FLIGHTLINE GRAPHICS
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An introduction to using Paint Masks

Forward

These instructions should give you a good grounding in the correct way to use your paint masks. Please read them carefully and if you have any questions please contact me before you start using them!

In this document you find guidance information on:

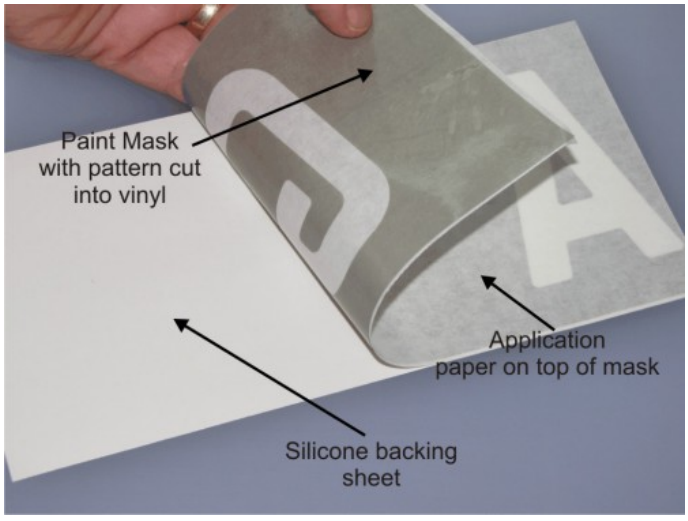
1. What are Paint Masks.

Paint masks are produced from a type of adhesive backed vinyl which has been specially manufactured for use as a paint mask. The low deposit adhesive has a low to medium tack grip which is ideal for full size and model applications.

The mask is supplied on a silicone backing sheet on the adhesive side of the vinyl, and a paper or clear plastic “application tape” on top of the mask.

The application tape holds all elements of the mask in registration until it has been applied to the target surface. When it has been located the application tape is removed before painting.

A paper application sheet is used for some masks, but increasingly they will be supplied with clear application “film” which has several advantages (see later for explanations).



The masks can be used to apply detail to the model as long as the detail is not too fine. Single coloured markings such as serial numbers and aircraft letters are the easiest masks to use and the most critical thing to worry about is applying the mask in the correct position.

Markings requiring more than one colour such as some insignia are produced by layering up the colours one on top of each other using a separate mask for each colour. The order of application is often important so they are labelled to indicate the order of use.

When layers of colour are involved it is necessary to overlay masks in registration to each other so the painted image builds up correctly. This is achieved by using a selection of simple registration systems which will be explained later.

2. How to look after your Paint Masks

Paint Masks are supplied in board backed envelopes or, for larger models, a pizza style box. It is highly recommended you store the masks in the delivery package inside your home away from fluctuating temperatures. If a mask has been rolled over to fit in the box it is better to remove the mask and store it flat. Normal ambient temperatures are fine but you should avoid storage close to windows, heating, or air conditioning systems. Rapidly fluctuating temperatures can affect the adhesive and also the potential to affect registration of multi layered masks. You should never stack items on top of masks as they are likely to deform.

Store your masks in this way and you will easily get 2 years or more trouble free storage without any issues. It is best however to use the masks as soom as you receive them for best results.

3. Best practice when painting

Please, please follow your paint manufacturers instructions when spraying and observe the recommended drying and re-application times. Some paints need a fine abrasion before application of subsequent coats and will be critical, particularly if the previous colour has been applied for some time.

Flightline Graphics recommends good quality paints such as epoxy or enamel paint. Also popular are automotive paints due to their availability but be sure you know what you are doing when using automotive paints as there are so many different types of paint chemistry in use around the World it is difficult to offer specific guidance here, but this generic advice is highly relevant to all.

Whatever you paint your model with, be sure that all the various paints you use: primers, base colours, top colours, and clear coats, ensure they are all compatible with each other and their adhesion to each other is known to be good. Just because a paint covers a primer without reaction does not mean the paint is compatible. There may be no adhesion between the primer and colour which will result in delimitation of the top colour at a later date.

The single biggest mistake modellers make is purchasing a brand of primer that is different to the main colour. Unless the manufacturer has told you these paints are compatible it is essential to check the paints for compatibility. **Just because a top coat covers the base colour does not mean they are compatible!**

Swapping brands of paint can have disastrous results that may not be initially visible!

Many wartime aircraft were given flat (or matt) finishes. A common mistake by model builders is to use flat paints from the base colour all the way to the final clear coat. While in principle there is nothing wrong with this practice we strongly recommend when using spray masks a satin to gloss paints to improve the adhesion of spray masks. Why?? Well if you look at flat paint under a microscope it actually looks like a mountain range so that light hitting the paint is scattered in all directions, reducing reflections making it look dull. The bigger the mountains the flatter the paint. Some flat paints are that heavily loaded with flattening powder standard masking tape and spray masks won't adhere!

So use flat paints if you insist, but expect difficulty getting the masks to adhere, and for paint to creep under the film. As stated, we strongly recommend satin to gloss paints and finishing off with a flat clear coat which will give the model a nice uniform hue, and that all essential flat finish!

If you work in a cold, dusty, or windy environment then you are unlikely to achieve good results so ensure good housekeeping is maintained during the entire process and apply the masks at room temperature, ideally 18° - 28°C. If you have to heat your workshop, don't start work as soon as the air temperature is comfortable, wait until the model and spray masks have also warmed up and at a stable temperature.

Best results are obtained when the masks are applied and immediately followed by spraying. Masks should be removed as soon as it is possible to do so. If you are concerned about poor adhesion of your top coat paint to the undercoat, warming the paint mask with a domestic hair drier on the lowest heat setting will ease the removal.

If using Klass-Kote please note there are some comments in the instructions specific to you when using this type of paint.

Use a small modelling airbrush or automotive touch up gun, and avoid brush application which can have issues. Be sure you know how to spray the paint you have purchased as the finish for insignia needs to be sprayed as thinly as possible to achieve the colour. Use the same brand of paint you used to spray the main colour scheme on your model.

Always prepare a test panel as you build your model and prepare it for paint as you prepare your model. Test your paints on the test panel away from the model! If you have ABS and glass cloth on your model you should prepare test pieces of both.

Apply the primer to your test panel, wait for it to fully dry and check it has keyed to the base material(s). Do this by applying masking tapes with different strength adhesive. You should get no primer lifting until the very highest tack masking tapes are used, and ideally nothing should lift at all.

Apply the next coat of paint which will typically be the main colours of the model. Again, after it has dried check the paint has correctly adhered by testing with progressively tackier masking tape. Poor adhesion will show itself very quickly. You should conduct these tests for all paint layers on the test panel and not you model!!!

In the picture opposite a silver paint (from shaker cans) had been used over the primer before the colour was applied. The idea was to weather the paint back to the silver to give the impression of flaking paint. While taking the first mask off the top colour peeled away from the model.

This is an extreme example, but it demonstrates what can happen if experiments are conducted on the model with paints that don't work together!
This picture was not simulated, it actually happened to a customer!

4. Labelling Conventions.

Markings made up of more than one colour layer will typically have identification letters cut into the mask to help you identify them. Typically the coding will look something like this:

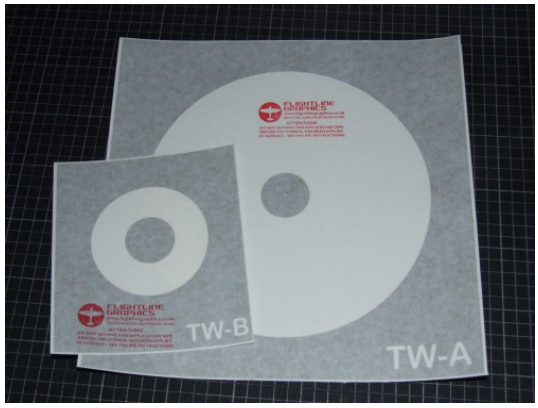
Code	Meaning
FU	**Fu**selage Insignia
SQ	**Sq**uadron or rank marks on the fuselage
SN	**S**erial **N**umber
TW	**T**op **W**ing insignia
BW	**B**ottom **W**ing Insignia
FF	**F**in **F**lash markings

Following this code there will be a hyphen followed by a letter indicating the order of application.

For example most RAF WWII aircraft had a standard type B roundel on the top wing which is made up of 2 colours — blue & red.

This will therefore have 2 masks, the first blue colour mask will be labelled **TW-A**, and the second mask for the inner red circle will be labelled **TW-B**.

In the example opposite the masks are labelled following this convention.



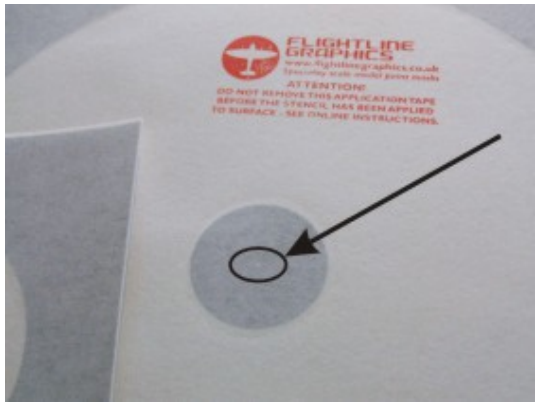
Some customers may have requested the colours to be built in a particular order to meet individual requirements and the coding convention will reflect that request where possible. I strongly recommend you become familiar with the codes on all your masks before use. In rare situations some masks may be further marked with a "**/R"** or "**/L"** to indicate left or right side of the model (as viewed from behind).

5. Registration marks

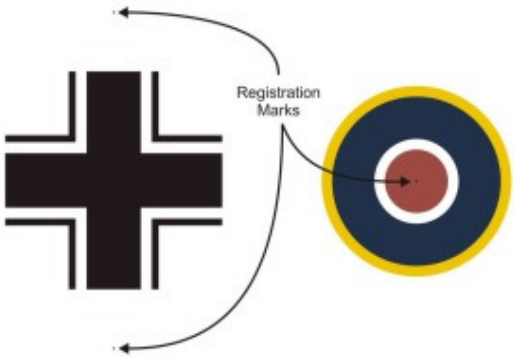
As mentioned previously, multi-coloured insignia will need some way of ensuring consecutive overlays of paint masks to retain their registration so the image builds up correctly.

One way this is achieved is by means of a registration hole cut into the mask at manufacture.

These holes are repeated on all colour layers in exactly the same place. These holes are the registration marks!



Single registration marks
The only insignia with one registration mark will be those that are made from ever decreasing circles. RAF roundels are probably the most common example where one registration hole is located in the centre of each roundel mask to fix the position of every circle in the sequence.



Multiple registration marks.
For all other insignia it is necessary to have a minimum of 2 registration marks to provide accurate registration of the colours. Insignia such as the German Balkenkreuz are typical examples where you will see 2 registration marks.

In some circumstances registration dots are not particularly helpful when it comes to registration of smaller markings that have a fine tolerances for alignment such as a drop shadow on some nose art or fin text. These are supplied without any registration marks deliberately so as to encourage manual alignment.

For these markings it is advised that you apply the first mask as normal following the general guidance. For the second & subsequent colours remove the silicone backing completely and overlay the mask using your eye through the clear application film to see the mask overlays correctly. It's fine for the mask to touch the surface and then "pop" it back off again to try again. If the film is in contact with the surface it is advised not to try sliding or dragging the mask over the surface to achieve alignment unless it is literally just resting on the surface. Once located the mask can be rubbed down for painting. Where there is potential for this to not go exactly to plan first time we typically supply spares with the order.

6. Registration Points.

To position masks onto your model it is necessary to find a way to accurately locate the registration marks on the paint masks in the same location as the previous mask. To achieve this you can use registration “dots” or “pins” to mark these spots on the model. There are advantages and disadvantages for both systems but first let’s see how they work!

6.1 Registration dots.

Registration dots can be used for all occasions and are preferred when dealing with small insignia and markings that are positioned over compound curves.

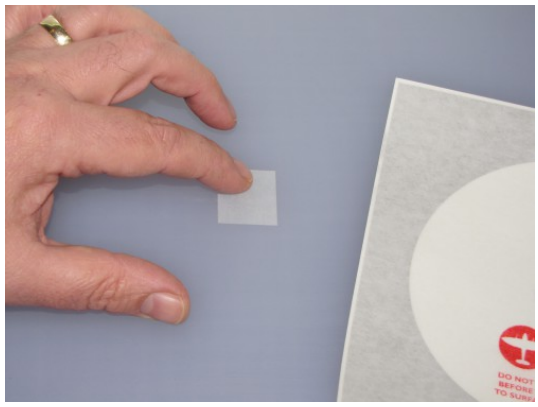
In this simulation we will set up the registration position for the mask opposite which is the first mask in a series to make a roundel. At the centre is the registration hole mounted on a disk of mask. Without that disk of mask in the centre there would be nowhere to put the registration hole so I refer to these pieces as “registration disks”.

The easiest way to make the registration dot on the model is to roughly work out the approximate position where the registration dot needs to be.

In the example opposite, assuming the mask is in the correct position, I put a finger over the registration disk at the centre and then slide out the mask while holding the same position with my finger.

I then introduce a small piece of masking tape under my finger where it will be required. You don't have to be too accurate about this provided the tape is big enough to cover the position where the dot will be required.

Very Important: Where the smallest circle in the middle of a roundel has a small diameter it is necessary to ensure that the size of the tape used is smaller than the diameter of the last mask. Please adjust the size of the tape used to ensure this fit. Greater care will be needed to mark the centre of the roundel in these cases.

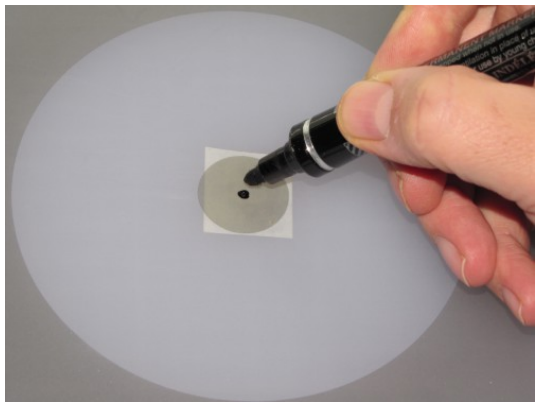


The first mask can be fixed and the application tape removed.

Take care when peeling back the application tape to ensure the registration disk in the centre is transferred to the surface over the masking tape.

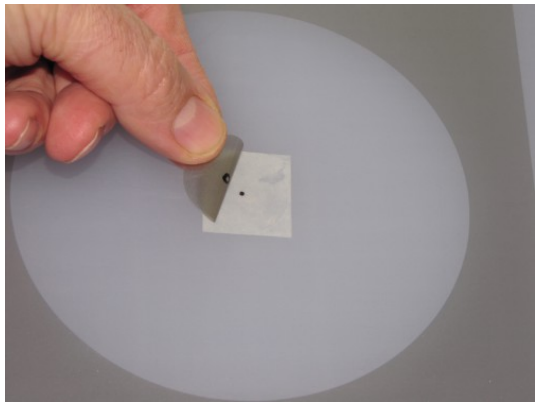
Note: more instructions are available on the correct procedure to follow when applying paint masks. For the purposes of this demonstration we are streamlining the procedure. Full instructions are available from the instructions page online. Click here for details.

Using a permanent marker place a dot in the registration hole so that the ink transfers through the registration hole to the masking tape. You have now made the registration dot!



It is not strictly necessary to use a piece of masking tape to hold the registration dot. Some modellers dab a spot of ink directly onto their model. The dot can be removed before the last circle of a roundel.
This is only practical where the dots are eventually painted over as in a roundel.

Do not remove the registration disk until after the paint has been applied as this ensures the registration dot retains it's integrity.



If this were not a simulation you would now paint the first colour, so please assume that the first colour has been applied at this stage.

After painting the centre disk section can be removed along with the rest of the mask. This will leave the registration dot on the masking tape ready for the next mask.

The next mask can be applied looking through the registration hole of the mask.

As in the example opposite, you may find it useful to cut back a little of the application tape so you can see the alignment easier.

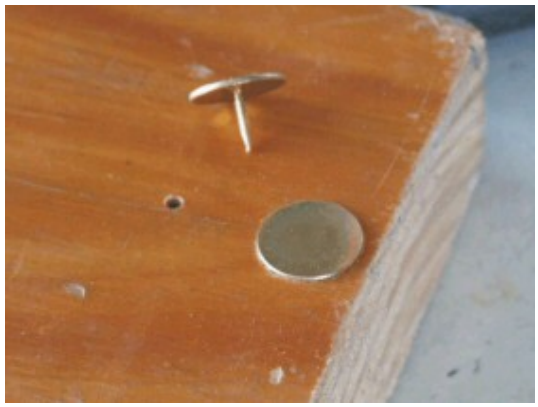
You would carry on painting the individual colours of the insignia until the full set of colours were applied. Only on the last colour would you remove the registration disk and the masking tape with the registration dot!

6.2 Registration pins.

Registration pins can be used in most cases except the following:
1. On roundels with very small centres as the amount of tape needed to hold the pin steady will most likely exceed the diameter of the smallest circle diameter.

2. Where very fine alignment is needed, and it is better to use a combination of registration dots and good hand-eye coordination.

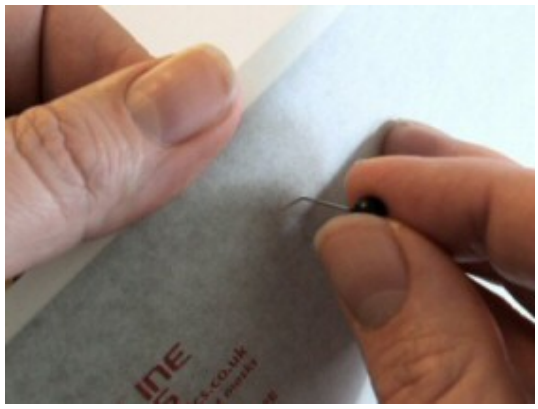
For registration pins I recommend the use standard domestic drawing pins which can be secured to the surface of the model using a good quality tape. These pins remain in position while all the colours are spray applied (except the last colour in some cases).



Tip: Drawing pins normally have a domed shape head which needs to be flattened before you use them so that they will have a lower profile when fitted to your model.

The best way to do this is to get a scrap piece of hardwood, drill a hole big enough to accommodate the pin. Put the pin in the hole and then hit the dome of the pin head with a hammer a few times. As you can see in the picture opposite the head can be made perfectly flat.

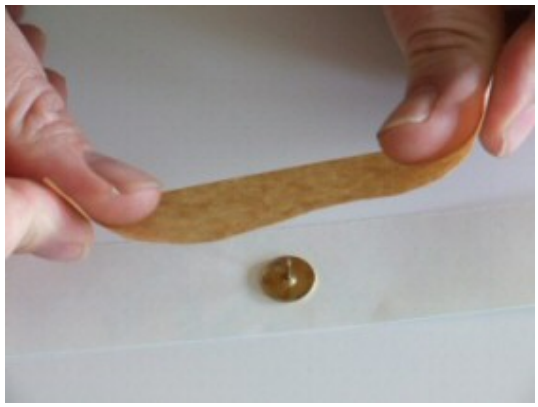
It is necessary to do some preparation work!



Using a small sharp pin pierce through the entire mask in the centre of the each registration hole.

If you are having difficulty locating them, hold the mask to a well lit window or a bright light and you should then be able to see the small holes in the mask.

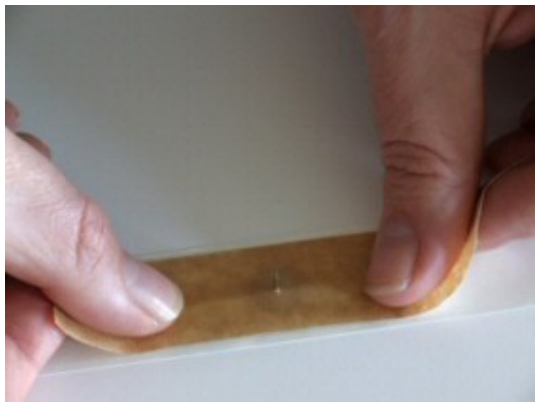
Prepare strips of silicone paper cut a little wider than the masking tape you are using, I usually drop a small strip in the box to get you started.



Lay the your drawing pin on a strip of silicone paper and apply centrally over the top of the pin a small strip of tape so that the pin punctures the tape in the middle.

Push the tape all the way down until it tape makes contact with the silicone paper.

Repeat this process until you have enough registration pins prepared for your spraying session.



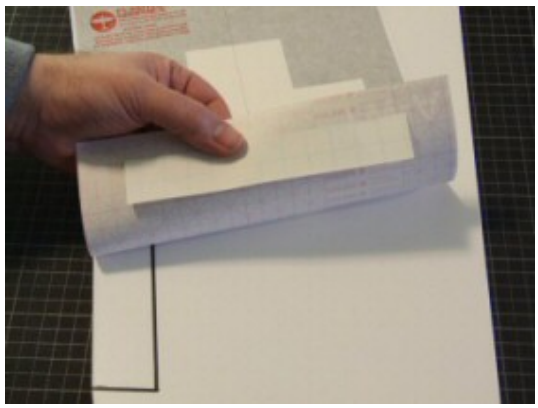
At the relevant point in your application process install the registration pin into the registration hole from the back of the mask.

The holes you punctured through with the pins in preparation work as guides making this possible.

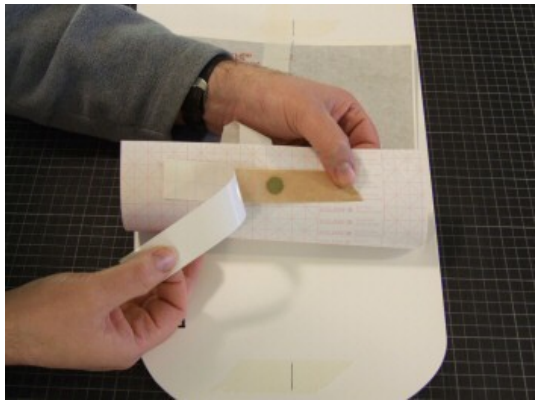
Each registration hole on a mask will require one of the above prepared registration pins installing.

Once done you are ready to affix the first masks to your model

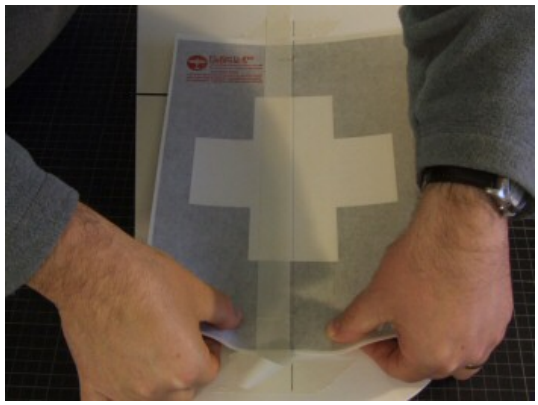
The picture opposite shows the mask ready for use on a 2 pin installation for the white colour of German Balkenkreuz insignia.



Once you have positioned your mask in the correct position, remove the silicone backing paper from the registration pin as shown opposite.

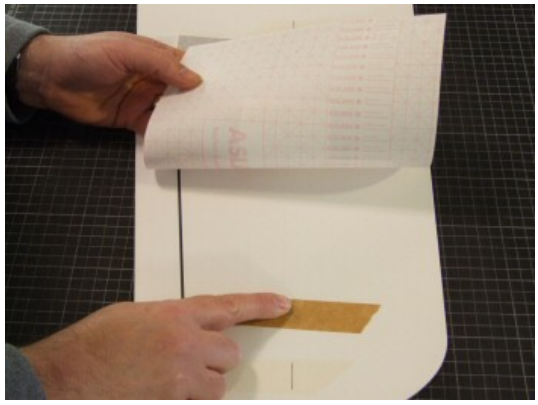


Apply the mask to the surface ensuring the tape grips the model surface thus securing the pin in position.



Lift the mask off and rub down the tape around the Registration pin to ensure it is securely located.

More demonstration material is available from the web site with a few worked examples on models to give you a better idea of the full process. Click here for details.



7.0 Removing the Application tape / film.

After The adhesive on the application tape is weaker than that on the spray mask, so the application tape should peel away from the spray mask relatively easy. If you have chosen a flat paint it is very likely this process will be harder and care should be taken as the difference in adhesion will be compromised by the weaker bond to the paint.

Peel away slowly making sure everything that should be on the model is transferred. If some mask starts to come away with the application tape then simply return the area affected to the surface and rub it down a little bit more. Often the heat of your finger will help in this process. Continue until all the tape has been removed.

These days we use a more transparent film rather than a paper application tape seen in these pictures. The film products make it easier to see through to the spray mask and the model surface so alignment by eye is easier.

8.0 Fixing masks down before painting.

Once you have your masks in position it is time to seal the paint edges on the mask to ensure a good fix to prevent paint creeping under the mask. Working in low temperatures (below 15°C reduces dramatically the adhesive strength and will offer a less reliable seal.

You only need to work around the edge of the mask that come into contact with the paint. I use a domestic spoon handle that has a smooth round on the handle, I know some people use an old propeller that has been sanded with a rounded edge.

You can see opposite the edge goes a little more glossy and less opaque as the adhesive is encouraged to take a stronger grip. If your model is traditional balsa construction take care not to crush your balsa if you have used a thin glass cloth coating. You don't need to press hard to get the mask to key down.

It is advised to paint immediately after applying your masks for best results.

9.0 Removing Paint masks.

It is difficult to give generic advise on mask removal as there are so many different situations that can make the removal process less easy. Your masks are made of a special material designed to be used as a spray mask with a low to medium tack adhesive.

Some people like to remove the spray mask immediately after painting. This can be risky if the paint has been over applied resulting in paint runs.

For people who use chemical curing paints like epoxy, 2K, and Klass-Kote, removing the mask shortly after application can make the paint “stringy” like mozzarella cheese on a pizza as you separate the slices. This can result in streaks of your new paint bridging the wet paint on your model and the edge of the lifting mask. This is caused by the chemical reaction as the paint begins to cure through an “elastic” state. You are advised to wait until the paint has lost most of it's solvent before removing the mask.

When it comes to removing the mask ensure the room is warm and the model has been in that environment for some time before you start. **Use a simple domestic hair drier on it's lowest heat to warm the mask as you peel. This softens the adhesive easing removal.**

Some paints such as Klass-Kote and similar 2K products can create some difficulty peeling the mask off satin to flat colours. The masks appear to be well stuck down and leaving a residue of adhesive as you peel. To reduce this problem have the mask on the model as little time as possible, and cover up as much mask with your secondary masking without affecting the spraying operation. The solvents in Klass-Kote and similar 2K paints can have some particularly aromatic solvents which will slightly penetrate the surface of the vinyl adding to problems.

When it comes to removing any adhesive residue you must wait for the paint to fully cure before using standard white spirits to remove the adhesive. The best way I have found is to lay some tissue on the affected area and carefully put enough white spirits on to fully wet the tissue in affected areas. Give it a minute to start dissolving the adhesive and then wipe off. You will need to follow on and wipe off the remaining detritus with a few more wipes soaked in white spirits. We do not yet know a better procedure for removing this gum residue unfortunately.

If you are having any issues like this try letting the paint dry for a few days to fully cure before going to the next colour, and have the mask on the model as sort a time as possible as previously mentioned.

10.0 General comments.

Mentioned earlier but worthy of note here, when using centre registration dots I know some people prefer not to bother with the masking tape to carry the pin at the centre. Instead they simply put the dot directly on the model using marker pens or contrasting colours! In reality it doesn't matter as you are going to over paint anyway. **Be sure the markers ink will not dissolve into your last colour!!**

For insignia where the registration dots are located outside the painted area you need to remember the area will be visible after the insignia is finished. For these areas use a piece of masking tape to carry the dot as described in the instructions above. Use a permanent marker to highlight the registration point before painting. **It is still important to cover the hole on the mask before spraying to prevent paint making a dot on your model!**

Any questions. Please contact me before you start! Click to contact.

11.0 Glossary of terms.

Application film	A clear plastic film applied to the top of the Paint Mask material to hold the artwork together during application.
Application tape	A white semi-opaque paper film applied to the top of the Paint Mask material to hold the artwork together during application.
Centre disk	A small circle of Paint Mask at the centre of a roundel used to hold the registration hole to enable accurate registration of the mask.
Paint Mask	A special opaque green-brown vinyl material specially designed to be used as a paint mask. It has a medium to low tack low residue adhesive.
Registration	The process of ensuring individual colours of a multi coloured image can be correctly aligned to build the image up correctly.
Registration dot	A small mark applied on a surface to hold two or more paint masks in registration so that images are built up correctly.
Registration hole	A 1.3mm hole cut into Paint Mask at an exact position over several layers to ensure correct registration (alignment) of masks.
Registration mark	Is a general term used to indication the position where registration holes / pins / dots will be found on a particular design.
Registration pin	A drawing pin retained by masking tape applied on a surface to hold two or more paint masks in registration so that images are built up correctly.
Registration point	See registration mark