in two distinct color shades. Pe-2 *p/n* 341-23 wore both versions, the darker of which had been partly applied over the lighter in a manner so as to replicate the camouflage pattern following field work.



## Ax-m Family Lacquers *for external use*

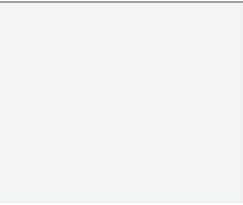
These paints were alkyd enamel finishes specifically intended for use on metal surfaces, with or without priming. Despite having been ordered in 1941 along with AMT paints, there is no physical evidence of the use of Ax-m lacquers until the autumn of 1943, following the issue of the NKAP's new painting recommendations. The finish upon application was satin.

	A-21m ' <i>light brown</i> ' (1)		A-32m ' <i>dark grey</i> '
	A-24m ' <i>green</i> '	?	A-26m ' <i>black</i> ' (3)
	A-28m ' <i>blue</i> ' (2)		

1. The official use of *light brown* to describe this color is inexplicable.
2. There is no known physical evidence showing the use of A-28m during the GPW. All wartime airframes which have been found to date wearing Ax-m finishes on the upper surfaces were painted with AMT-7 Blue underside. It is currently thought that A-28m came into service use during 1947, and is confirmed from 1948. The updated color swatch is based upon VIAM's documented comments regarding the 'greenish' tint to the finish (and the causes of this), and from new samples taken from un-restored Il-10 airframes in the Chinese AF Museum collection.
3. A-26m Black was ordered in 1941, but no evidence exists for its use as a camouflage finish and no samples of it are known. The *Album Vozdushnyikh Vintov* 1943 (Catalogue of Aviation Propellers) suggests its use on various propellers, from which of course archaeological paint samples are not routinely collected!

## Other Various Finishes with Aviation Use

A few other paints in use on VVS aircraft from the 1930s.

	MK-6, MK-6F ' <i>noch</i> ' (1)		AE-10 ' <i>grey</i> '
	MK-7, MK-7F ' <i>winter</i> ' (2)		3B ' <i>protective</i> '
	AE-8 ' <i>gloss white</i> '		Common Industrial Primer (nomenclature unknown) (3)

1. MK-6 *night* was developed for use on long-range aviation (ADD) bombers. It was found to cause inordinate drag and was replaced by AMT-6 from 1943. The 'F' version was alcohol soluble.
2. MK-7 was the standard white finish adopted so enthusiastically during the first winter (1941-42) of the war. Disastrously, it was found to cause excessive drag, and was gradually abandoned during 1942. The 'F' version was alcohol soluble.
3. Not a single paint, but rather a species of commonly used industrial primers with similar chemistry and coloration. These were widely observed on various sub-components delivered to aviation factories: steel tubes, pressed sheet items like instrument panels, armor pieces, mounting brackets and such like.

## The Number Colors

During the period roughly from 1935 to 1939, the Soviet government decided that it would like to "standardize" aircraft coloration at the various factories. This was a rather ironic pronouncement from a collection of Ministries who could not help but to stick their respective oars into any such discussion and *authorize* or *deny* the use of outdated paints; but such is the nature of large bureaucracies. The idea seems to have been to identify ten, or so, colors as a standard palette, whereupon the government could simply refer to "color # 3" and be sure that a yellow-green surface finish would result.

But, however often one encounters these numbered colors, I could not figure out to which color these numbers referred. It was a vexation. Happily, researcher S Kuznetsov has found out for us; and we must all be grateful at long last for that discovery. Therefore, the color numbers are described according to the following chart.

Lacquer # 1	Sand Brown
Lacquer # 2	Grey
Lacquer # 3	Yellow-Green
Lacquer # 4	<i>unknown</i>
Lacquer # 5	Dark Green
Lacquer # 6	Black
Lacquer # 7	White

It is interesting, and telling, that no specific lacquer type, family nor formulation is mentioned. It would appear that a standard palette is what the government had in mind, however vague it might be given the number of available paints on hand which fit the various descriptions. Moreover, the specification of a sand brown color is curious, in that no such color is known to have appeared on any VVS aircraft during the period in question. And lacquer #4? It is mentioned, so this one is still a mystery.