

AIRBRUSHING Scale Model Aircraft



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Introduction

Since the invention of aircraft, for a variety of reasons, people have had the desire to model them in one form or another. During World War II, for example, aircraft models were used for identification training; carved wood or balsa wood kits was the starting point for these models. Injection moulding came into play in the mid-1930s using cellulose acetate, which gave far more accurate results in far less time. In the 1950s, polystyrene was commonly used and is still used today. Initially, the mouldings were very basic and dimensions were not very accurate, frequently leaving bare cockpits and undercarriage bays. From the 1960s onwards, plastic-injection moulding came on in leaps and bounds, and present-day mouldings include very detailed cockpit interiors and wheel-bays. In addition to injection-moulded plastic, some modern kits include polyurethane resin and etched brass parts, and there are after-market companies, like Eduard and Aires, going one step further to produce super-detailed resin and etched brass accessories.



Injection moulding has advanced since the 1950s and manufacturers are improving all the time. This 1/48 scale undercarriage bay is from a 2008-produced Tamiya F-16. This kind of detail would have been unheard of in years gone by, from a mainstream producer.

Once the model has been made, most modellers will have the desire to paint it, to provide an accurate representation of the real thing. Most people start painting with brushes, and a skilled painter with the right brushes can make any model look good. Armed with an airbrush and a little expertise, however, you can make a model look very good indeed, whatever the base material. This book is written to assist you in buying and setting up your equipment, then using your airbrush from beginner level to more advanced techniques and gaining the skills to give an expert finish.



A typical multimedia kit that includes etched-brass and resin components, as well as the plastic parts. These accessories enable the builder to go a step further with details and building skills.



Eduard manufacture, under the Brassin label, this superb super-detailed 1/48 scale Merlin 61 engine, which also includes engine bay covers and etched-brass details (not shown in this picture).

A BIT ABOUT THE AUTHOR

After service in the Royal Navy, I joined the aviation industry and for twenty-two years I painted real aircraft for a living, working on historic

aircraft made from canvas and wood, Spitfires, air ambulances, through military aircraft and helicopters to Boeing 767s, including executive aircraft like The Queen's Flight. I was heavily involved in the design and first application of the colourful exterior scheme of the display aircraft Hawker Hunter 'Miss Demeanour' in the late 1990s, and I have been making models of ships, dioramas and aircraft as far back as my childhood. In 2003, I put my first love of model-making and my career skills together and formed a company supplying paints and painting equipment to the hobby market. From this I developed my present work. For the past thirteen years I have been teaching beginners in airbrushing at a class for model-makers. In my view, the principles of painting a model are the same as painting real aircraft – it is just a question of scale. The beginner's class has given me insight into problems modellers have when they start to airbrush. In this book I will share my experience to give you the confidence and skill to produce a well-painted model, something to be proud of, and help you deal with many of the pitfalls you may come across.

I do not teach people to spray paint, I teach people to be in control of their equipment. Just like handwriting, everyone will develop their own airbrushing techniques and habits, both good and bad. Only by learning from your mistakes will you advance. So, believe in yourself, prepare your project, read this book and enjoy your airbrushing.

In the preparation of this book I would like to thank the Airbrush Company for their unfailing support with my courses and their encouragement for writing the book, as well as for providing access to photograph some airbrushes, compressors and equipment; to my wife Rosemary for her support in helping me put this book together; and to numerous enthusiasts, groups and museum staff for their help and permission in obtaining images by allowing access to exhibits, engines and to air side. I am particularly grateful to the staff at Duxford, Cosford and Gloucester Aviation Museums. My thanks also go to my publisher who made the initial suggestion and who have helped me through the writing process.

Chapter One

Aeroplanes

To get a realistic finish to any model aircraft, there is no substitute for thorough research. Once you have chosen a subject, go and look at a full-size example, if you can, but be aware that modern security criteria can make this problematic with some subjects. In the UK there can be restrictions, and in other countries this will likely be the case, so always make sure you have permission – it is always good manners to ask first. If you can't get out, there are lots of good books available at specialist bookshops or at your local library. Searching on the internet can provide you with information you would not get access to at an air show. Museums are ideal for historical aircraft; some of them allow close access and have engine cowlings or doors open for those who want to go the extra mile with detailing.



When looking for details associated with particular aircraft, museums are the place to go. Recently, at the RAF Museum Cosford, this Ju-52

engine bay was exhibited fully uncovered, showing many details and colours of the components.



This is a cockpit of a Jet Provost available for the visitor to go and sit inside. Notice the wear and tear, scuffs and bare rivets around the cockpit. The entry and exit sills are covered with padding or scuff plate, to stop injury to visitors and damage to the aircraft.

MILITARY AIRCRAFT

If you can get access to an aircraft of your choice, take pictures of areas such as wing folds, undercarriage bays and cockpits. Take notes, particularly of the tones, shades and of damaged areas. Remember that the digital photograph development process can change the colour of paintwork, depending on your camera and computer settings. Also, make careful notes about colours and tones you can see. Steel exhausts on World War II aircraft are often misrepresented. Painting them in a monotone rust colour does not represent the real thing, unless the subject has been abandoned to

the weather somewhere, and even then corrosion will be random and in different colour tones. Modern military jet aircraft with reheat have a ceramic surface, where light grey and off-white is more usual. Note the pattern of exhaust stains on fuselages and wings; they will be different depending on where the exhaust outlet is and the airflow over the wings.



This picture of a P-40 was taken at Duxford and the aircraft is currently in flying condition. The exhaust pipes show typical colours that can appear on the outside of individual exhaust stacks.

When painting real military aircraft in grey and green camouflage, a wet-on-wet system is usually used. Both colours are done at the same time; the aircraft is marked out for the pattern first, then two or more painters with the grey start to paint and block in their section, followed by several painters with the green. They put on the soft edge to the camouflage and block in their section. With this style of painting, the green over-spray will blend in well with the grey, but it will change the shade of the grey. Painting may start with BS381/637 medium sea-grey but the finished aircraft colour will be darker. Obviously it is not practical to use this system on a model. Modellers will usually paint the lighter colour first, mark out the camouflage, then add the darker colour later. There are various other methods for creating camouflage patterns and these will all be covered in the camouflage section of [Chapter 6](#) and the British World War II demonstration in [Chapter 7](#).



Another aircraft exhibited from, and currently flying out of, Duxford is this Spitfire. Note the rust on the exhaust where at least five different colour tones can be seen. Also, note the faint light grey and brown

exhaust stains on the fuselage.



White ceramic coating can be seen in this SR-71 exhaust system.



Note the grey exhaust cone has both light and darker grey tones running horizontally and the stainless heat shields have various coloured stains. IAN BROWN

CIVIL AIRCRAFT

Civil airline and executive aircraft will usually be kept to a high standard with only small paint chips or oil and grease stains visible. There are always exceptions, and some light aircraft can get to look quite tatty and unloved. The burning of jet fuel actually leaves a grey or brown residue on airliner exhaust cones. Some of the latest engines look to have stainless steel parts that appear to have burnt blue and purple tones. White is the most common colour used on airliners but there are many different shades of white and some airlines are insistent upon a particular shade.

Corporate colours on logos or parts of the aircraft, such as fin and

rudder or engines, are specific colours and matching these can be difficult, but there are model paint manufacturers whose ranges cover some airline colours. Hannants' Xtracolor range is one. By taking a picture of the airliner with you to a local model shop and going through their paint range, you will most likely find a close match. Don't be too rigid about the colour you chose, because appearance varies according to paint application methods, primer colour and light conditions. So, when choosing a shade to apply, the person you should aim to please is yourself.



Some nice details of typical staining from grills and underwing panels. Note also the different colour reds on the cowlings. Small details like these can make a huge difference to a model, giving it a more realistic look. IAN BROWN

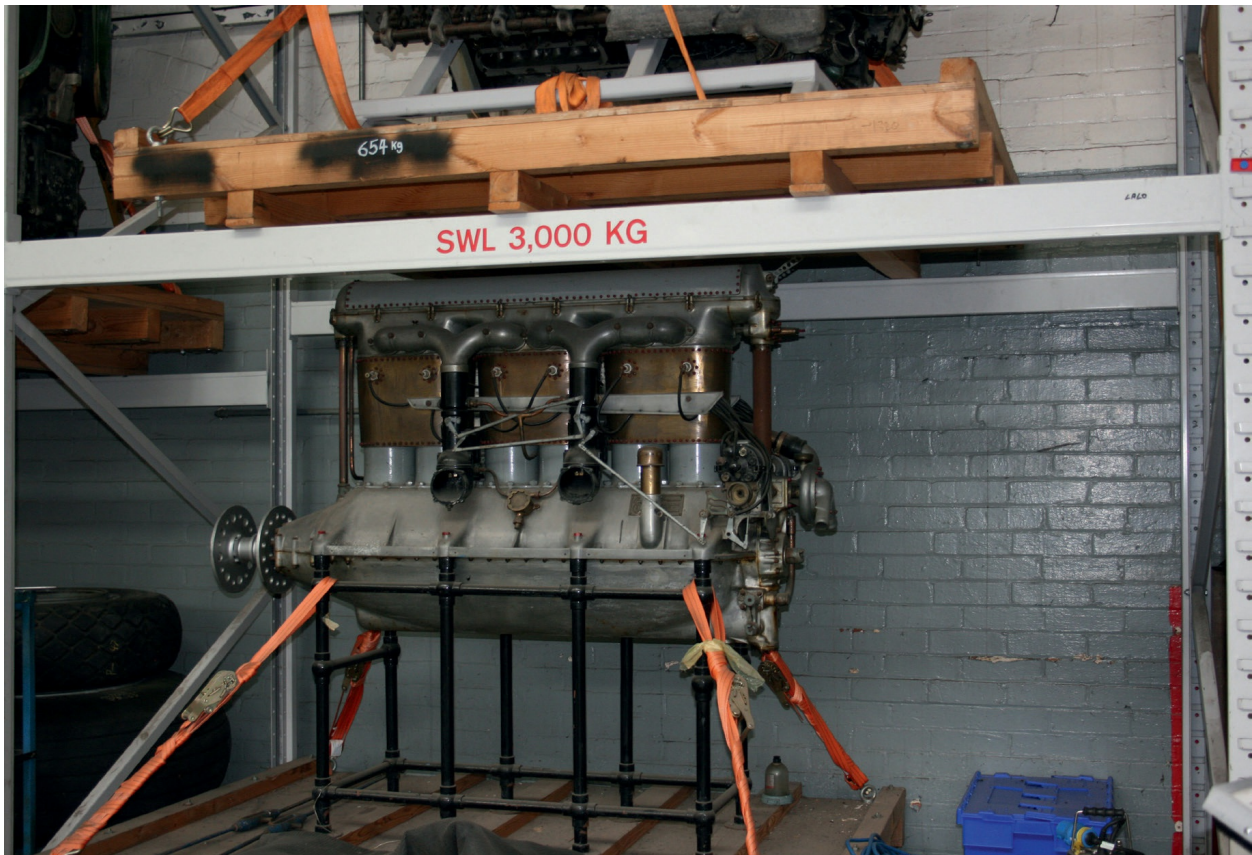


One of the later aircraft engines showing the blue stainless steel cone. These can also have a purple tone to them. IAN BROWN

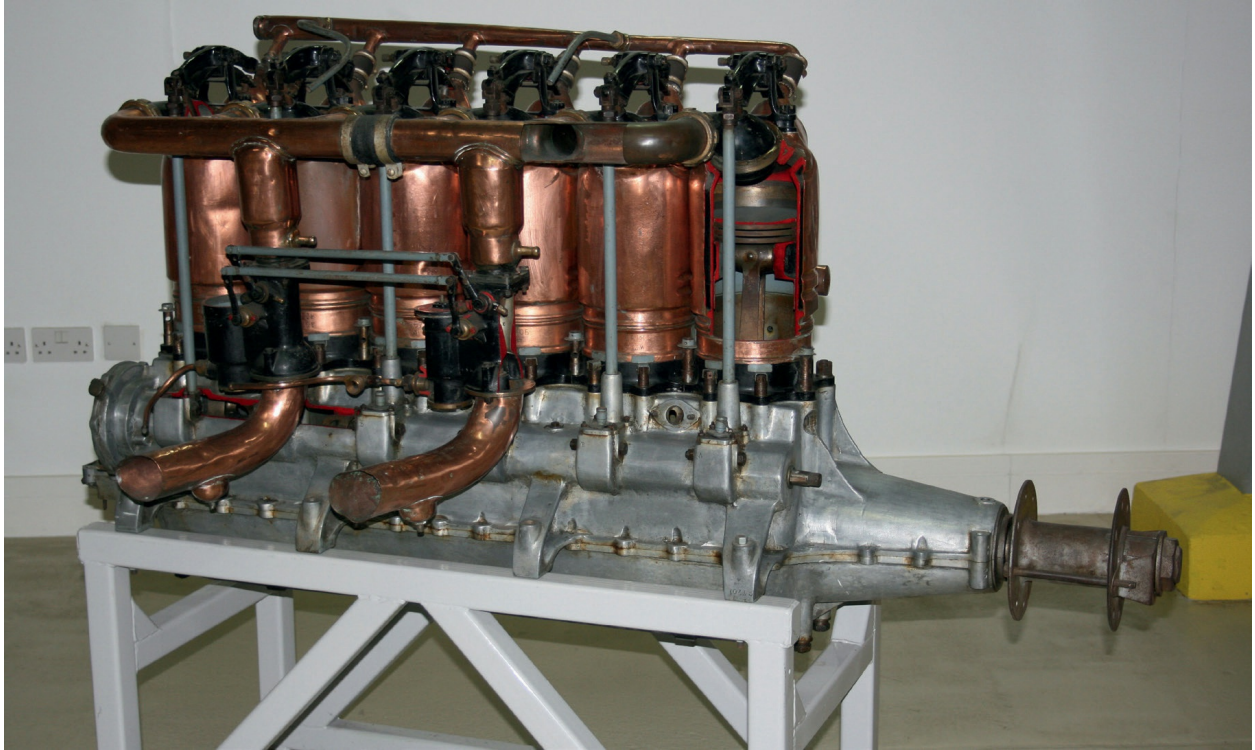
ENGINES

One area that can make or break the look of a model aircraft is the engine; again museums and the internet are good resources for information on colours and details. Many museums have engines on display, but it is those on the aircraft that will be more useful, providing no major restoration work has been done. The engines displayed at ground level are usually freshly painted and sometimes cut away to display the internal workings. These engines may not be entirely honest in their representation of colour. You can usually tell which ones are accurate by the condition of them, and then by cross-referencing photographs taken with images available on the internet or in books. Early aviation engines were usually bare metal – often a combination of aluminium alloys, steel, brass and copper. This produces quite a colourful pallet in comparison to later engines, which are often painted in a single colour. Bear in mind all these metals

come under intense heat and often become covered in castor oil, which gives the modeller an opportunity to be very creative with metalizing and weathering, to help make the finished product far more realistic. Engines that are painted will show areas of wear and tear, chipped paint around nuts and bolts, pipe connections and areas with restricted access.



Keep your eyes open when visiting hangars. This engine was amongst others stored on racks. It shows the engine in original condition, not polished and buffed up like the one in the next picture.



Engines are often found around the edge of aircraft displays in museums, but they are not necessarily in original condition.



This engine has had an unfortunate end, but the colours caused by heat to the cylinders are worth noting.

PROPELLERS

The wear and tear patterns on propellers are very different, depending upon the environment in which they are working; aircraft taking off from an aircraft carrier will not get too much punishment, whereas aircraft taking off from a quickly built runway on a coral island will have

a lot of chipping and wearing on both the propeller and the airframe. Blades are likely to have sustained more damage on the rear outer third than the front side. Early wood propellers can be painted, varnished wood or a mix of both. A frequent mistake modellers can make is to place metal chippings on propellers that were, in reality, made of other materials, for example, both Jablo blades and Hydulignum blades were both made from compressed wood. Jablo laminated blades, manufactured in Manchester, were covered in Rotoloid sheathing. Some had metal strips attached to the leading edge and some were sheathed in brass around the leading edge, depending on the specifications of the customer. These types of propellers were used extensively in World War II and are still used today. Therefore, if you are going to put chipping on propellers, be aware of the possible variants and try to ascertain the type of blades that were fitted to the aircraft you are doing.



A wooden propeller fitted to a Gloster Gamecock in the Gloucestershire Aviation Collection. Note the brass-sheathed leading edge.



One of the P-40 propeller blades' rear faces, showing erosion on the leading edge and pitting on the rear face. The pitting is caused by small stones and mud picked up off the runway during take-off and landing. There are also a fair number of bug splats amongst the pitting.



Another propeller with leading-edge erosion and chipped paint.

Engineers are often shown with ground crew 'pulling through the propeller', which means rotating the propeller by hand. The technique is important on inverted engines, if they have been standing for a while. It's possible for oil to bypass the pistons and fill the cylinder head internally, which will cause hydraulic lock and can seriously damage the engine. If engineers who do this work have greasy hands, they will stain the propeller, and this effect can be replicated by dry-brushing and smudging small areas with a slightly different shade of

black, or using a stained clear gloss coat on to selected areas of each prop.

BIPLANES

Painting model aircraft such as biplanes and triplanes, both civil and military, may require different treatment from a monoplane aircraft, depending on the colour scheme, because of the variety of materials that might be represented. An all-yellow trainer aircraft should not present too much of a problem, but a World War I aircraft with olive drab upper surfaces, doped linen lower surfaces and, perhaps, natural wood panels and struts will need to be painted in sub-assemblies. Otherwise a very difficult masking procedure would need to be undertaken, with the possibility of breaking something. Painting sub-assemblies requires both good kit quality and good building skills.



On some early propellers you can find a mix of varnished and painted wood.

Weathering linen-covered aircraft has its challenges. Castor oil could act like a paint stripper on the paints used in the manufacture of linen at the time, and mud and rough airstrips would leave their mark on lower surfaces too. All these possibilities, together with frequent use of exposed engines, can make a model of this period a very interesting and attractive project. Representing aircraft that are clear

doped linen can be problematic if you are looking for a realistic finish, as you can often see through the fabric, which reveals blurred images of the ribs, spars and sometimes the roundel painted on the top of the wing.



In this picture, the internal wing structure is visible through the fabric, as is the roundel painted on top of the wing. Notice the rib tapes are more visible as they pass through where the roundel is located, and all the rib tapes appear lighter than the fabric. Also note the inter-plane struts' wood grain and colour.

Chapter Two

Preparation

The top surface of the paint will be a reflection of what is underneath, so any imperfections, deep scratches, gaps, lumps and bumps will show up. Trying to bury them with paint will not work, so proper preparation is vital. Inspect all surfaces for gaps and imperfections and lightly mark them with a pencil so you do not forget where they are. Inevitably you will need to use a file or sanding stick to rub down seams, joints or excess glue marks, and there is an abundance of material to choose from. Firm favourites amongst modellers are the sponge sanding sticks that are used by manicure technicians. There are various grades, from 100 grit up to 1,200 grit for general sanding, and 3,000 grit to 12,000 grit for polishing and buffing. The softer sponge sanders will allow you to ride over small raised details like rivets or small vents without damaging them. Please be aware that some metal finishes are so fine they will show up scratches from rubbing down if you have used too coarse a sanding stick or finishing pad.



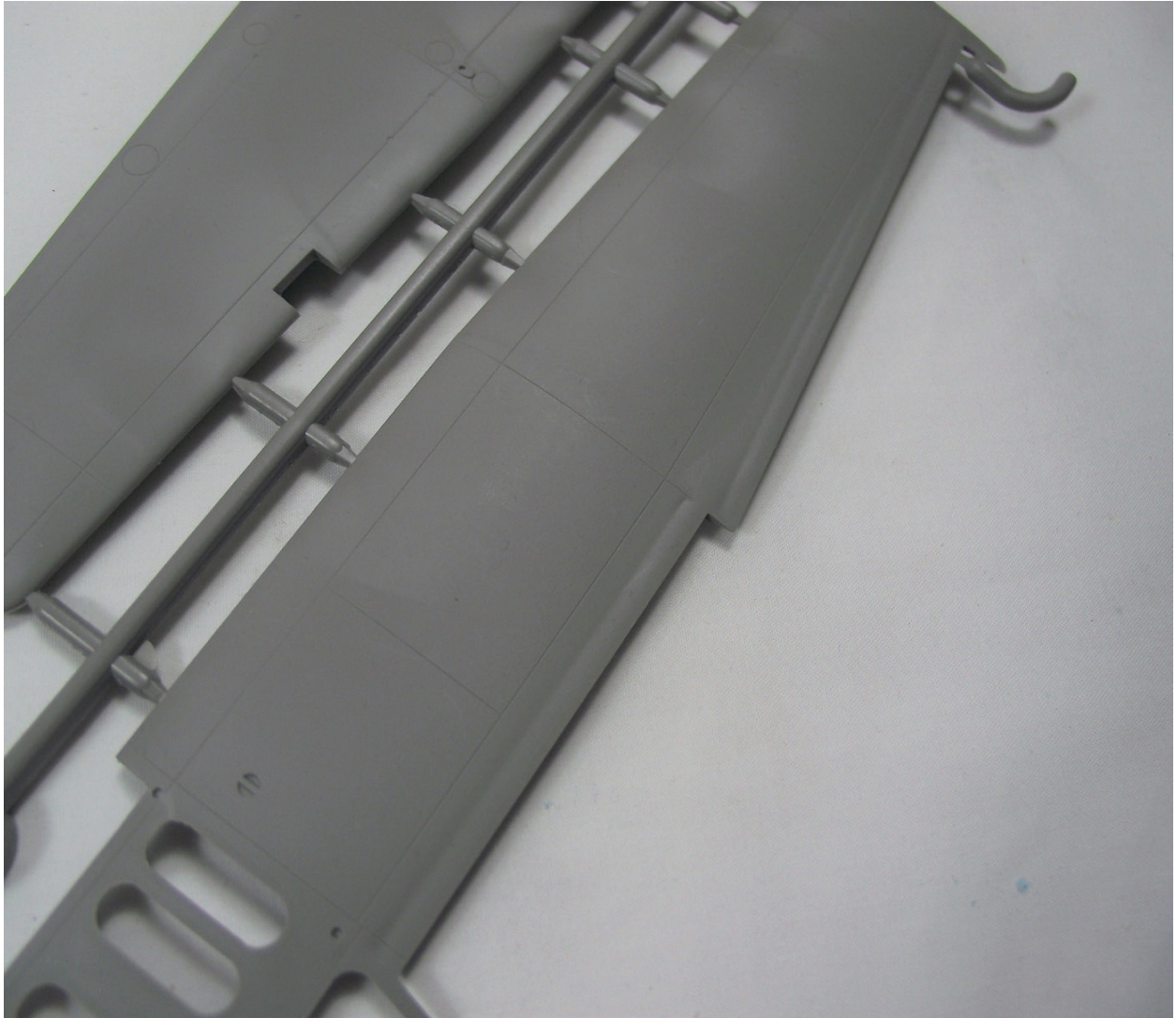
A typical selection of sanding sticks for use in preparation stages.



Using the wrong grade of sanding stick or pad can result in heavy scratching that will be difficult to remove. In this deliberate demonstration, the scratches inflicted are showing through a very heavy coat of primer. Even finer scratches would show through metal finishes.

You will need to fill gaps on poorly fitting parts or sink marks on the visible surface. There are many different types of filler available to modellers – the trick is to find the right one for the job. Using a single-pack putty for a large gap will not work if you try to fill it in one application. This type of filler will shrink back and a deep fill will stay soft underneath for a long period. For large gaps use a suitable model putty such as Milliput, which is a two-part epoxy that you knead

together to apply. Excess can be worked away with water. In some circumstances baking powder or micro balloons and superglue can be used, even car body filler is usable, but remember that some two-pack fillers are carcinogenic, so make sure you wear a mask when rubbing them down.



Sink marks are caused by uneven cooling of the plastic in the mould. Usually in an area of thickness, like these on this wing trailing edge, there is a moulded-on spar structure on the underside.

When using any filler, sand the surface around the defect first. This will help when sanding the filler down, as it will feather out the edges and so blend in better. The smaller the scale, the finer the rubbing

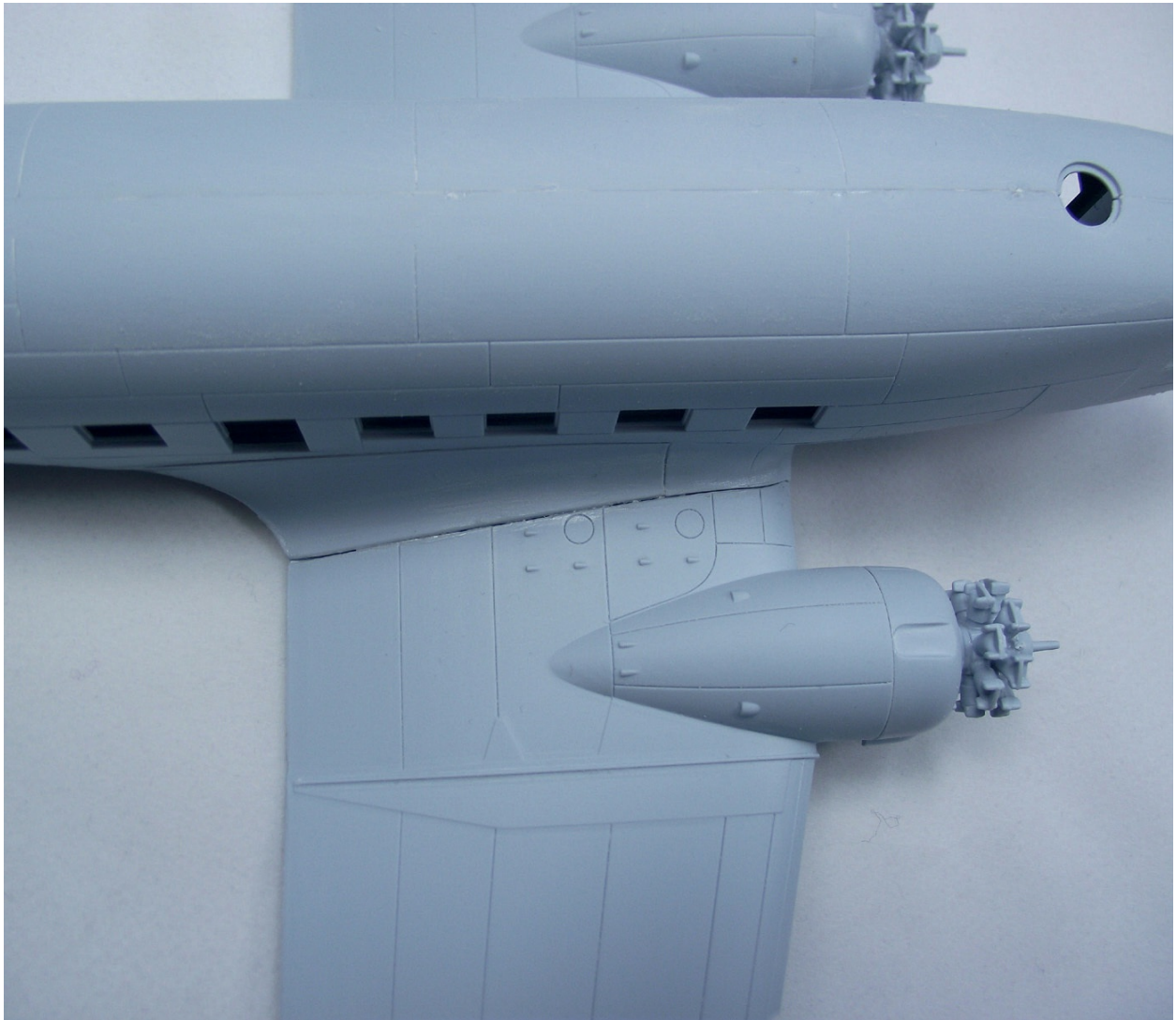
down should be. For small amounts of filler, start with 180 grit and finish off with 240 grit or finer if doing metal finishes. Once the primer is on, you will have another chance to correct any flaws before putting on the finish coats.



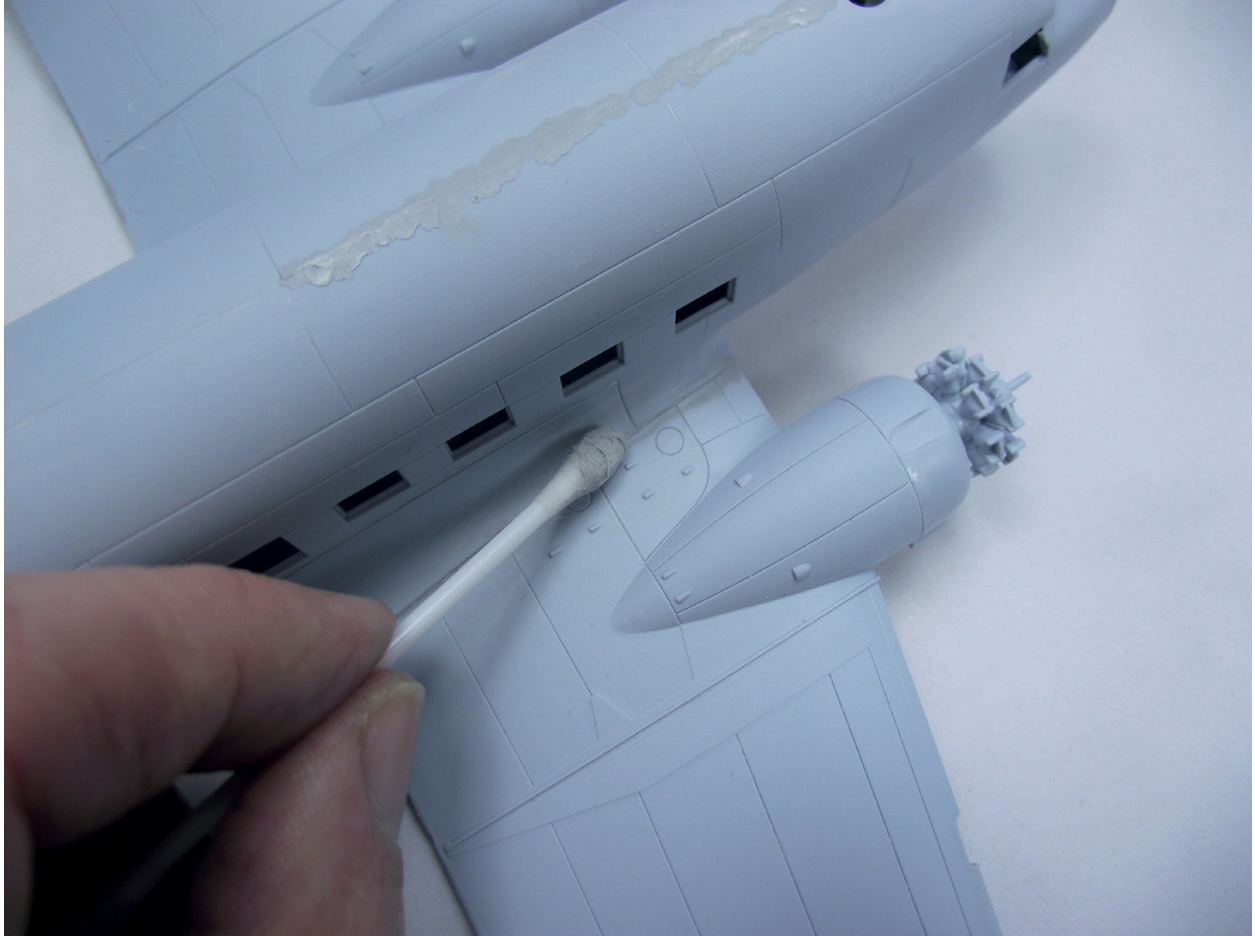
A selection of fillers all can be used on plastic. Make sure you use a mask when rubbing down, especially car body filler.

Small gaps can be filled using a high-build primer. This product usually has micro-fillers included that help to bridge the gap. Apply with a brush, wait approximately 15min and then, using a cotton bud soaked in rubbing alcohol, remove the excess, leaving the gap filled with primer. This method is preferable where the gap is close to raised

detail that you do not want damaged when rubbing down. White correction ink can also be used this way.



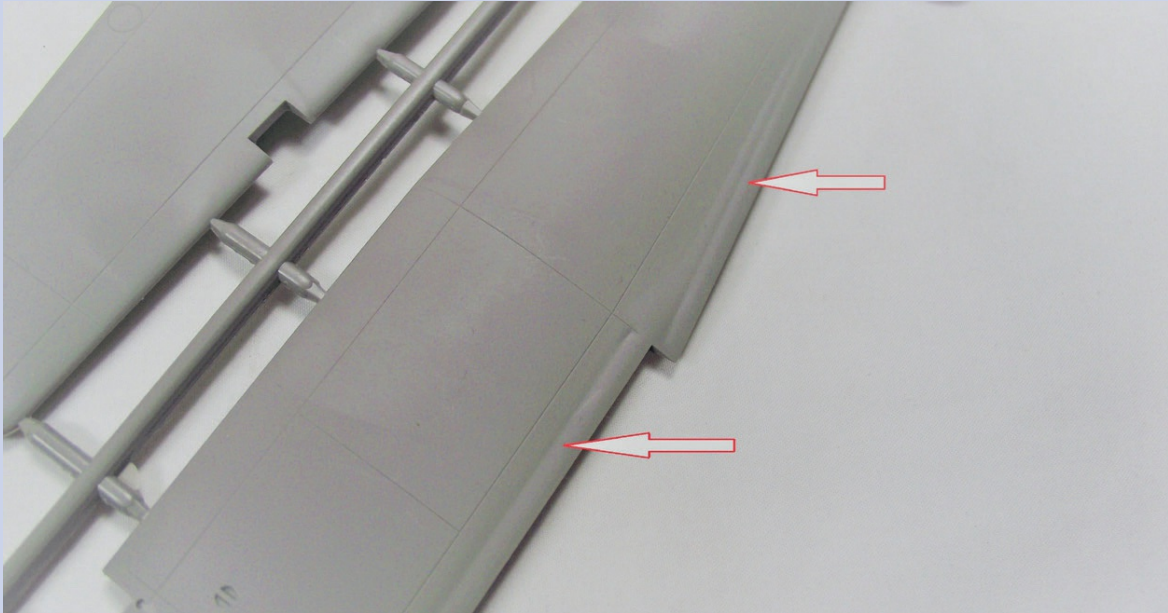
Gaps like these are close to raised detail; fill the gap with liquid filler, such as Mr Surfacer 500 or a similar product.



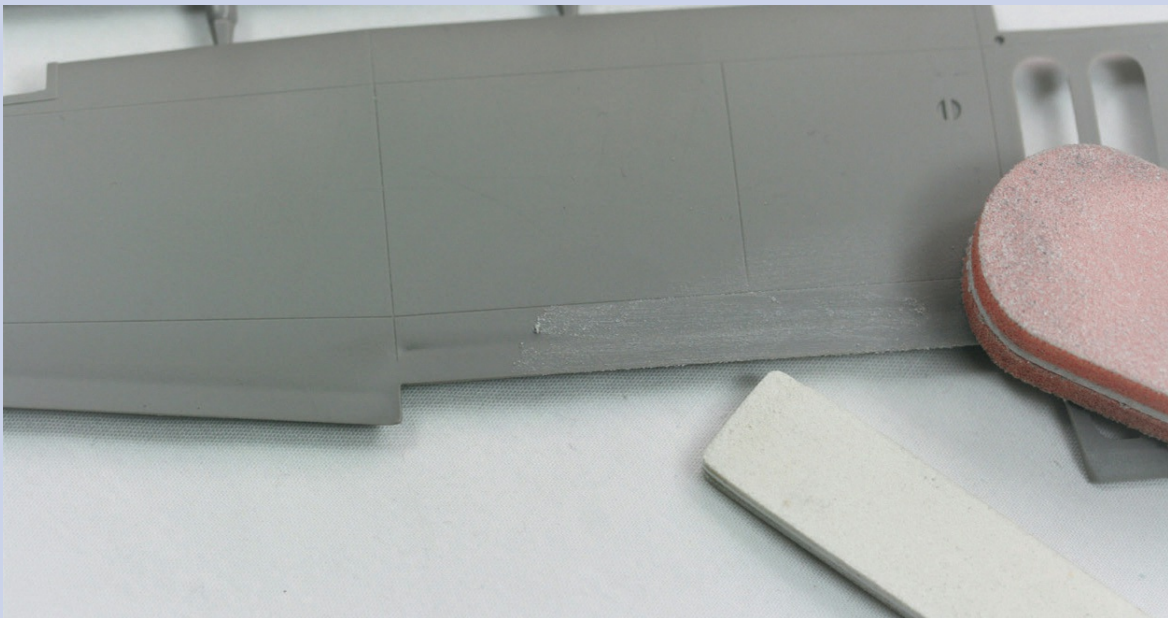
Mr Surfacer 500 has been placed in the gap between the wing fillet and wing. After approximately 10min, remove the excess with alcohol on a cotton bud. This will save damaging the small vents, which may happen if conventional rubbing-down methods were to be used.

After any sanding, it is best to use a stiff, short-haired brush to clean out seams and engraved detail in order to dislodge any accumulated dust. Having done this, to ensure there is no remaining dust, it is a good idea to clean the aircraft using a mild solution of soapy water. A piece of kitchen towel lightly damped down with alcohol solution will also remove any possible contamination from grease or oils. While the model is drying, clean down your work area with a vacuum cleaner to avoid any dust getting into the atmosphere while you are painting. Immediately prior to painting, wipe down your model with a Tak rag. These are available from DIY stores in the decorating consumables section.

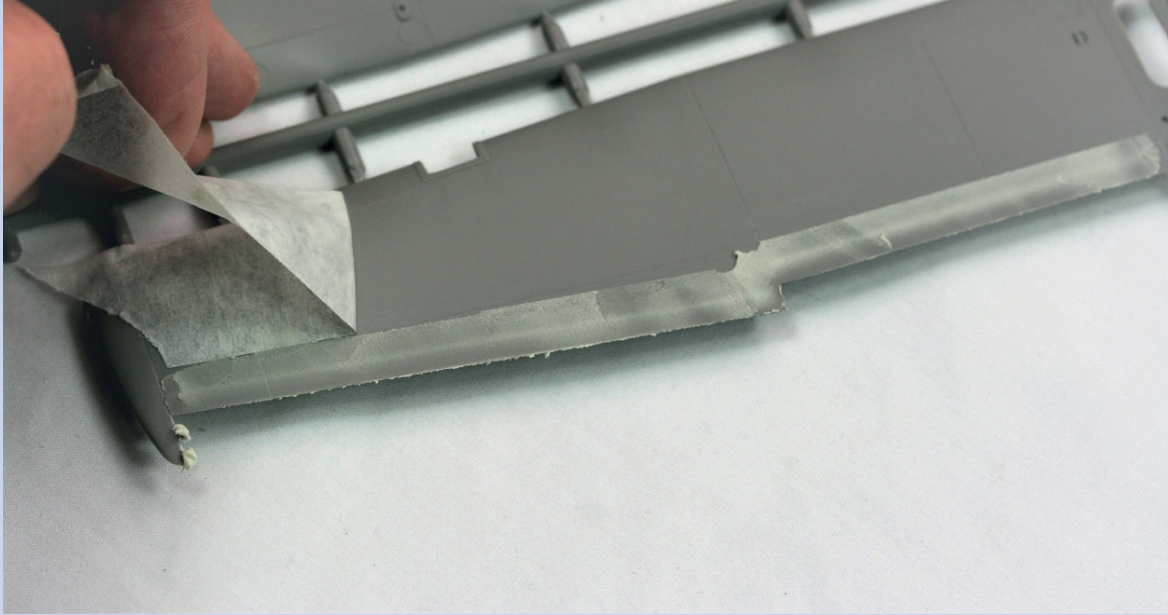
Using Filler to Correct Sink Marks



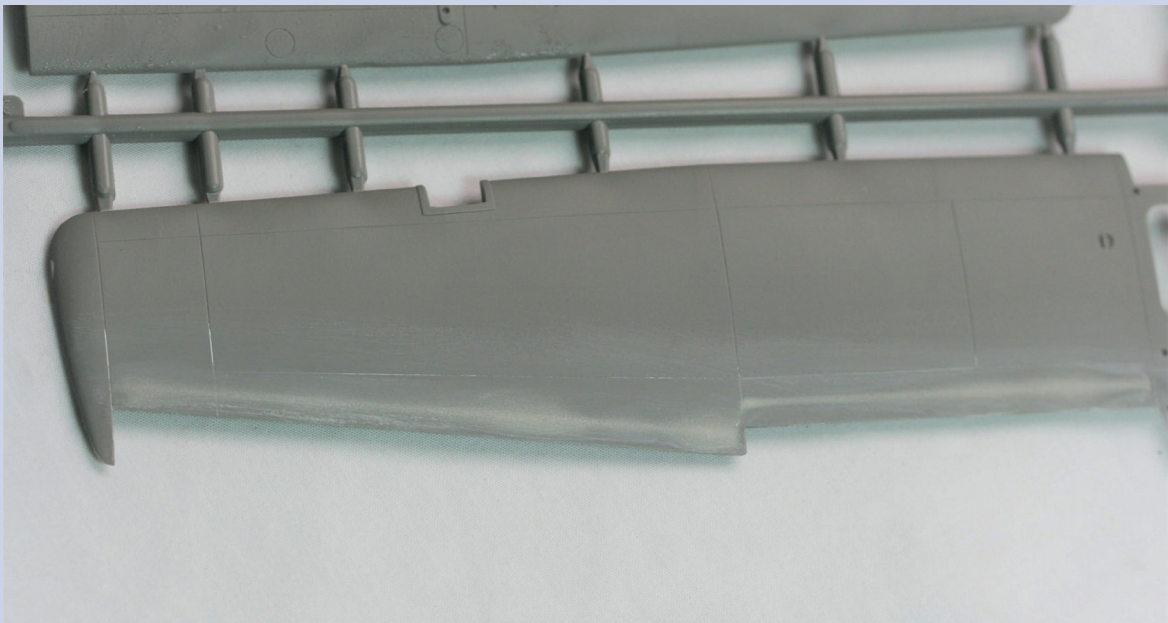
The sink marks in this trailing edge require filler. This is a common problem on plastic model kits.



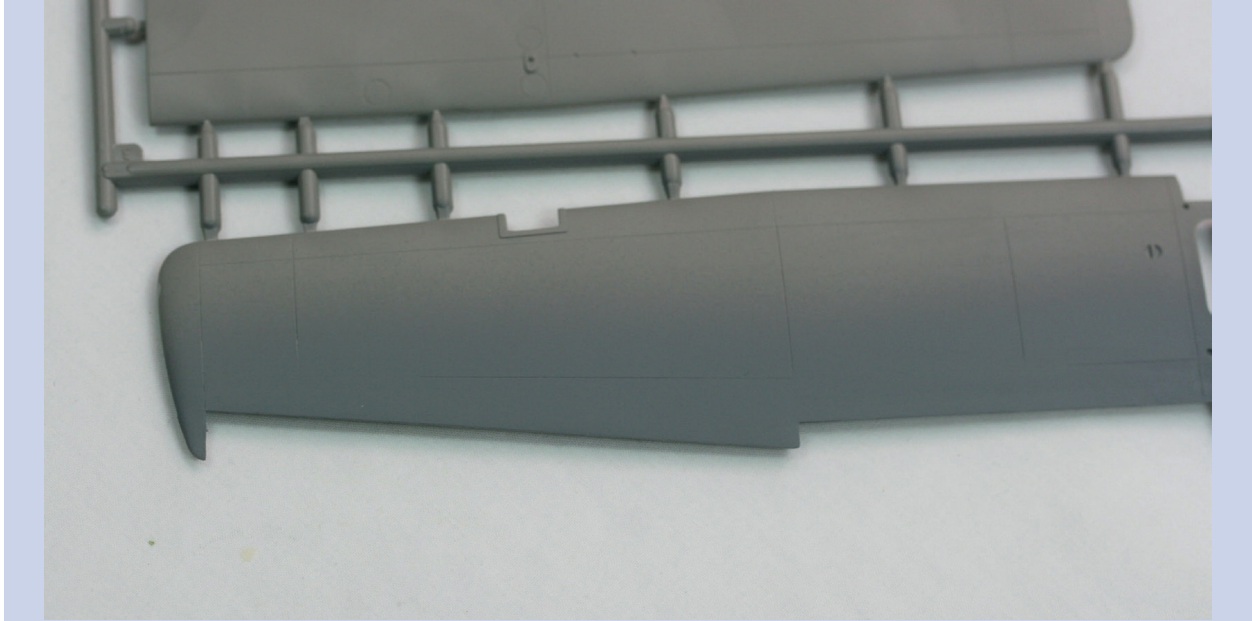
Rub down the area around the defect with a 180-grit sanding stick. This gives a keyed surface for the filler to bond to, and assists in feathering out the edges.



Mask off any scribed panel lines close to the area to be filled. Apply the filler, removing the excess as you go, and remove the tape while the filler is still wet. Car body filler was used on this occasion, as it is ready to rub down after 15min.



Rub down the filler, keeping to the area of filler, using 180-grit sanding stick and finish off with a 240-grit sanding stick.



Clean off the dust and spot prime the area. Check for any defects and finally re-scribe any seams as necessary.

MASKING

The next stage will be to mask off any areas you do not want painted, such as cockpits and undercarriage bays, which will have been painted during assembly. Every modeller will have their own preference as to what materials to use; here are a few of the most common ones:



Every modeller will have their own preferences for masking materials. Here is a typical selection of masking materials available.

- Soft tissue or sponge can be teased into cockpits and masking tape used to seal the edges.
- Masking tape can totally seal the cockpit in, if you have the right edges to do so, but just in case overspray could get behind the tape, it is still worth pushing a little sponge or tissue before sealing it.
- Liquid masking can be used for canopies and camouflage patterns. Alternatively, purpose-made, computer-cut paint-masking sets are available for specific aircraft.
- Ultra Mask is a low-tack, transparent masking film that can be cut to approximate size and then pushed into the corners with a cocktail stick and finally trimmed up with a sharp knife.

One area many modellers and real aircraft painters struggle with is pulling a straight line with masking tape or going around compound curves where the lower fuselage is a different colour to the upper half. As a general rule, use a wider tape to pull straight lines and a finer tape to go around curves. The finer the tape, the easier it is.

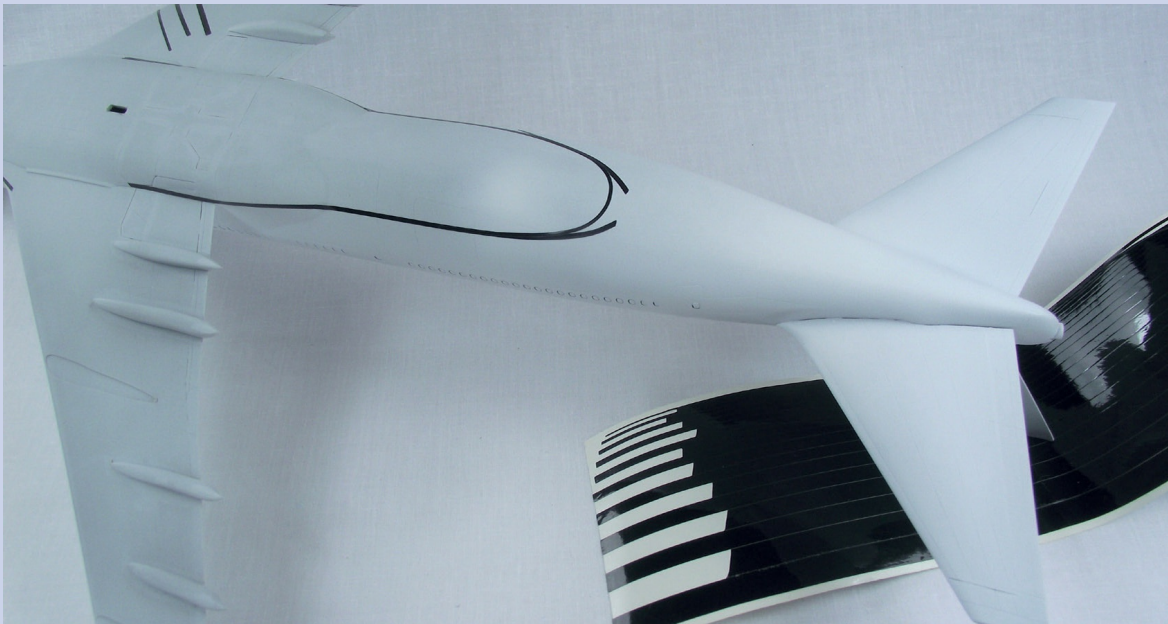
First of all mark out where you need to start from and approximately where it will end, tack one end of the tape on the starting point, keep the tape clear of the fuselage and in one pull tack it down at the other end. Keep looking along the tape edge at the same time to make sure it is straight and then lightly press down the tape.

Once you get your line straight, use the fine tape to go around the curve, you have to start pulling the line upwards or downwards, depending on which side of the tape you are painting. Horizontal skin joints can help and act as a guide, but at some point you will have to start pulling up or down so that it looks straight from the side and from the front. A common mistake is to look along the wrong edge of the tape, so make sure you are looking at the edge you are going to paint against.

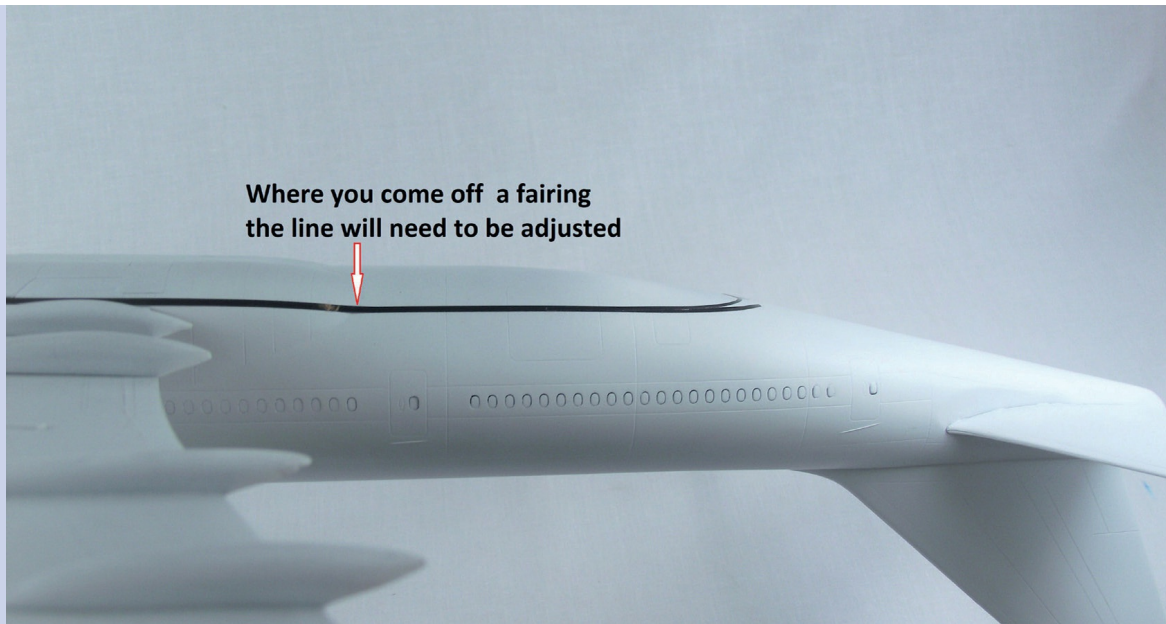
How to Pull a Straight Line Around Compound Curves



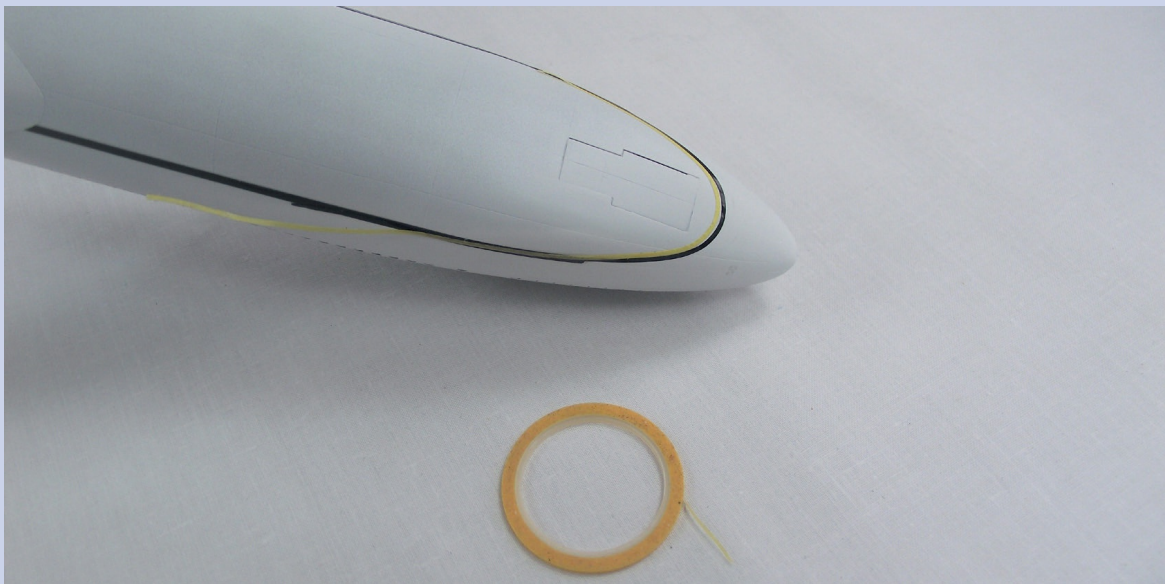
Concentrate on looking along the tape to keep it straight when pulling and placing it down.



Thinner tape is easier to use when going around curves. One-metre strips of pre-cut vinyl tape are available with various sizes from 1 to 8mm widths.



View from the side and the front or rear to make sure the line does not dip or rise.



If you need to make adjustments, especially on the curves, place another tape on the inside or outside of the original tape before removing it – this will act as a guide. The original tape will be stretched, so it is best to replace it with a fresh piece.

Chapter Three

Tools and Equipment

COMPRESSORS

Buying a compressor and airbrush package is an investment in your hobby. The old saying 'you get what you pay for' has more than a ring of truth about it and, consequently, it is worth paying that little extra for good-quality equipment. If you are a total beginner when you are buying, go to an established or recommended airbrush supplier, who will be able to advise you and give you different options according to what you want to use your equipment for. Local plastic model shows have modellers displaying their work on show tables, and usually they will be more than happy to offer guidance and share their experience with you. Shows often have specialist retailers offering compressors and airbrushes, who can give advice on what you may need.



A typical range of Iwata and Sparmax compressors designed for airbrushing.

To successfully operate any airbrush it is essential to have a constant air supply. It is possible to use compressed air from a car tyre and adapter or from divers' air tanks, but these will only give a limited supply of constant air before the pressure starts to drop. Some manufacturers supply an airbrush starter set with a can of compressed air. Again, unfortunately, the air pressure will start to drop and you

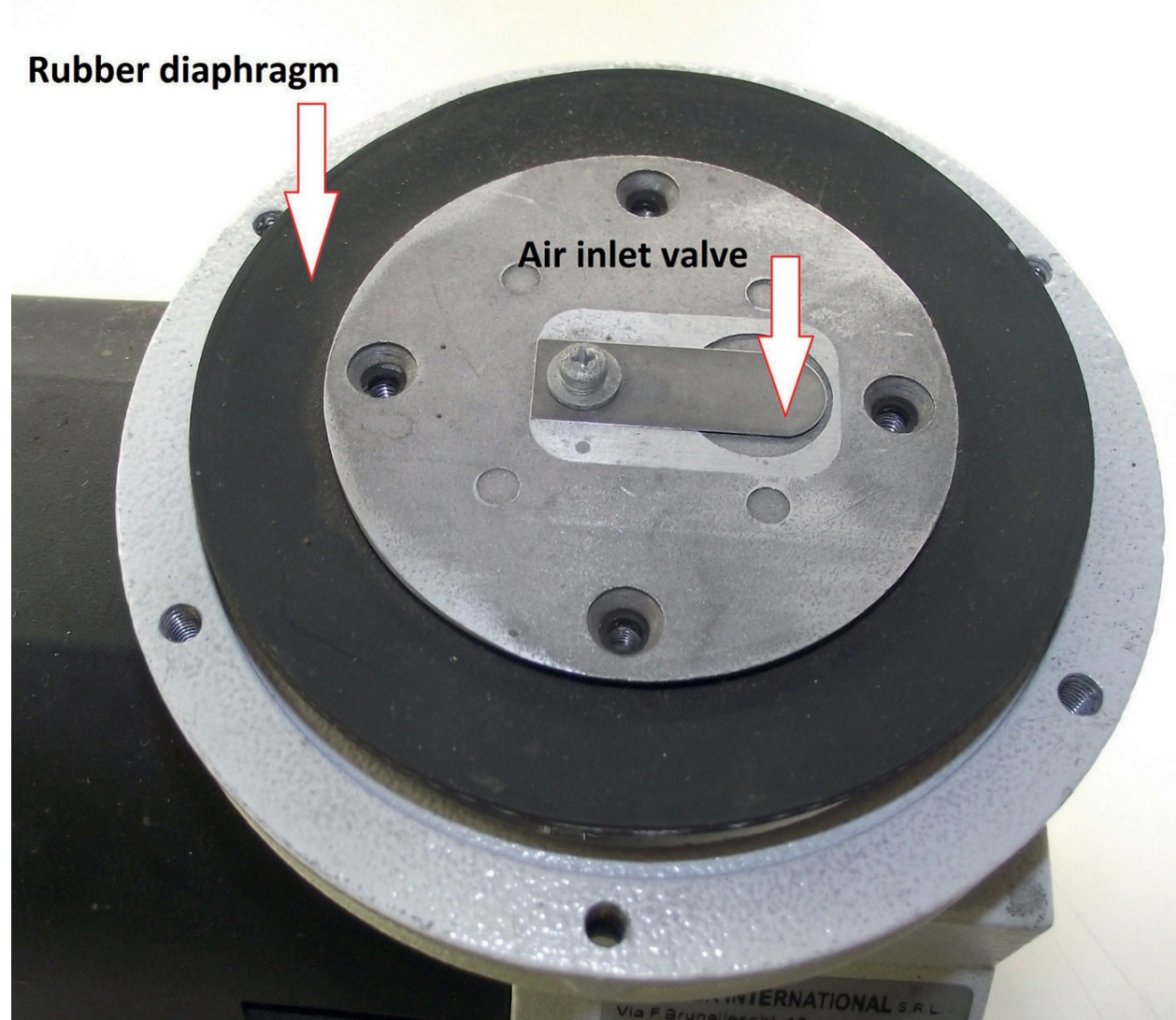
may run out of air just as you come to a critical part of painting or as you need to clean the airbrush. For the cost of half a dozen cans of air you could buy a compressor that is designed specifically for airbrushing. Please note that there are compressors sold at garages or camping outlets that are designed to inflate air beds or beach toys, but they will not run an airbrush.



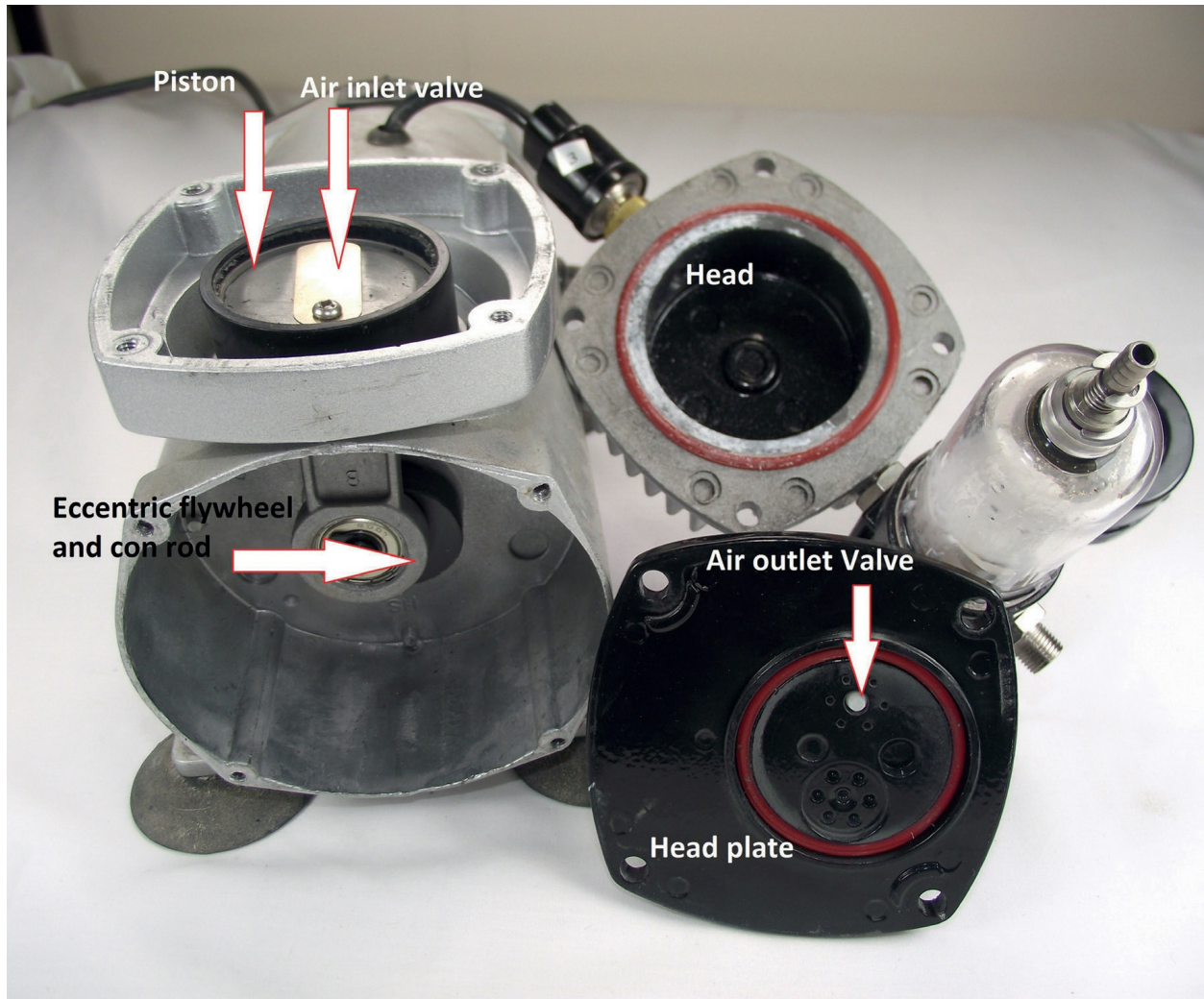
Many retailers will do bundle packages for people starting out, e.g. this Sparmax kit.

The output, or airflow, your compressor produces is measured in CFM (cubic feet per minute). This is important to know as some airbrushes require a high airflow output, e.g. the Sparmax GP-850

requires 1.2CFM if you want to use the fan pattern nozzle.



A diaphragm compressor with the head removed to show the rubber diaphragm and inlet valve.

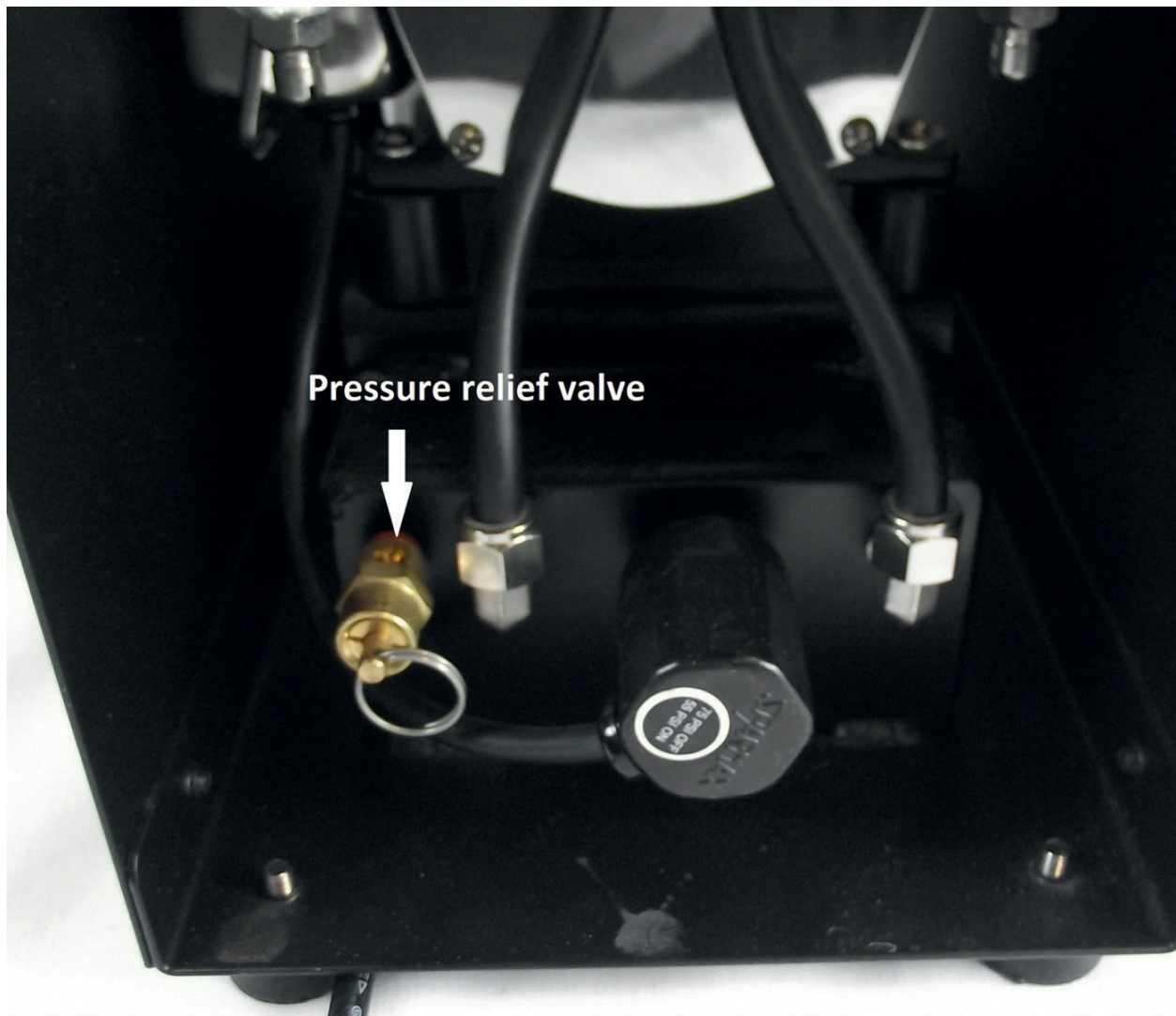


A piston compressor with the side plate, head plate and head removed, exposing the working parts.

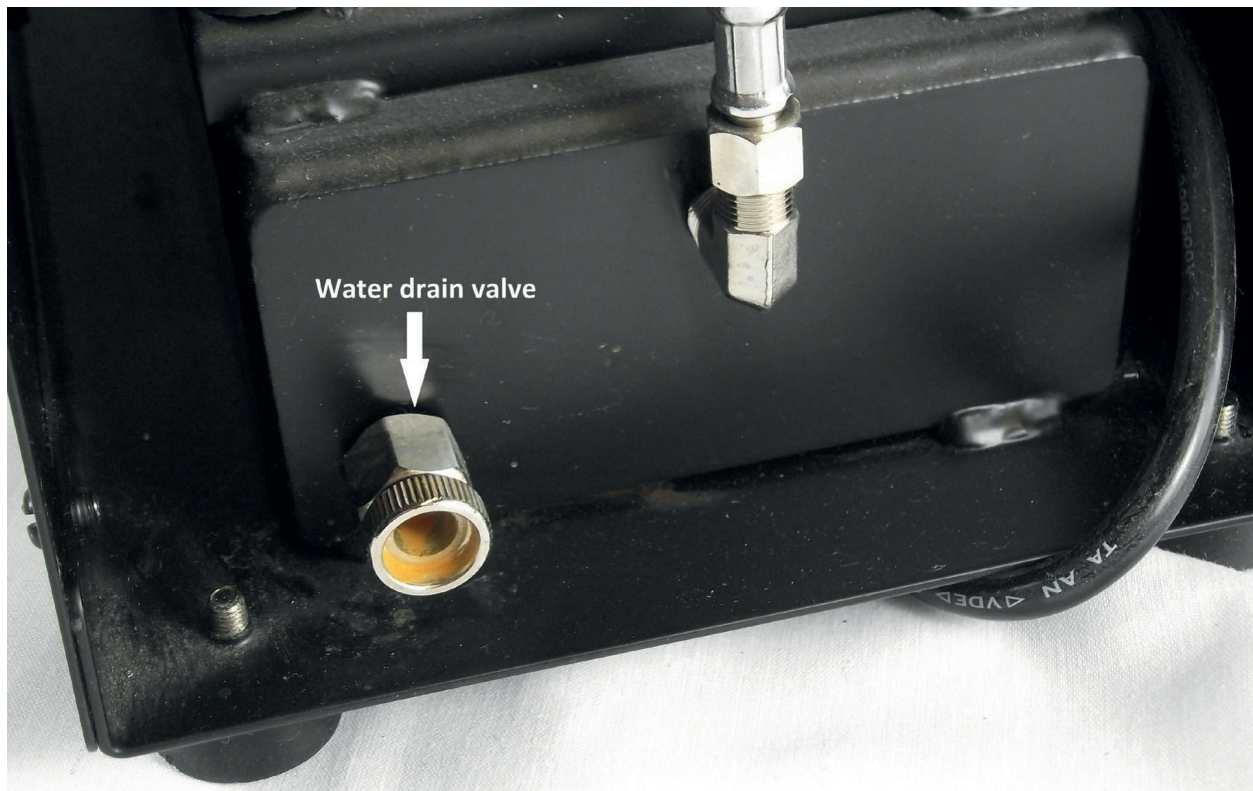
Without going into descriptions of complex engineering, there are two main types of compressor for airbrushing: diaphragm or piston. They both work on the same principle of eccentric flywheel and con rod. The diaphragm compressor has a rubber and fabric disc; a piston compressor can be dry (oil free) or have an oil-lubricated piston. There will be an air inlet and an air outlet. As the con rod pulls down, it will draw air into the cylinder. Then, when the con rod pushes up, the inlet valve is closed and, as the piston compresses the air, the outlet valve opens.

On some compressors, there is an air inlet filter, which you can clean or replace, depending on your usage. For oil-lubricated

compressors, check the oil regularly and inspect your filters for signs of emulsified oil. This is a creamy coloured substance that can block filters and make a mess in moisture traps. If you find some, it means a seal somewhere in the structure has broken down and needs replacing. Compressor oil and paint do not like each other and will cause contamination of the materials you are trying to work with. If oil gets into your airline, it is very difficult to get rid of – the only true way to eradicate it is to fit a new airline.



The pressure-relief valve, which is fitted to an air reservoir, will automatically open if the tank becomes overcharged.

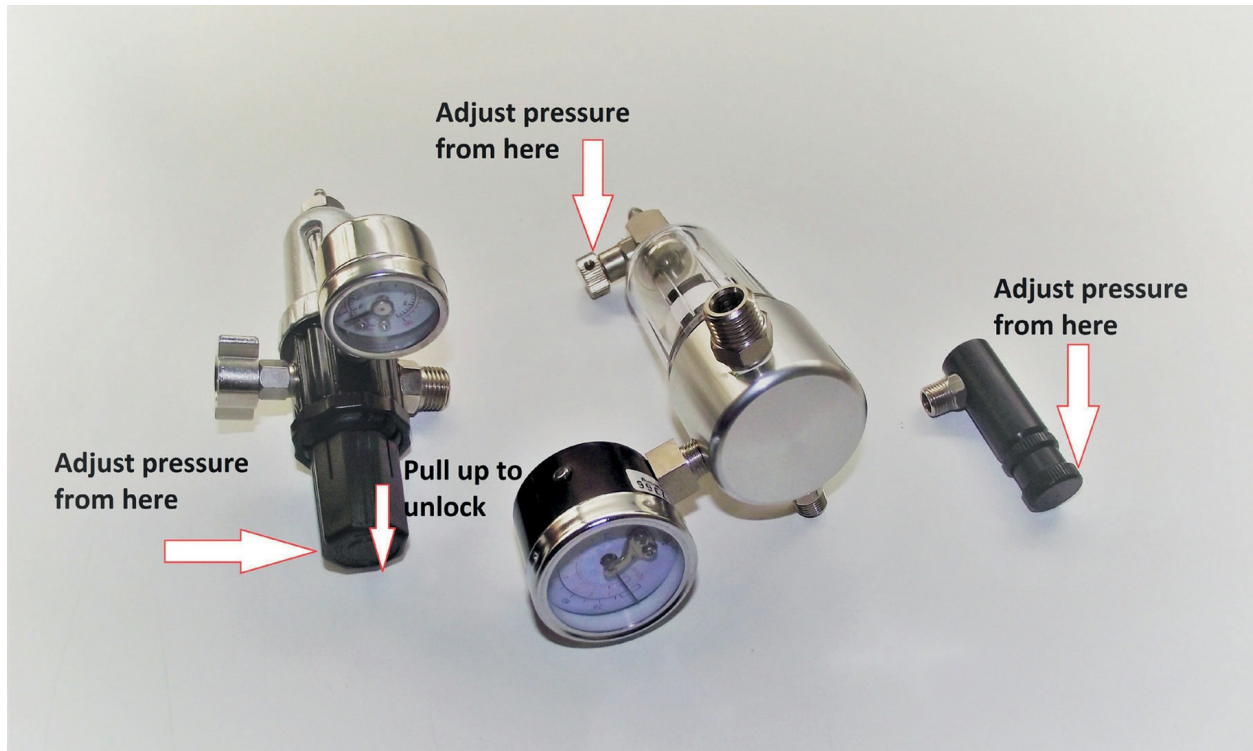


Drain off water from the reservoir on a regular basis.

For compressors fitted with air-storage tanks, a safety feature called the pressure-relief valve is incorporated into the design. This will open should the auto switch-off fail and the compressor tries to overcharge the air reservoir. Storage tanks also have drain plugs that need to be opened on a regular basis. Any moisture from warm air going into a cold storage tank will condense to form water.



Pressure gauges do vary between different manufacturers. This is a typical gauge from Iwata showing the three most commonly used units of air – psi is the most commonly used unit.



Regulators, moisture traps and bleed-off valves. Note the regulator on the left has specific fittings to prevent incorrect fitting.

Once you have selected and acquired your compressor, you need to control the air supply. The air pressure developed by a compressor is measured in pounds per square inch (psi), bars (kg/cm²) or megaPascals (MPa). Psi is the most commonly used term in airbrushing. If you connect an airline and airbrush, plug it in and start the compressor without an air regulator, your setup can develop up to 80psi or more, which is far too high and will possibly damage the compressor. The paint is likely to dry before it hits its target and small parts would likely be blown away by the airflow. Most plastic modellers will only need a maximum of 25–30psi. If your compressor does not have a regulator, you can buy an add-on. These are readily available and can vary from a small bleed-off air-valve with no gauge, to an air filter and moisture trap with gauge and anti-vibration lock. Regulators are like a one-way valve and must be fitted the correct way around. This can be identified with either an arrow pointing in the direction of the flow of air (in from the compressor and out to your airbrush), the words 'in' and 'out' stamped on the body of the regulator, or specific

fittings that preclude incorrect connection.

MOISTURE

Air taken into a compressor will always have a proportion of moisture contained in it. Moist air drawn into a cold compressor will condense into water droplets. If this water comes into contact with water-based paint, it doesn't cause too much of a problem, but if you are going to use enamel or solvent-based paint, then it will cause damage to the painted surface. The quantity of moisture that develops depends upon the atmosphere you are painting in; for example, if you are painting in a utility room, there is more likely to be moisture in the air if the laundry is in use, whereas painting in a roof space may well be very dry, with very little moisture in the air.



The last line of defence from moisture is an inline moisture trap, which fits on to the airline, just before the airbrush.

Normal operation of a compressor can develop moisture, so compressors with attached air reservoirs, whether in the handle or in a tank mounted below the compressor, will have a drain plug fitted, which needs to be drained regularly. Compressors without a reservoir will need a bleed-off regulator that will automatically drain away any moisture as it develops. Compressors with an auto shutoff switch will have a moisture trap that requires you to manually drain off the water

by pushing up a button in the bottom of the trap. Moisture traps are usually incorporated with the regulator but small inline moisture traps can also be fitted on to your airline. All moisture traps need to be checked for collection of moisture and the water released. If any moisture does get through to your airbrush in normal operation, you will pick up a different sound as it passes through the nozzle of the airbrush. If this happens, check your work and check your moisture traps, and release any moisture trapped in them.

AIR HOSES AND ADAPTORS

There are two types of hose available: vinyl or fabric-covered rubber. The vinyl hoses tend to be light and easily kinked or tangle, whereas fabric-covered rubber hoses have a little weight to them so hang nicely from the airbrush and usually last longer. Good-quality hoses usually have 'O' rings in the fittings, which eliminate the need to use Teflon tape on the screw threads to prevent air escape. Make regular checks of the airline for splits or cracking, and also check for leaks on all connections. Faulty hoses will need replacement and, if connections leak, then try adjusting them before replacing them. Air hoses are available in different lengths, from 5 to 10ft. Bearing in mind your compressor draws its air from your surroundings, it is worth having the longer hose type to allow painting to take place at distance, so as to keep overspray away from the compressor.



The main type of hose available is either vinyl or fabric covered, or rubber as seen here. The coiled hose tends to get tangled; whereas the fabric-covered one has weight, so hangs well from the airbrush.



Quick release, with micro air-control valve, shown on the left and three types of adapters for different airbrushes to accept the standard one-eighth air-hose fitting. Other combinations are also available.

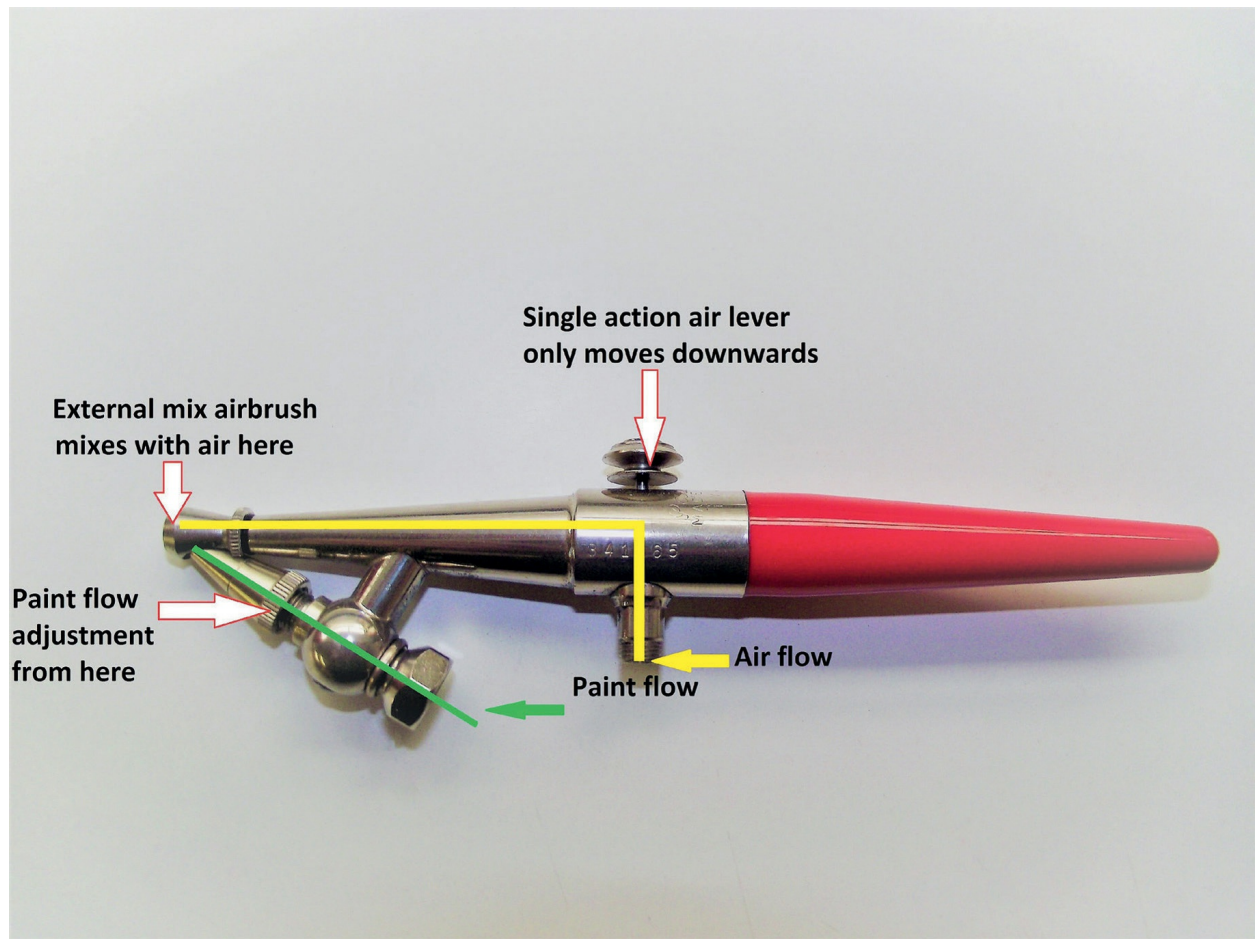
There are many different types of airbrush available and manufacturers may have used a variety of hose attachment threads, making a direct match to an airline less likely. This is easily resolved by using suitable adapters, which are available from airbrush suppliers. Another very useful addition to the airbrushing kit is a quick-release system, which enables you to remove the airbrush without losing all the air from your compressor. The system consists of the quick-release body, which attaches to your airline, and a quick-release plug, which goes on to your airbrush. There are quick-release bodies available either with a micro air-control valve or without. If you use the micro air-control valve, it will enable you to adjust the airflow through your airbrush to get the best results for stippling or fine line work by adjusting the valve accordingly.

AIRBRUSHES

Today there are many companies making airbrushes, with a price range from as little as £10.00 to £400.00, depending upon quality and function. It is not possible review all of them, but some of the most popular ones are explained.

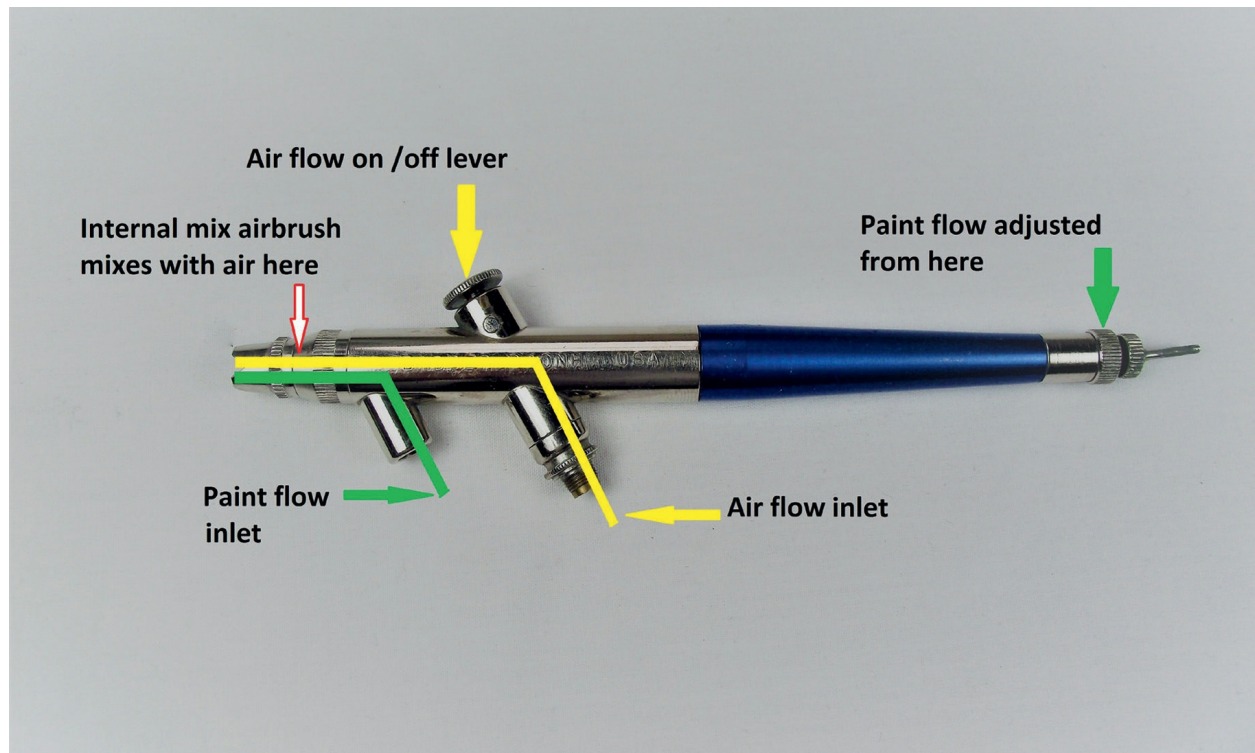


This is a Badger 250-2, which is usually sold with a can of air. It can be set up on a compressor via an adaptor. There is very little control over paint flow, but it can be useful for primer or ground work on a diorama.



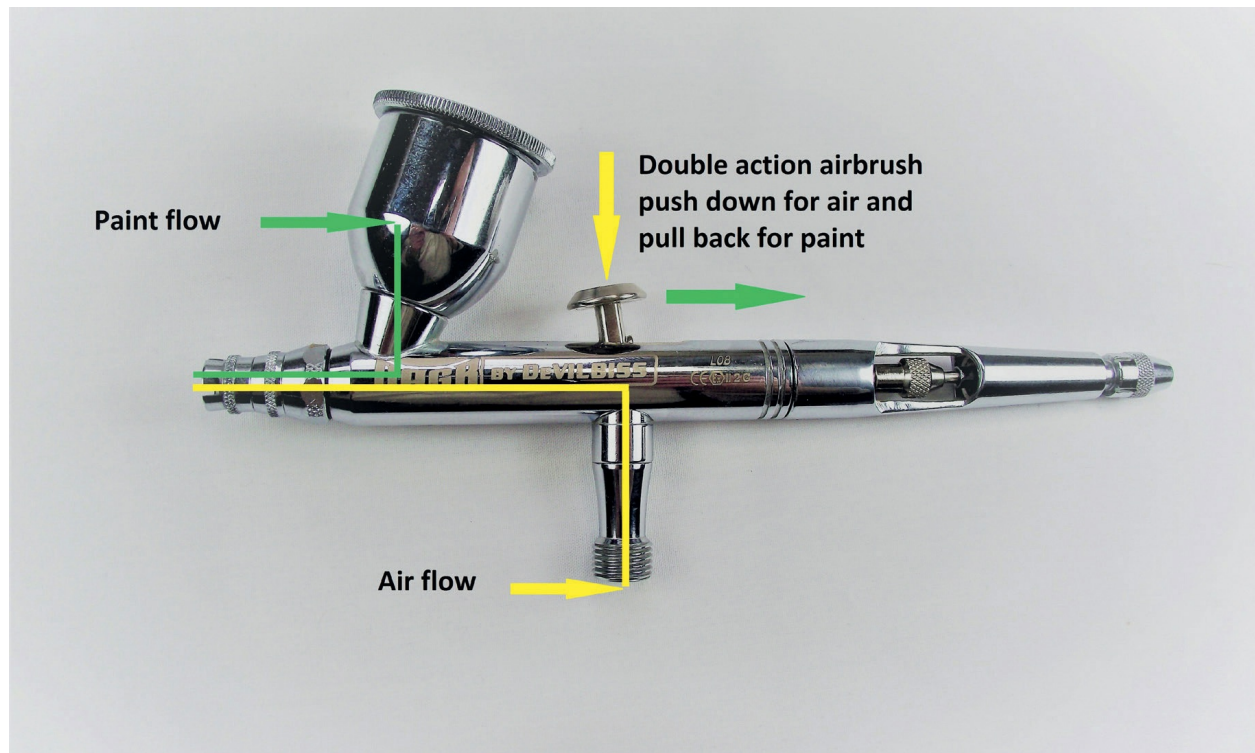
A Paasche single-action, external-feed airbrush is a popular choice of airbrush for beginners, but does use a large volume of air.

Airbrushes can be put into two categories: external mix, meaning the paint is mixed with the air outside of the airbrush, or internal mix. Most manufacturers are developing the internal-mix variety, so the external-mix types are becoming scarce, although Paasche and Badger continue to manufacture some external-mix models. The basic principle of an airbrush is simple and, once you understand it, you can often analyse and cure any problems you encounter. Air is forced through the airbrush body and, at some point either inside or outside the airbrush, this air is mixed with the paint coming through the nozzle. This is called atomization and the resultant mix will form a spray pattern.

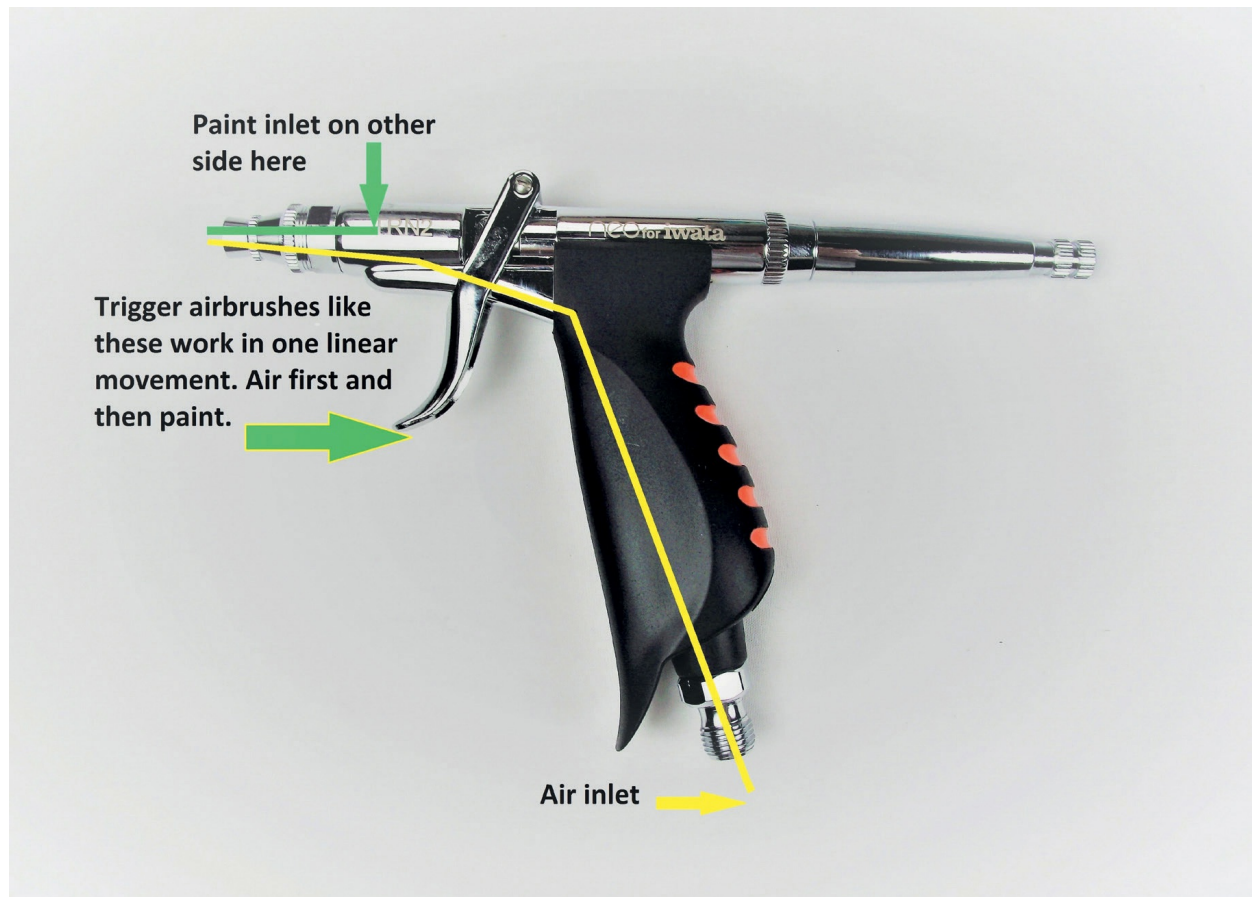


Many modellers will have started airbrushing using the Badger 200 single-action airbrush. Fine- and medium-sized needle and nozzle set-ups are available with gravity or suction feed.

Both internal- and external-mix systems can be either 'single action' or 'double action'. Single-action airbrushes adjust the paint flow from the back or middle of the airbrush, and the trigger on the top of the airbrush provides the air. If the paint flow adjuster is fully screwed in, you will not get any fluid when you depress the trigger. The more you unscrew the paint flow adjuster, the more fluid you will get out.



This is the DeVilbiss DAGR typical double-action, gravity-feed airbrush.



Trigger-action airbrushes are becoming increasingly available. Beginners tend to find this type of airbrush easier to use, due to the single, linear movement of the trigger.

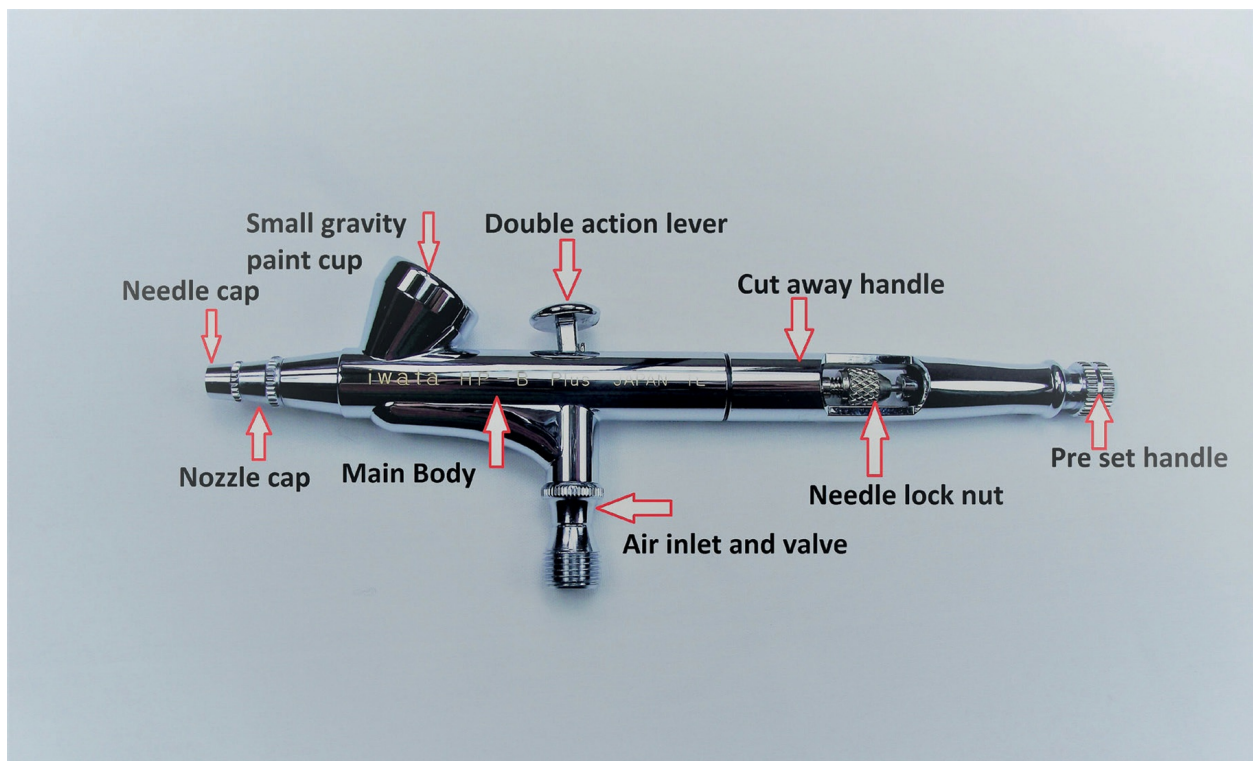
Double-action airbrushes have a spring-tensioned trigger, so when you press down for air you can also pull the trigger backwards. The more you pull back, the more fluid you will get out. Some companies are now developing airbrushes with triggers and handles like those used on small commercial spray-guns; these are classed as double-action airbrushes. The airflow starts first and then the paint is supplied in one linear movement from the operator. Some people, especially beginners and those with dexterity problems, find using a trigger airbrush easier to use, others prefer the traditional method of push down and pull back lever.

To get the paint into the airbrush there are three types of feed: suction feed, gravity feed and side feed. Suction feed tends to require more air to draw the paint up into the airbrush. Paint fed from above

the airbrush uses the force of gravity to push the paint into the airbrush to be mixed with air. The advantage of this system is that slightly thicker paint will still go through for spraying. Side-feed airbrushes can be used as either gravity or suction, and have available different sizes of bottles and cups for the paint.

Parts of an Airbrush

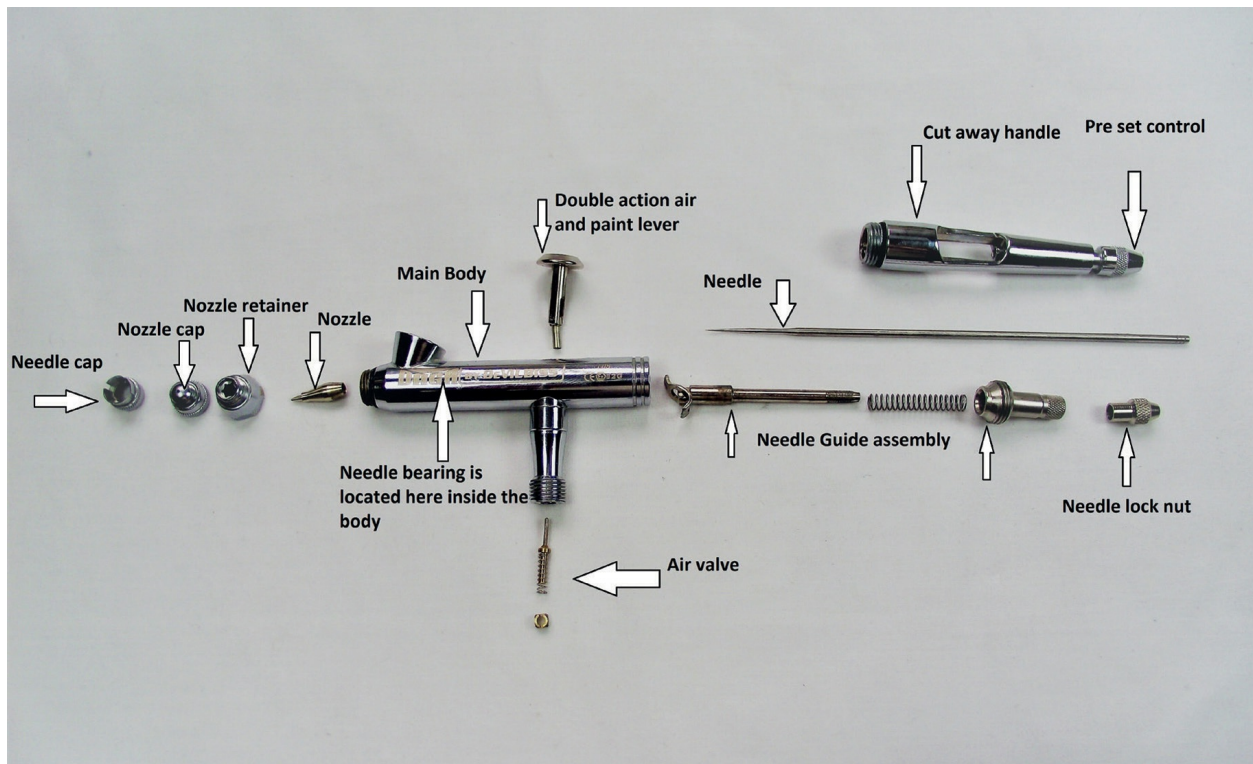
Every airbrush manufacturer will build their airbrushes differently, but the principle will be the same for all airbrushes. You will have the following basic parts:



The basic parts of an airbrush.

- Body
- Handle
- Nozzle cap
- Needle cap
- Nozzle
- Needle

- Trigger
- Air valve



The DeVilbiss DAGR dismantled, showing all the removable parts. Different manufactures will use different names for some of these parts, but the basic assembly will be the same.



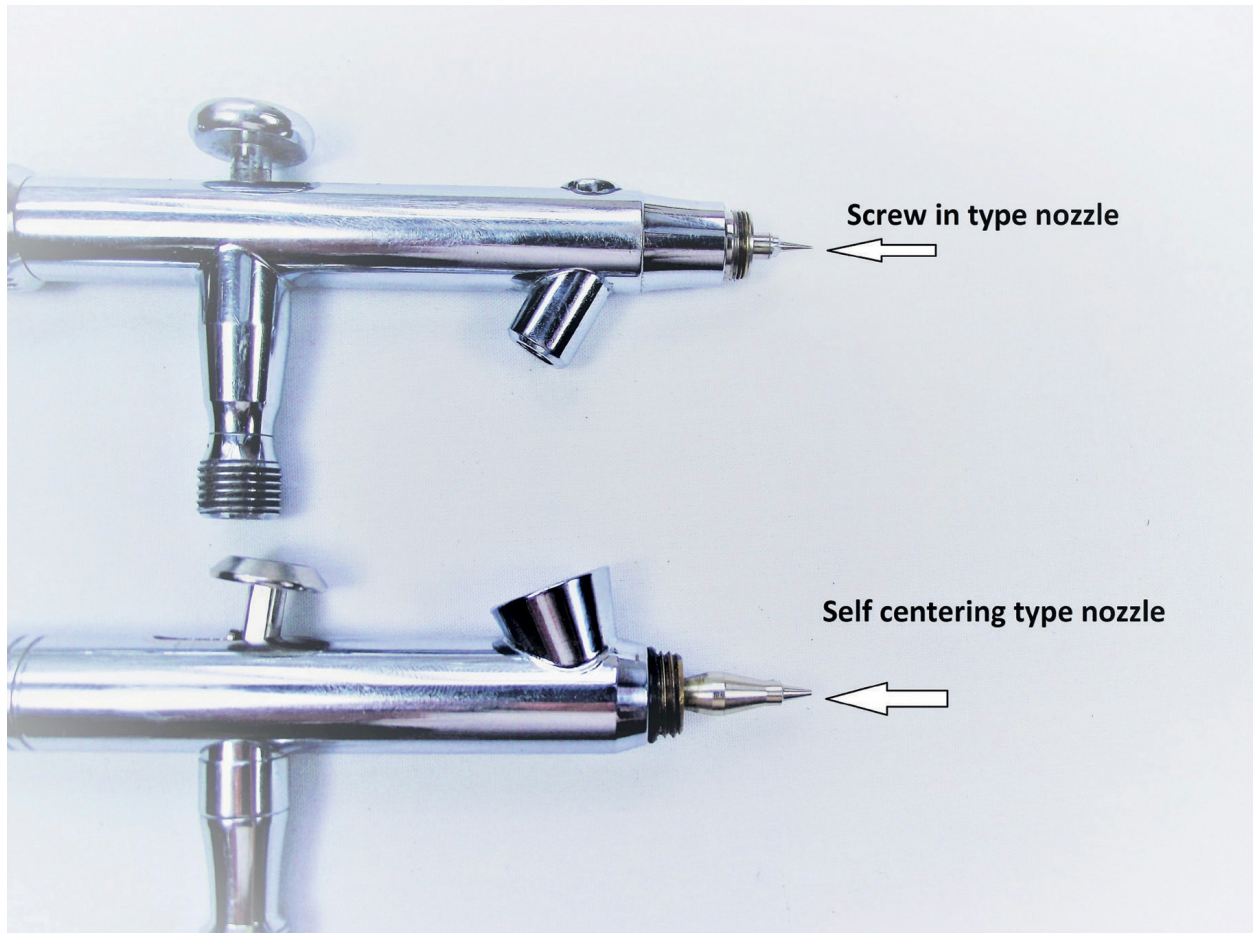
The Iwata toolkit is expensive, but having the right tool for the job will save money in the long run. The plastic jaws on the pliers are very useful; they will save damaging the external surface of the airbrush when removing tight nozzle caps.

Inside the airbrush body will be a needle bearing, a needle guide and a needle lock-nut. The needle bearing is held in place by a nut or screw and usually requires special tools to remove it. There are specialist airbrush importers and wholesalers like The Airbrush Company who have a dedicated engineer who will service your airbrush and compressor if you do not have the skills, confidence or tools to do the job. For Iwata airbrushes there is a dedicated toolkit, which comprises of specially designed tools for dismantling Iwata airbrushes; some of the tools will be universal for use on other brands of airbrushes also.



Various types of needle cap or crown cap you may come across.

Needle caps are there to protect the needle tip from being damaged; their appearance can vary from just two prongs pointing forwards to a cone shape or crown cap. When working close to a piece of work, the overspray and air needs to escape to prevent a build-up of paint in the cap, this is where a crown cap comes in – the gaps between the peaks allow the overspray and air to escape, therefore stopping a build-up of paint being blown on to your work.



Two types of nozzle you will come across.

Nozzle sizes are designed for viscosity of the fluid, as well as the coverage required. Some manufacturers do not give actual sizes but give fine, medium or large indications. Listed below is a guide to sizes available.

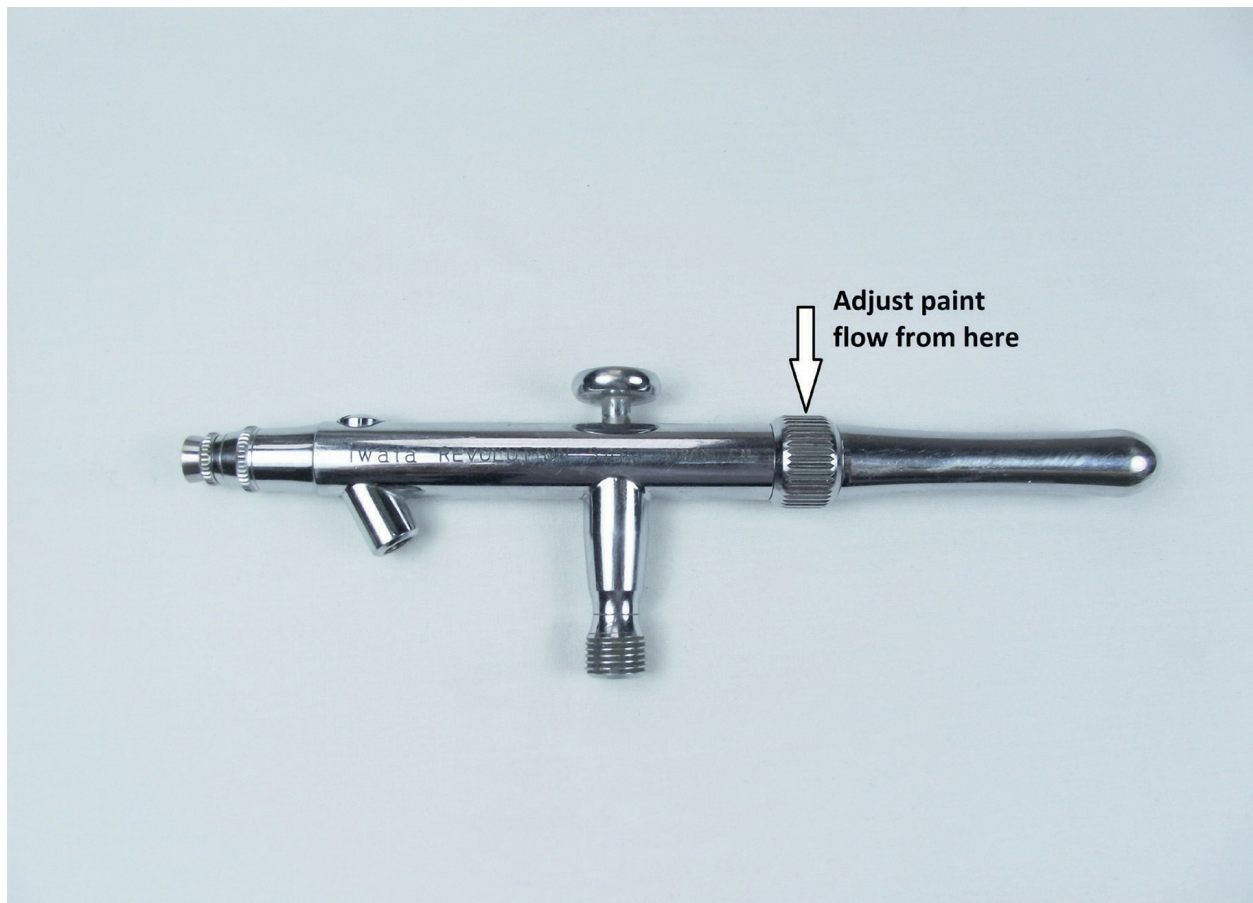
- 0.15–0.2mm: for very fine, delicate work.
- 0.3–0.35mm: fine work and medium coverage.
- 0.4–0.5mm: medium to large areas, but many airbrushes are still capable of doing fine work with a 0.5 nozzle.
- 0.6–0.8mm: large area coverage.

Generally there are two types of nozzle: self-centring or screw-in thread. The self-centring nozzle is easier to handle and clean, whereas the screw-in type is easily sheared off or lost. Both types are

delicate and require careful handling.

Handles will vary too. A pre-set handle allows you to use a double-action airbrush like a single action one, if you are doing fine, delicate work, such as mottle patterns on German World War II aircraft, and you can pre-set how far you can pull back on the paint flow, so not to accidentally ruin what you are doing.

A cut-away handle allows you to grasp the needle lock-nut and pull fully back to clear a blockage or to empty the paint cup of fluid for quicker colour changes and cleaning.



Iwata Revolution SAR is a single-action airbrush with a 0.5 needle and nozzle set-up. The fluid adjustment is carried out from the middle of the airbrush and is a suction feed.



Iwata Eclipse SBS, a side-feed airbrush, has the advantage of being either suction feed or gravity feed. There is an option to alter the 0.35 needle and nozzle set-up to a 0.5 needle and nozzle set-up.

Professional modellers will have an airbrush for every occasion, but everyone has a budget; if you choose wisely, you can get an airbrush that will satisfy all your needs. For example, if you model 1/72 scale aircraft, a 0.2 nozzle with a small gravity cup will be fine for doing a 1/72 scale Bf 109 with a 126mm wingspan; but if your next project is a 1/72 scale Concorde with a 363mm wingspan, you are going to struggle and you will need a bigger cup size and a 0.35 or 0.5 nozzle. A more appropriate airbrush would be the Iwata Revolution or Eclipse range, which would cope with the Bf 109 and the Concorde, as would the Devilbiss DAGR or the Badger 150 with a medium to large needle and nozzle set-up. The main point is to get started and make sure you get an airbrush that will cope with all your needs. You can always expand your range when you are more proficient and have the budget.



The Harder and Steenbeck Infinity CR plus airbrush is capable of doing very fine work with the option to have a 0.15 or 0.2 needle and nozzle set-up.



Airbrushes with a conventional trigger are becoming more popular

with modellers and many manufactures are providing them. Needle and nozzle set-ups from 0.2 to 0.5 are available.



This is the Sparmax GP-850. It has a 125cc removable gravity bottle and has a 0.5 needle and nozzle setup. It comes with two air caps, giving you a round spray pattern 3–50mm or a fan pattern 25–63mm. The fan pattern requires a compressor output of 1.2CFM.

SPECIAL EFFECTS

With some airbrushes, nozzle caps can be removed and by adjusting air pressures and fluid viscosity, you can create a spattering effect. This can be used for custom-painting effects like the base used for the Miss Demeanour model or for mud splashes on airframe under-surfaces.



Using spatter effect to replicate stars on a base for Hawker Hunter Miss Demeanour. Start by applying a random shape of blue paint. There are a few ways to achieve a spatter effect, one is to reduce the air pressure (so that the paint does not atomize) and, therefore, the airbrush spits the paint out. Build up paint on a lolly pop stick and use the air pressure to blow the paint off, or flick paint off a stiff-haired brush.



Once you are happy with the white spots, cut a cross in a sheet of paper, place the centre of the cross over one of the spots and spray a small amount of paint over the cuts. The air pressure will allow the paint to go through the cuts, giving the effect you can see in this picture. Afterwards you can place freehand spots of white on the centre of the cross and on more distant stars. Finally, place a gloss clear coat over the whole piece.

Seals and Ultrasonic Baths

All airbrushes have seals on or in them. Areas like the air valve, nozzle caps, needle bearings and handles will usually have rubber seals, but some will have seals made from Teflon. Rubber seals are easily damaged, especially if you are using solvent-based paints and cleaners. Teflon seals are more resistant to solvents and harder wearing, but even then, if you leave an airbrush soaking in any form of cleaner for long periods, you are likely to create problems with sealing or with movement of parts, e.g. the air valve, as rubber seals in

particular will swell up. For deep cleaning, you can use an ultrasonic bath, which uses ultrasonic vibration to clean, and is especially good on nozzle caps and nozzles. Airbrushes that are used daily or weekly will benefit from being stripped down fully and cleaned every month. Airbrushes that are not used so frequently could be thoroughly cleaned six monthly or even annually, especially if they are cleaned through thoroughly after use. If you do not have an ultrasonic cleaning bath, you can purchase cleaning brushes that are especially designed for cleaning airbrushes. These are available from airbrush retailers.



Ultrasonic cleaning baths take all the hard work out of cleaning your airbrush. You will be surprised how much dirt will come out of what you thought was a clean airbrush.



Cleaning brushes should be an essential part of your airbrush cleaning kit. These types of brush are specifically designed for cleaning airbrushes

WARNING

Please note ultrasonic baths get hot and some are made from plastic, so do not use any solvent directly in them. If you want to use solvent, place the

solvent into a small glass dish with the parts in, place the dish into the bath and surround the dish with water. The ultrasonic cleaning will still work through the glass but the solvent will not be in direct contact with the heat source or with the plastic of the bath.



Airbrush parts are in solvent in the glass tumbler, and the tumbler is placed in water in the ultrasonic bath.

EXTRACTORS, FACE MASKS AND ANCILLARY EQUIPMENT

Many model-makers will be working in a spare room, attic, on the kitchen table or maybe an outside shed. It is important to realize that

airbrushing a project will create overspray (atomized paint), which will float in the air. Whether you are using water-based or solvent-based material, atomized paint should not be ingested through breathing. From a health and safety point of view, as a minimum you should wear a paper dust-mask and ensure good ventilation, to protect your respiratory tract. If you are doing a large amount of airbrushing and your budget allows, consider buying an extractor. The extractor comes with filters and ducting, which can be placed through a window or fixed to a vent. If you purchase an extractor, please make sure it is electrically CE approved and is approved for use with solvents, to reduce the risk of electrical or solvent fire. If you are using solvents, the filters will eliminate dust that would otherwise settle on your work and in the paint, and will also get rid of any fumes that may be present. Extractors suitable for use in a domestic setting are becoming more readily available and start at a reasonable cost (approximately £85.00 at the time of writing).



Extractors come in various sizes to suit available budgets. This one is

portable, everything folds up and the power lead retracts back into the box, which has a handy carry handle, useful to people short of space.



Health and safety is everyone's responsibility. Atomized paint should not be ingested, even if it is water-based. Take precautions whenever you rub down filler, resin or when spraying paints.

There are many types of mask available, from dust-filtering, half-masks from DIY stores, to half-mask respirators with various types of cartridge for use with different applications. If you are using solvent-based paints, then the half-mask respirator should be used. When you are mixing paint or handling a model during painting, inevitably you will get paint on your hands. To protect your hands it might be wise to

invest in a box of vinyl or latex gloves. A box of 100 pairs will cost under £10.00.

During painting you are likely to find that your hands are full when you need to put the airbrush down, perhaps to top up the paint or to move the project around. An airbrush hanger is a convenient tool to have or, alternatively, you can use a clean pot. This can be used as a safe receptacle for wasted paint or for spray cleaners that you are running through your airbrush. Clean pots are also a place to place your airbrush.

A hairdryer is a useful tool to have, especially if you are using acrylics. If you make a mistake, you can force dry the paint in minutes and repair the problem. You can also mask on to the force-dried paint without fear of damaging it, but you cannot do this with enamel paint as it requires 24h to cure.

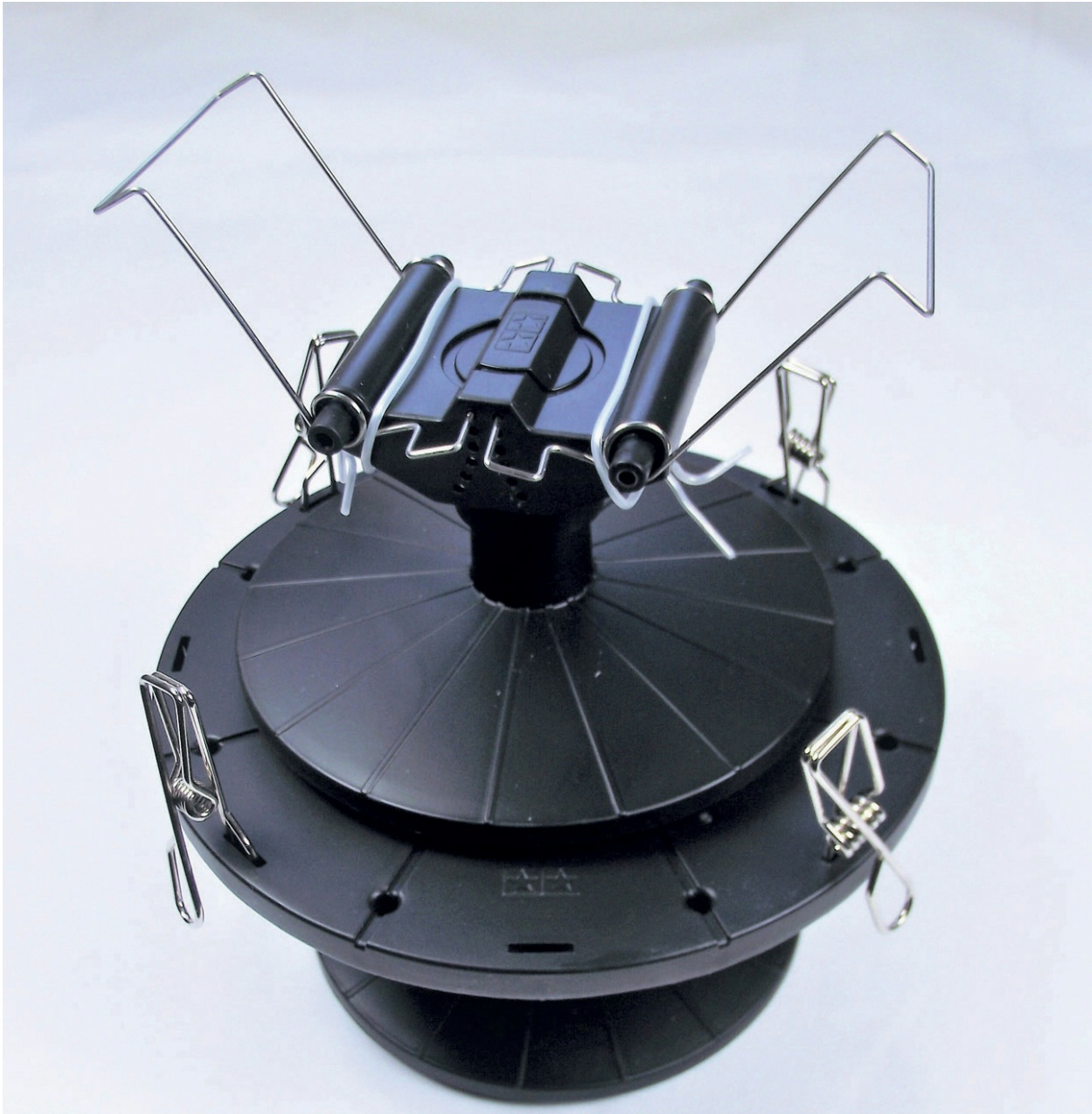
COLOUR CHARTS

Model kit and decal manufacturers all give varying information when it comes to painting your model. For example, Tamiya will give Tamiya paint colours or give the name of the colour, such as RAF Ocean Grey. In the real world there are conclusive recorded documents to which many modellers regularly refer and those listed here are the ones most commonly used:



These are just a few available colour charts or manuals that can assist you in choosing the colour you require. The federal standard book is available as a colour fan. Both versions are expensive but only really necessary for people carrying out extensive painting. Most of the information is now freely available online.

- British standard colours (BSC)
- Federal standard colours (FS)
- Reich's Luftfahrt Ministerium (RLM)
- Reich's Ausschuss Lacke (RAL)



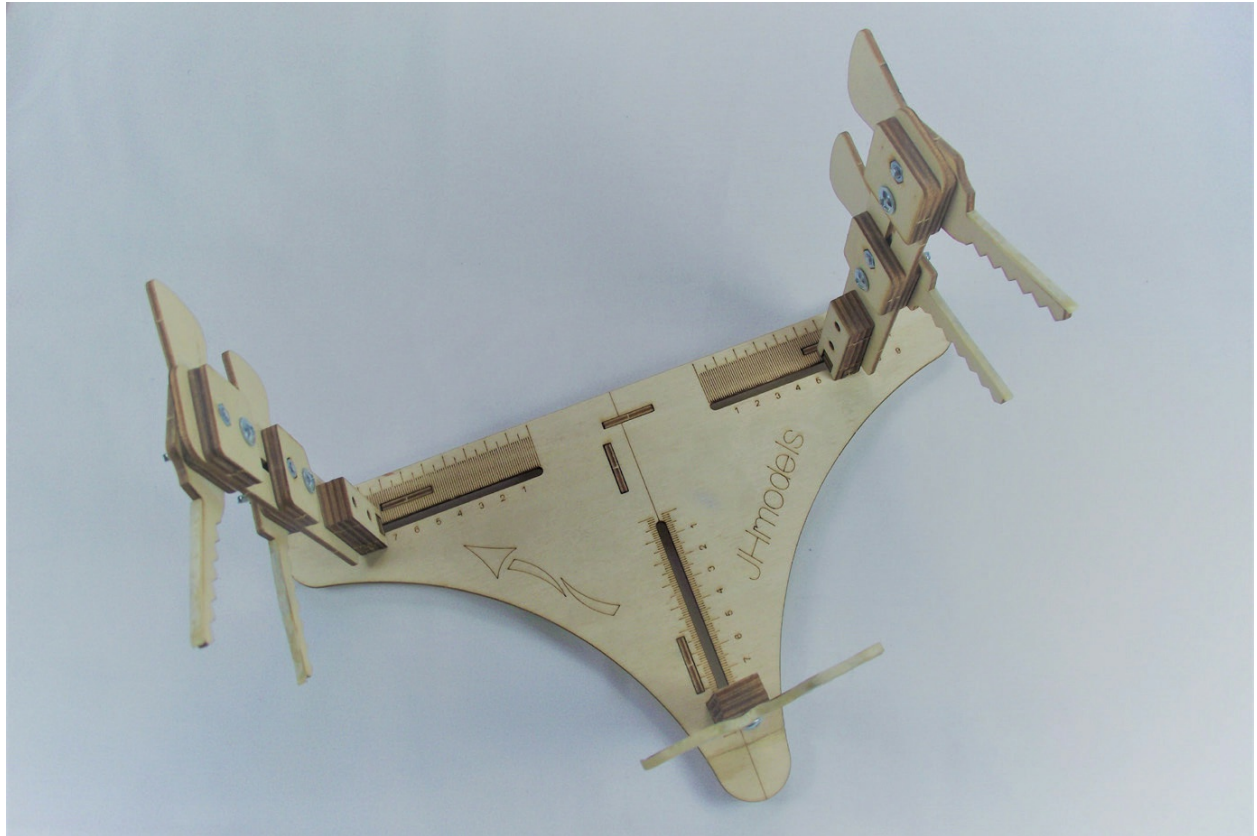
The Tamiya painting stand is in two separate parts, the upper unit is seated upon the lower unit and both are able to rotate.

By searching online you will find many cross-reference charts that will list the colours and who makes them. For example, the model paint manufacturer, 'Lifecolor' produce a cross-reference chart with their colour charts. There are others available. Constancy in colour production is not as precise as the manufacturers would like it to be. Accuracy in matching a particular military shade may vary with

different model paint manufacturers, and even with full-size aircraft paints, colour batches can deviate. Please be aware that printed or on-screen colour chips will not be accurate due to the printing process or the on-screen settings.

MODEL PAINTING JIGS

One of the problems that can occur when you start airbrushing your model aircraft is how to hold the model during the spraying process to ensure you don't break it, smudge wet surfaces or create an accidental 'mask' of your fingers. Creating a jig is a good solution, but aircraft are all so very different in size, shape and suitable hold areas. With military jet aircraft, the jet pipe can be used with a dowel of the appropriate size inserted into a wood base; the model can then be turned with no problem and left on the jig to dry. Other methods include coat-hanger wire formed upwards so the ends go into the undercarriage bays; these are then held with a clamp. The paint manufacturer Tamiya make a multi-function paint stand with various clips, and a building jig can also be used.



The JH Models' building jig can also be used for painting.

Chapter Four

Getting to Know Your Airbrush

SETTING-UP

Once you have assembled your airbrush and compressor, you will need to set the pressure you want to spray at. Some manufacturers will have the regulator screwed fully in, which means that when you switch the compressor on, the pressure will shoot up to maximum, so be prepared for it and watch the pressure gauge. Turn the regulator anti-clockwise to reduce the pressure. To set the pressure you want to spray at, press the trigger on the airbrush to get the air flowing through the airbrush and adjust the regulator anti-clockwise or clockwise to the pressure you require. When you let go of the trigger to shut the air off, the pressure will rise slightly on the gauge, but then settle back to the pressure you set when you press the trigger again.



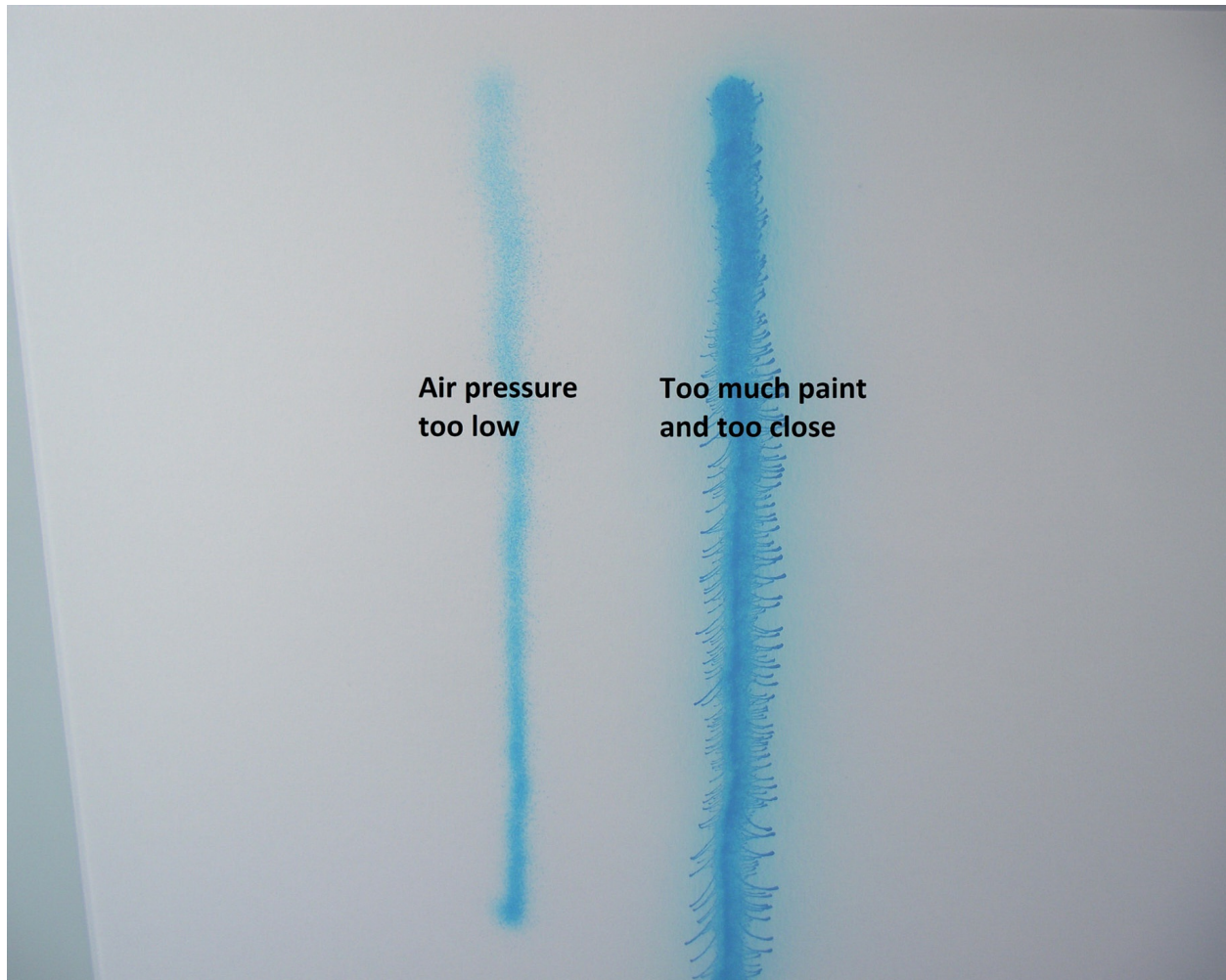
Using ink or food colouring eliminates the possible problems that might be encountered in mixing paint when a modeller is using an airbrush for the first time. When you start to mix up and use paint, you should be able to get the same results as with inks, but because paint may be more viscous, you may need to use more movement of the needle.

The basic exercises described in this chapter are all about getting control of your airbrush. First of all, get some paper or card set up on a table-top easel or propped up against a box and make sure you are comfortable with your position. There is no correct way to hold an airbrush. Using one is rather like handwriting – everyone is different. Whichever way you decide to hold it, do not be too rigid and stiff. Try to make sure you can be flexible with your wrists when doing your

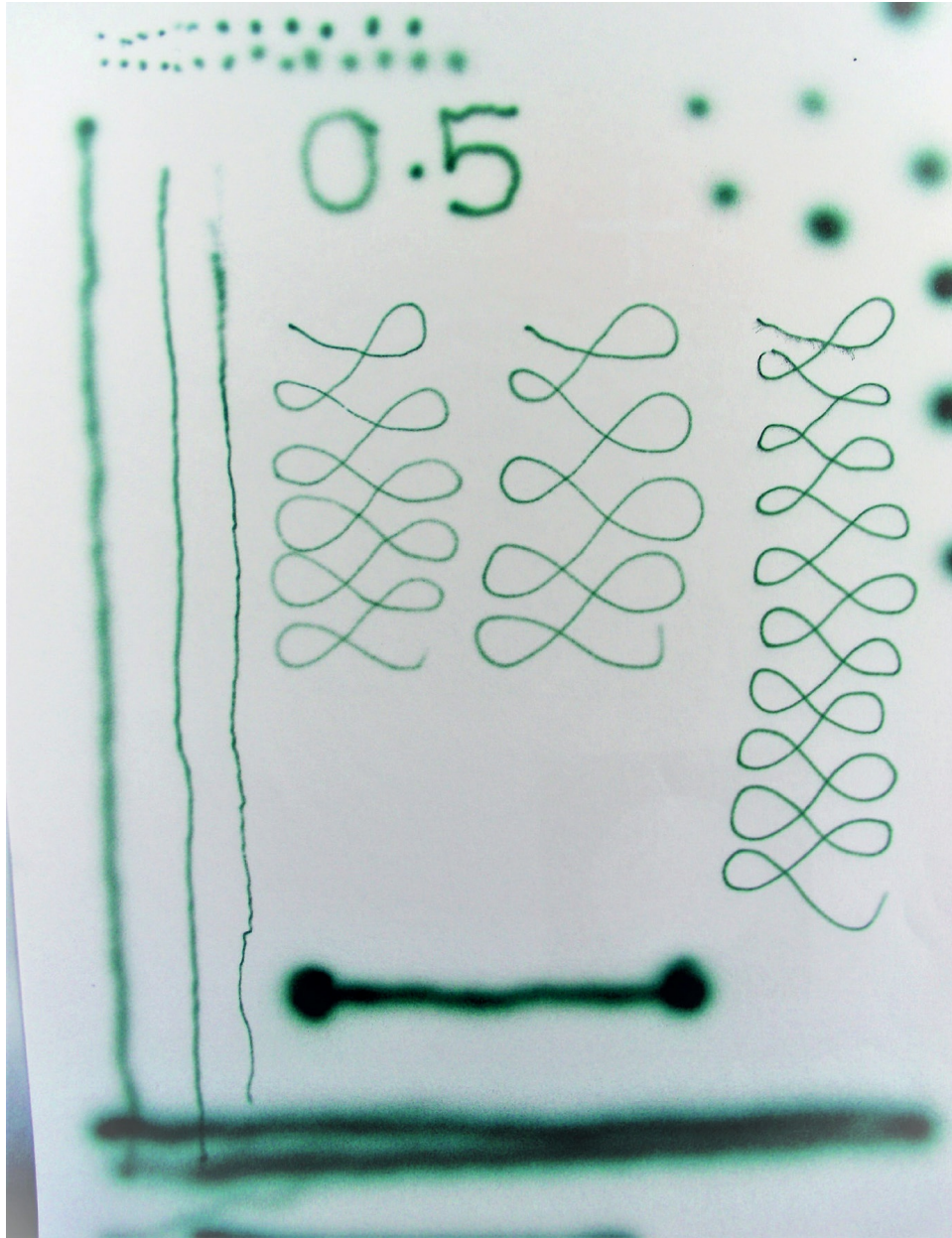
strokes. There are many airbrush instructions that state you must operate parallel and at 90 degrees to the work-piece. The distance is important but eventually you will find you do not have to be at 90 degrees from the work-piece as long as you get an even coverage. Set your air pressure between 15 and 18psi and load your airbrush with pre-thinned paint, food colouring or ink. Using one of these eliminates the mistake most people make, which is having the paint too thick, and each is easy to clean out.

FIRST STEPS – SINGLE-ACTION AIRBRUSH

Using a single-action airbrush, unscrew the fluid adjuster one-quarter of a turn and hold the airbrush approximately 6mm away from the paper. Now press down the trigger and release it. You should have a small spot of paint on the paper. If not, open up the fluid adjuster a little more until you do get a spot. If you are using a suction feed, you may need to get the paint flowing first by unscrewing the fluid adjuster more, but on a gravity airbrush, the paint flow will usually be instant. Now vary the distance from the paper and by unscrewing the adjuster to provide fluid, experiment to make dots of different sizes. Now practice doing straight lines, circles and vary your distance and air pressure to see what difference each change makes. It is best to keep your painting stroke slow and steady, with continuous momentum, and let go of the trigger as you withdraw the airbrush. If you just stop on the page, with the paint flowing, a completed line will have a build-up looking like a ball on each end and the colour will usually run. This is referred to as 'barbelling'.



This picture demonstrates the most common application problems. Applying too much paint, too close to the surface is the most likely. Don't be too hard on yourself, take your time and keep trying. It only takes practice.



A single-action 0.5 needle and nozzle set-up was used to produce this sheet; the 'barbell' effect low down on the sheet is over-exaggerated for demonstration purposes.

FIRST STEPS – DOUBLE-ACTION AIRBRUSH

The correct way to operate a double-action airbrush is to start running the air and then move the trigger backwards for paint. If you do it the

other way around, you will let fluid into the nozzle first and when you apply the air, it will spit out the paint and make a mess of your piece of work. To practise, hold the airbrush approximately 6mm from the page and apply the air, then move the trigger backwards 1 or 2mm. Straight away let go of the trigger and you should have a small spot of paint. If you get a spot of paint with 'legs' coming from it, you are pulling back too far. If you get nothing at all, you need to pull back on the trigger a little more. Keep trying this in different ways, for example bring the airbrush further away from the paper, then try letting more fluid out to get larger spots. Once you have mastered spots, try doing some lines, figures-of-eight, circles and curves. You can also adjust the air pressure up and down to see what different results you get. To practise with greater precision, use a children's colouring book to fill in basic shapes. Spending time doing these exercises will give you confidence and control.



Children's colouring books are useful to practise control by filling in the

shapes. This helps with eye to airbrush to surface co-ordination.

COVERAGE

Irrespective of which airbrush you choose to use, as well as control over direction and flow, you will be aiming to get an even coverage of paint. As a first exercise, on a piece of paper, mark out a 100mm box and attempt to fill it in, moving from left to right. When starting to do this, it is common to get stripes or light gaps between your strokes. This is caused by moving the paint flow too far away from the first stroke when making your next stroke. You should aim to have an overlap of each stroke. If you do get stripes, it is an easy fault to remedy by doing a cross-coat, going from top to bottom, but this time make sure you lightly overlap your strokes. When using paint, rather than ink, you will need to let the first coat 'flash off' before doing this.

COMMON PROBLEMS

When doing these exercises, if you get spattering or a grainy look on each side of the line, try increasing the air pressure. If paint is blowing around, then the pressure is too high or you are too close to the page. Please bear in mind, when using ink or food colouring on paper, that it will react differently to paint, but it is important, when first starting out, to gain control of your airbrush, and ink or food colouring are easily removed and cheaper to buy for trialling and for practice. Every time you mix any paint up for a model, repeating the same exercises should give you the same results and build your confidence in using the new material.

On both double-action and single-action airbrushes, if the fluid knob is fully closed down and you get paint out when you depress the air lever, this means the needle is not seated properly within the airbrush. Release the needle lock-nut and pull the needle rearwards, then gently push it forwards again until it comes to a natural stop. Never try

to push it beyond this because if you force the needle into the nozzle, you will damage the nozzle. Some manufacturers send out new airbrushes with the needle drawn back for safety during transit, so you will need to check any new airbrush you purchase and reset the needle, if necessary.

To avoid spoiling your building work, never start painting directly on to the model you have just built. Instead use an old model or a piece of card. It is good practice to do this because if something is wrong with the mix or the pressure, it will show and you can do something about it without making a mess on your model.

END OF SESSION CLEANING ROUTINE



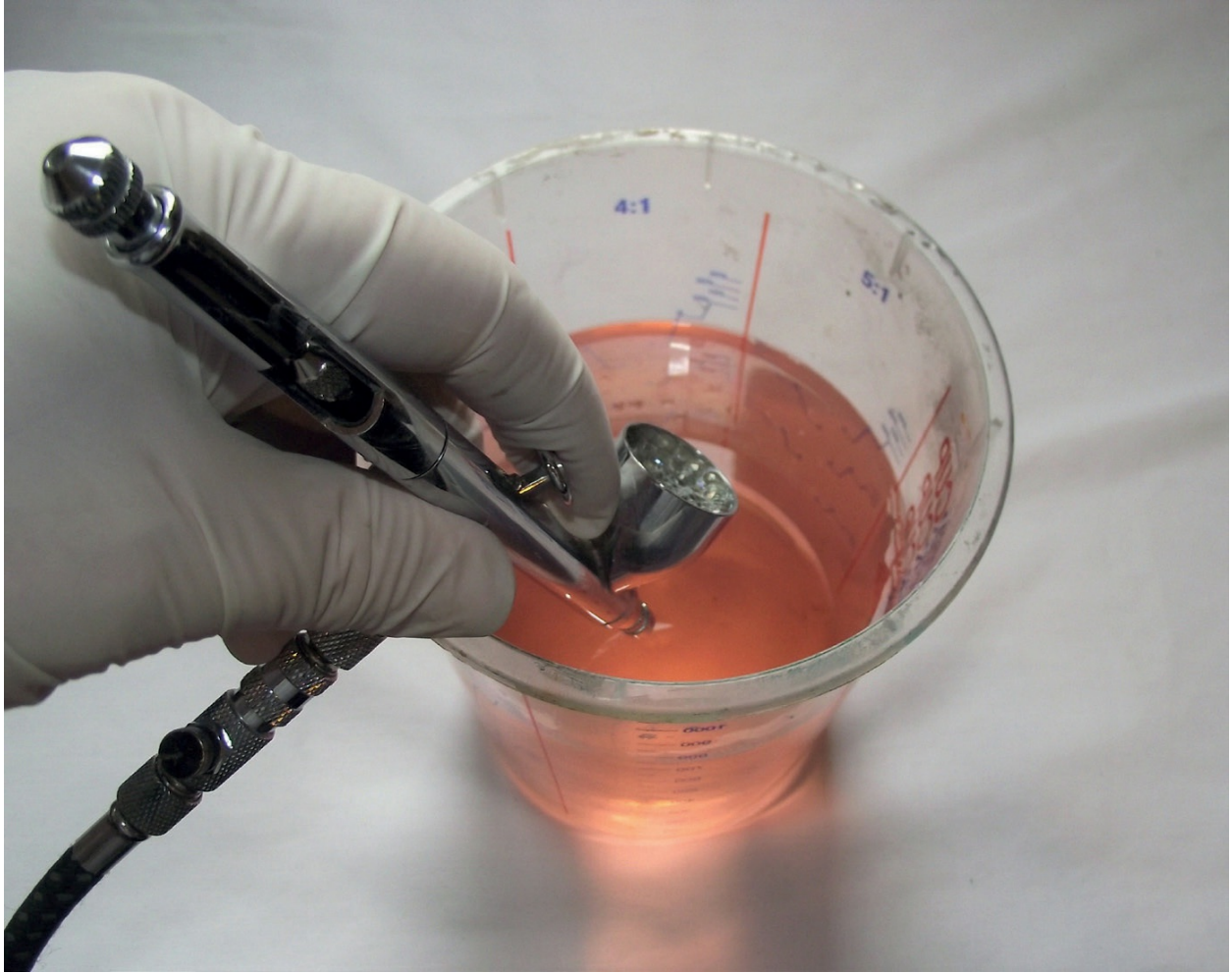
There are many brands of cleaners you can use. Make sure the ones you choose are suitable for the paint you are removing. For example, the Medea cleaner (left) and Active Foamer (right) are for acrylic paint only. The liquid reamer will clean out anything.

1. Cleaning your airbrush is vital to keep it running smoothly and to stop blockages.



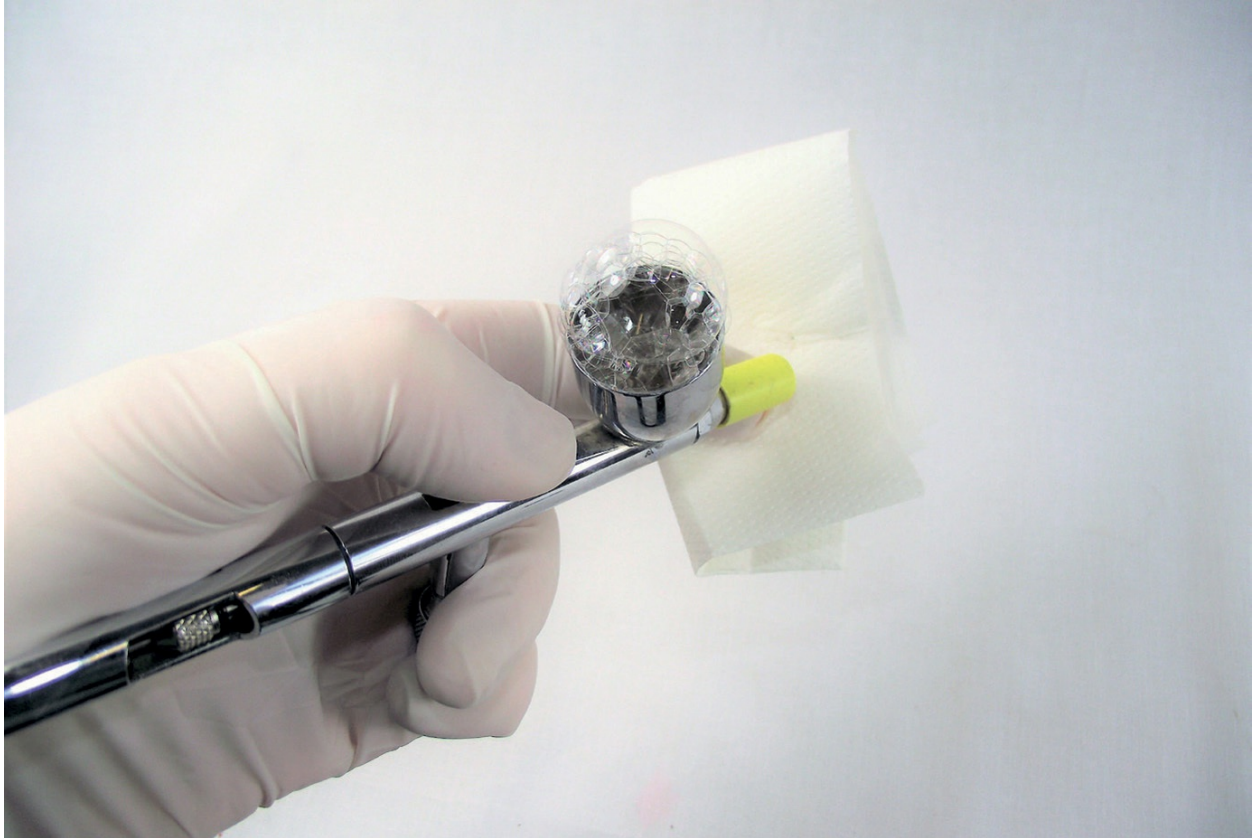
The plastic bucket is used for immersing the airbrush into water or solvent for initial cleaning. The clean pot (right) is used for disposing of paint or cleaner, saving harmful overspray getting on to the surrounding workspace.

2. For water-based acrylics, empty out any remaining paint in the cup and in the airbrush by operating the airbrush into a cleaning station pot, if you have one. If you do not have one, empty it into a waste container.



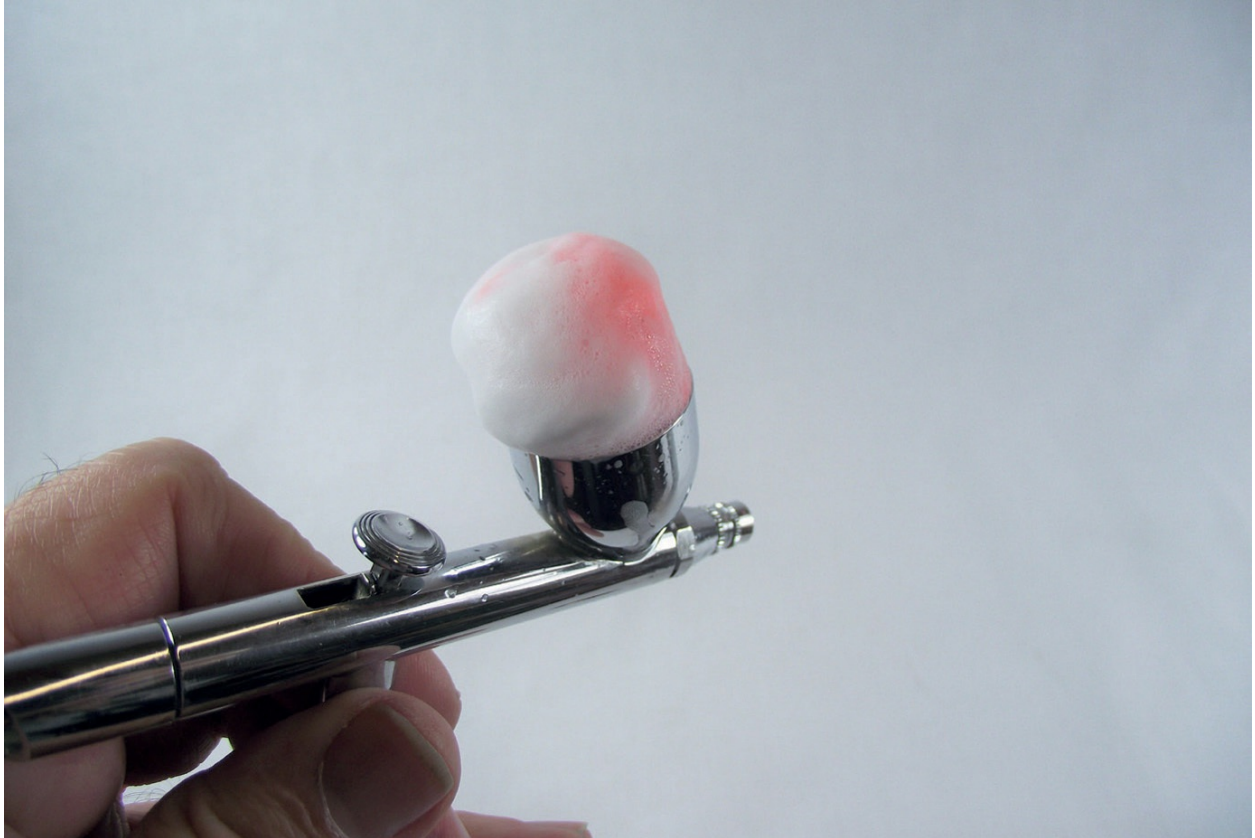
Immersing the airbrush for a short period during cleaning is not a problem, but do not leave the airbrush soaking in anything. If you keep the air pressure low (less than 20psi), you can flush through the airbrush while it is immersed in water.

3. Replace the paint with water or some thinner appropriate for the material you used, if the colour isn't water-based. Using a cleaning brush, agitate with the brush to remove stubborn paint left on the cup walls, and discharge into the waste container. Keep doing this until the cleaning fluid is running clean.



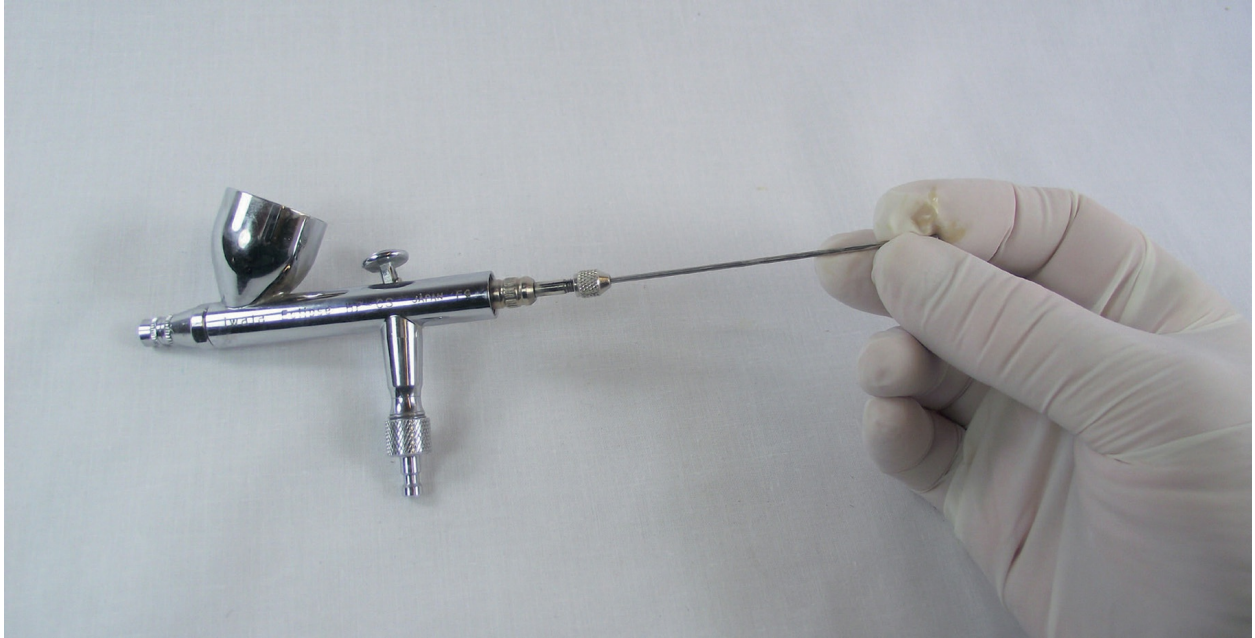
This action will help clean the nozzle and will clean away any paint around the needle bearing. If you get cleaner coming back into the handle or around the trigger area you, need to adjust or replace the needle bearing.

4. With water or acrylic cleaner in the airbrush, hold a pad of tissue or a plastic cap over the end of the needle cap and operate the airbrush. This should blow fluid back into the cup. Next, release the tissue or plastic cap and operate the airbrush again. Repeat several times, flushing fluid back and forth through the nozzle.



Active foamer will draw up paint from the airbrush if any is still present. It will not fully remove it, but it lets you know paint is still there.

5. Next, insert a propriety airbrush cleaner for acrylics and flush through the airbrush. After flushing through, an active foamer can be used. Let the foamer do its work for a few minutes. If there is still paint present, it will come up through the foam. Then flush through with water or some more cleaner.



Undo the needle lock-nut anti-clockwise and withdraw the needle rearwards.

6. Now remove the needle from the airbrush by unscrewing the needle lock-nut and drawing the needle rearwards.



Carefully draw the needle through some tissue with cleaner applied to it. Check the needle tip for damage and trueness. Damage to the needle tip, if minor, can be dressed out with 1,200 wet and dry. If the damage is too great, then replace the needle.

7. Carefully give the needle a wipe down using kitchen towel with cleaner applied to it. Now the needle is removed flush through cleaner, this gives the cleaner full access to the nozzle.



Using aerosol cleaner and a straw to clean a self-centring nozzle helps to keep the nozzle clear of any debris. This nozzle can be cleaned from both directions.

8. If you have a self-centring nozzle, remove the nozzle cap and remove the nozzle (you may have to wiggle it a little to remove it). You can now flush through the nozzle with an aerosol cleaner and straw.



Keeping the needle cap clean is just as vital as cleaning the airbrush interior. Inspect the cap for damage while doing this. A damaged needle cap can cause spray pattern disruption, as well as paint build-up and spitting.

9. Clean the needle cap using a cotton bud soaked in cleaner. Do not use cotton buds on internal parts of the airbrush. If cotton a bud was used internally, it may leave cotton lint inside, which could block the nozzle.



Airbrush oil, such as Super Lube, applied to the needle will help stop the needle sticking in the needle bearing. A small amount can be dropped in the trigger slot to keep the air valve operating smoothly.

10. Lubricate the needle with a little airbrush oil applied with your finger. Now reassemble your airbrush and give the outside a wipe down with cleaner.

USEFUL NOTES

A cleaning routine for airbrushes where enamel paint has been used

is the same as above but instead of water use white spirit. A very small quantity of strong solvent can be put through the airbrush, but ensure you remove all traces of it by flushing through some water. Solvent left in contact will damage rubber seals. If your airbrush has a screw-in nozzle, be careful as these are usually very small and delicate, and easily lost. Only remove these if you are confident to do so. Instead, flush through plenty of cleaner. If you do want to remove the screw-in nozzle, make sure you do so over something like a small tray.

Never leave an airbrush soaking in any cleaner as it will affect the seals.

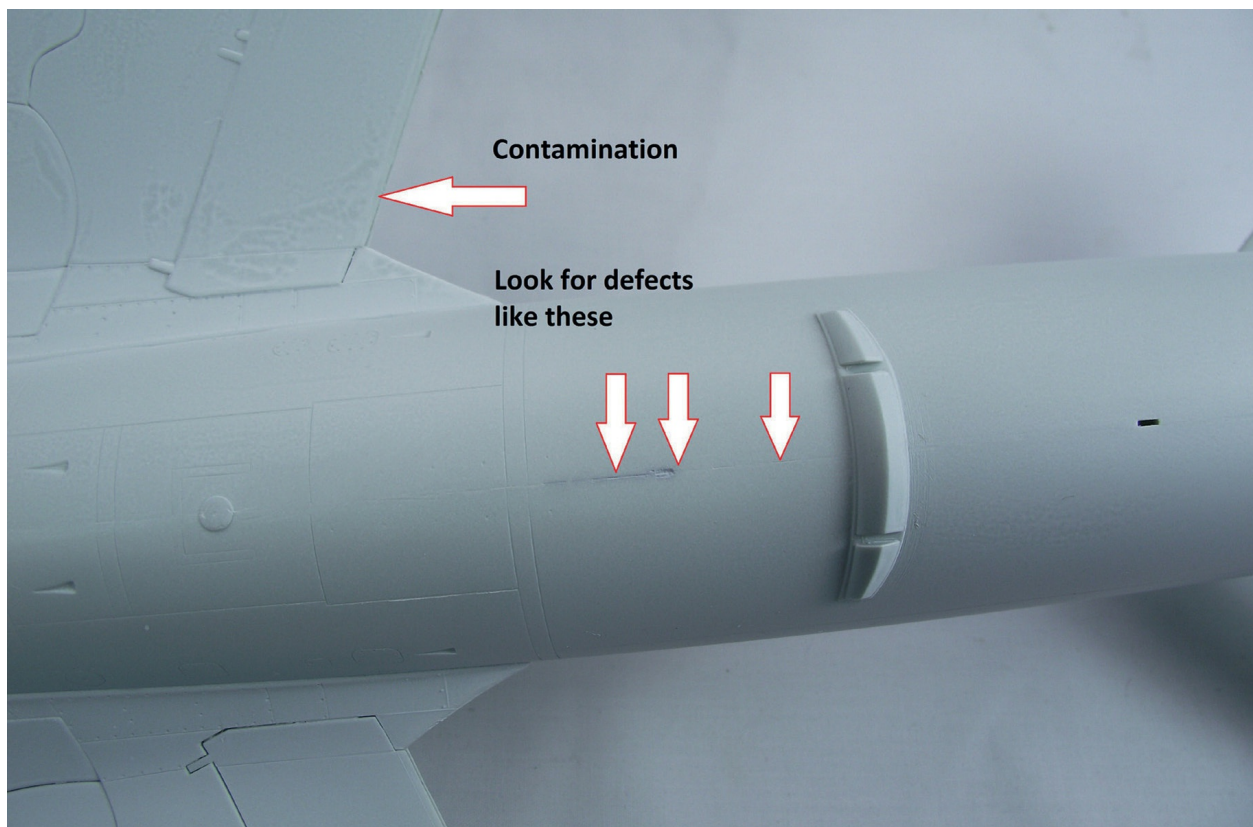
There are cleaning reamers available for clearing dried paint from nozzles. Be wary of these as they can easily damage the metal and turn your 0.3 nozzle into a 0.5.

There is no need to do a full clean between colours unless you are changing from black to white or are planning to use a clear coat on the next application. Just empty out the first colour, remembering to run the airbrush to empty out the paint from the nozzle, then put in the new colour and run some through the airbrush on paper or spare parts to check for the arrival of the new colour.

Chapter Five

Primers

Model-makers who are starting out with paint might ask why we use primers. The basic answer is that all paint needs a base to adhere to. Without a primer coat, paint will easily peel off plastic. Even the primer requires the base material to be lightly keyed, or at least thoroughly cleaned, so it has something to 'bite' on to. Primer also serves as an indication of how good the build and preparation is. If there are seams or filler patches still visible after priming, you have another chance to carry out corrections before putting on finish coats.



Typical problems that primer will highlight, which will require correction before painting finish coats.

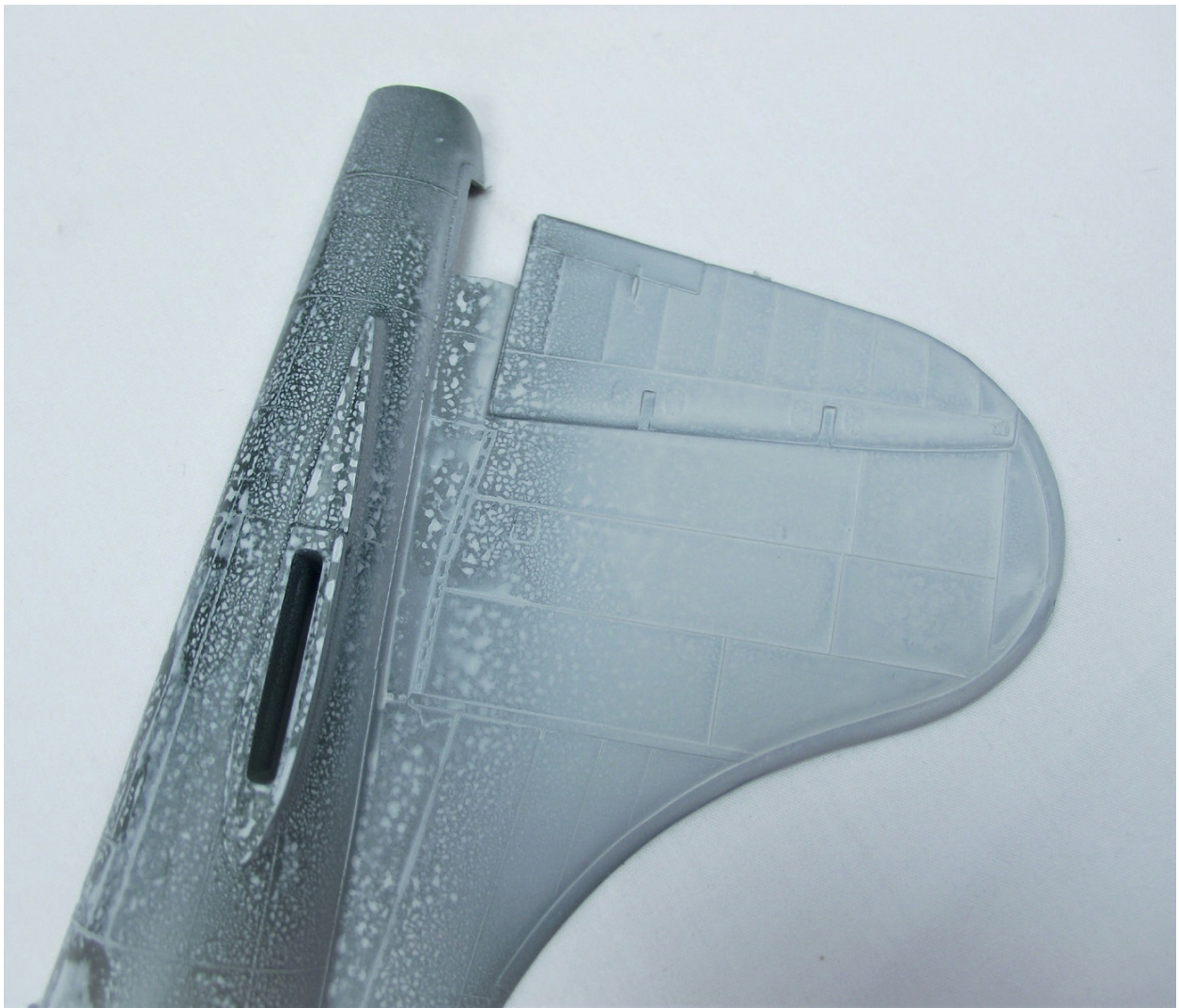


Almost all model paint manufacturers produce primer. These are just a selection of what is available.

Almost all model paint manufacturers make their own primers, so there is an abundance of primers on the market. Even aerosol primers from car-part suppliers can be used, but they tend to give a coarse spray pattern or settle too heavily, which can bury some fine detail. Preference, therefore, goes to primers specifically designed to be used with airbrushing and plastic models.

There are aerosol primers, pre-mixed primers and primers you have to thin yourself. Because the viscosity of primer is thicker than paints,

and some have micro-fillers in them, you will need to have a 0.4 or 0.5 nozzle set-up in your airbrush to apply it. Ultimate primer, which is manufactured at a viscosity intended to go straight into the airbrush without thinning, can be put on with a 0.35 nozzle set-up, if the primer is fresh and almost new. Some modellers will keep an old or a cheap airbrush just for priming. Considering the wear primer can put on an airbrush, this is a good idea. Air pressure for primers needs to be higher than finish coats. This is because primers have heavy pigments, so to atomize sufficiently, a suggested pressure would be 22psi, but you may need more, depending on the primer.



Surface tension can be seen at the base of the fin and fuselage. After force drying, the top of the fin has had a second coat.



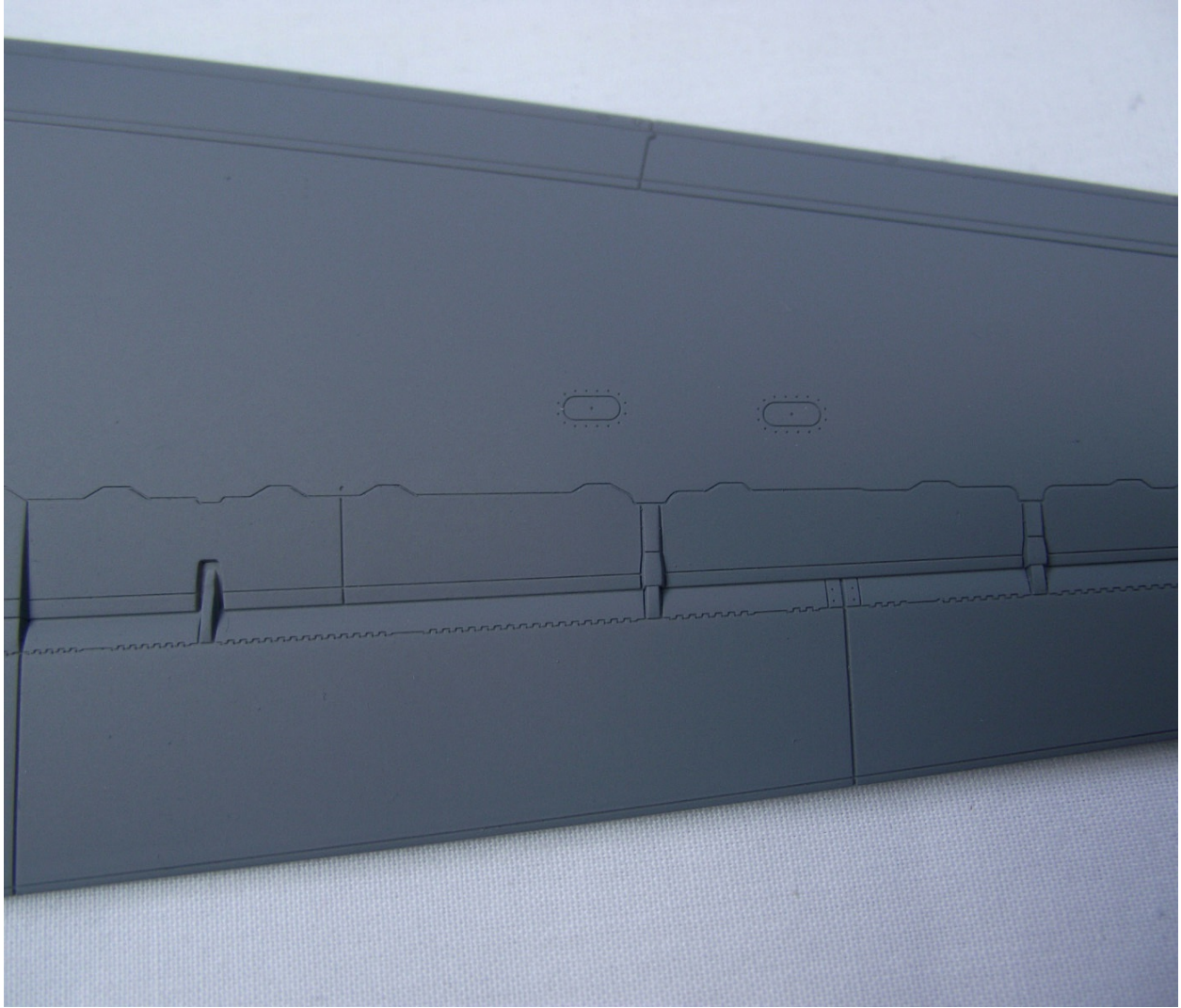
Too much primer applied in one coat will result in sags or runs. Start with light coats and build up. You must let the primer flash off between coats.

Primers come in water-based or solvent-based versions; both can have application problems. When you mix the primer yourself, be aware that some water-based primers going on plastic will just want to pull away and separate, like putting water on a waxed car bonnet. This is caused by surface tension. To get around surface tension, apply the primer in light coats, which you build up gradually, leaving 10min between coats. Primers that are pre-thinned usually do not react this way. In the illustration, surface tension has been deliberately created by slightly over-thinning in order to demonstrate the reaction. Even

though this looks excessive, it is not an insurmountable problem. You can easily get around the surface tension by either washing off the primer with a tissue or sponge, or you can force dry it with a hairdryer and continue applying light coats until coverage is achieved.

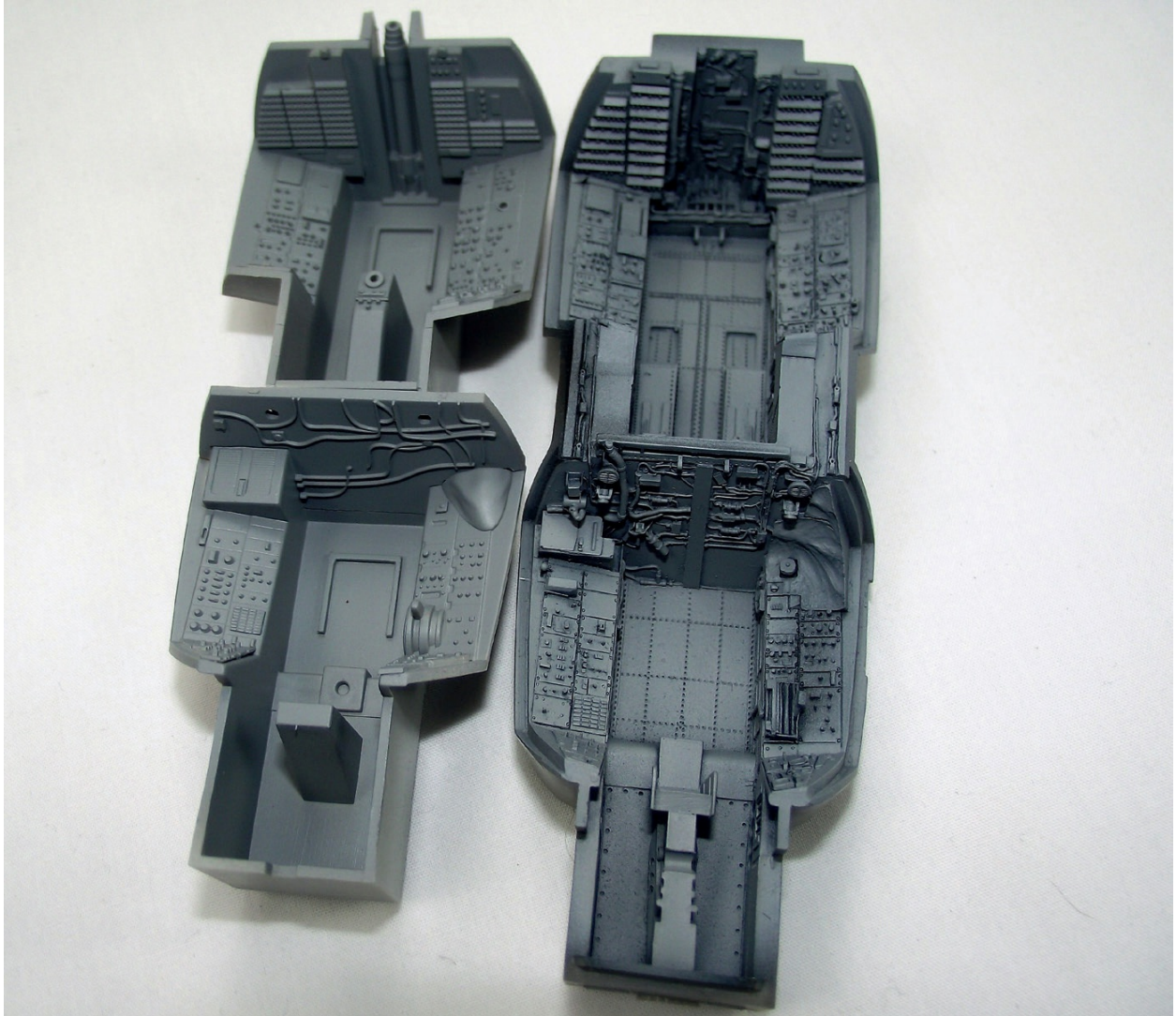


Applying Ultimate water-based, acrylic polyurethane self-levelling primer. This primer goes on very smoothly and shrinks back into detail very well.



Ultimate primer after drying.

Solvent primer can react with itself if applied too heavy, or it can give a slight reaction to certain plastics. This is not detrimental to the model, but the primer will need to be lightly rubbed down. The application of aerosol primers and airbrushed primers needs to be done carefully so as not to leave a dry and grainy surface; the best description of the finish you are seeking is to get it 'just wet'. If you make it too wet, it will run or get sags. The term 'just wet' also applies to topcoat finishes, which are discussed in more detail in [Chapter 6](#).



The primer colour you choose can affect the finish coat. In the picture, there are two primed cockpits: one using black primer and one using light grey primer. Both cockpits have then had two coats of Dark Gull Grey applied and the difference is clear to see.

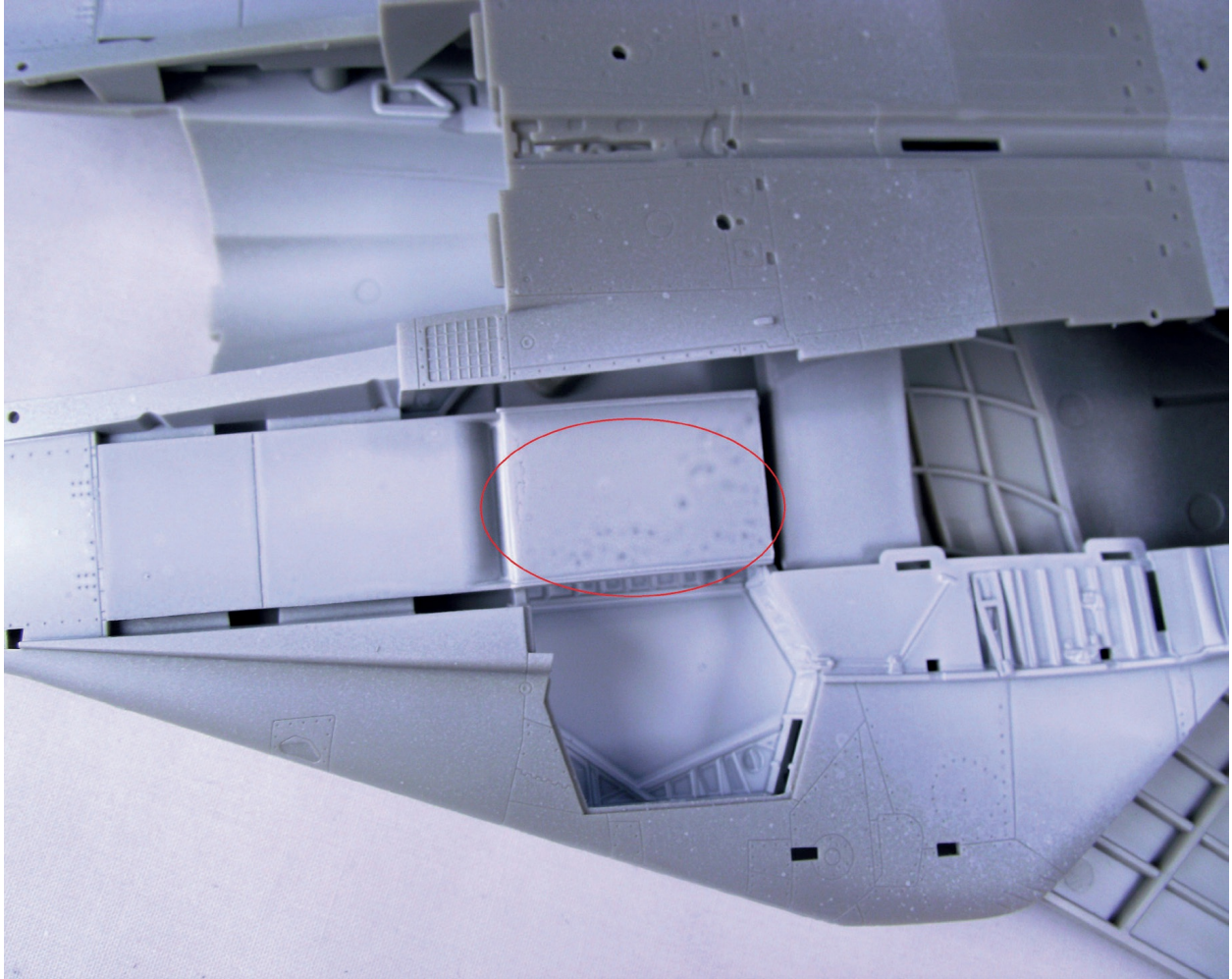
When applying primer with an airbrush, there will be times when you need more than one coat to provide good coverage. A second coat will soak into the first, so you may need to increase the amount of primer or add a touch more thinner to obtain the 'just wet' consistency. If you do not apply enough primer, it will be dry and have a rough feel to it.

Primers can now be purchased in different colours. You can use this choice to your advantage to pre-colour the work you are doing. The

three main colours available are black, white and grey, but the manufacturer of Ultimate primer now has primer available in the following colours: Red Oxide, Yellow Gelb and Olive Green. These colours could be used in chipping effects or, if you are portraying the interior of an aircraft, the Gelb yellow looks very similar to zinc chromate etch primer. Using black for cockpit interiors or areas with deep recesses can automatically provide shadow areas, so when applying, for example, a grey-coloured top coat, you do not try to cover all of the black primer, thus giving more definition. Using different coloured primers can also be useful under metal finishes. The use of different colours of primer on selected panels will achieve more panel tones from one metallic colour.

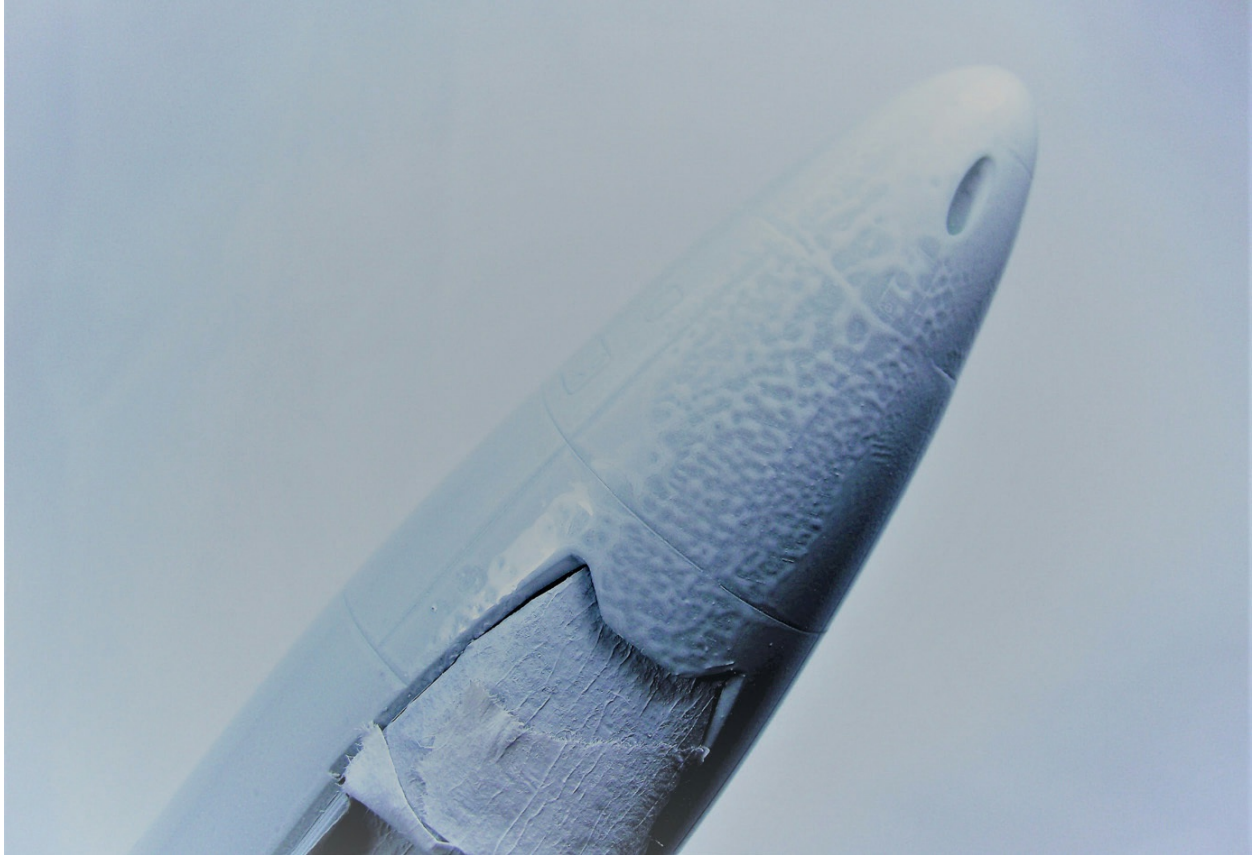
ETCHED BRASS AND RESIN

Most primers will attach to small parts of etched brass with no problems, but if you have large areas or areas that you want to mask up later on, then an etching primer should be used. Etching primer is usually an acid-based primer and not a paint, so may appear semi-transparent. Model railway paint suppliers are a good source for this material. Some of the plastic model paint primers are designed for use with metal. For example, Tamiya aerosol primer states 'for plastic and metal', as does the water-based Ultimate self-levelling primer.



A sample of fish-eye contamination, in this case visible as multiple spots. You may only get one or two spots.

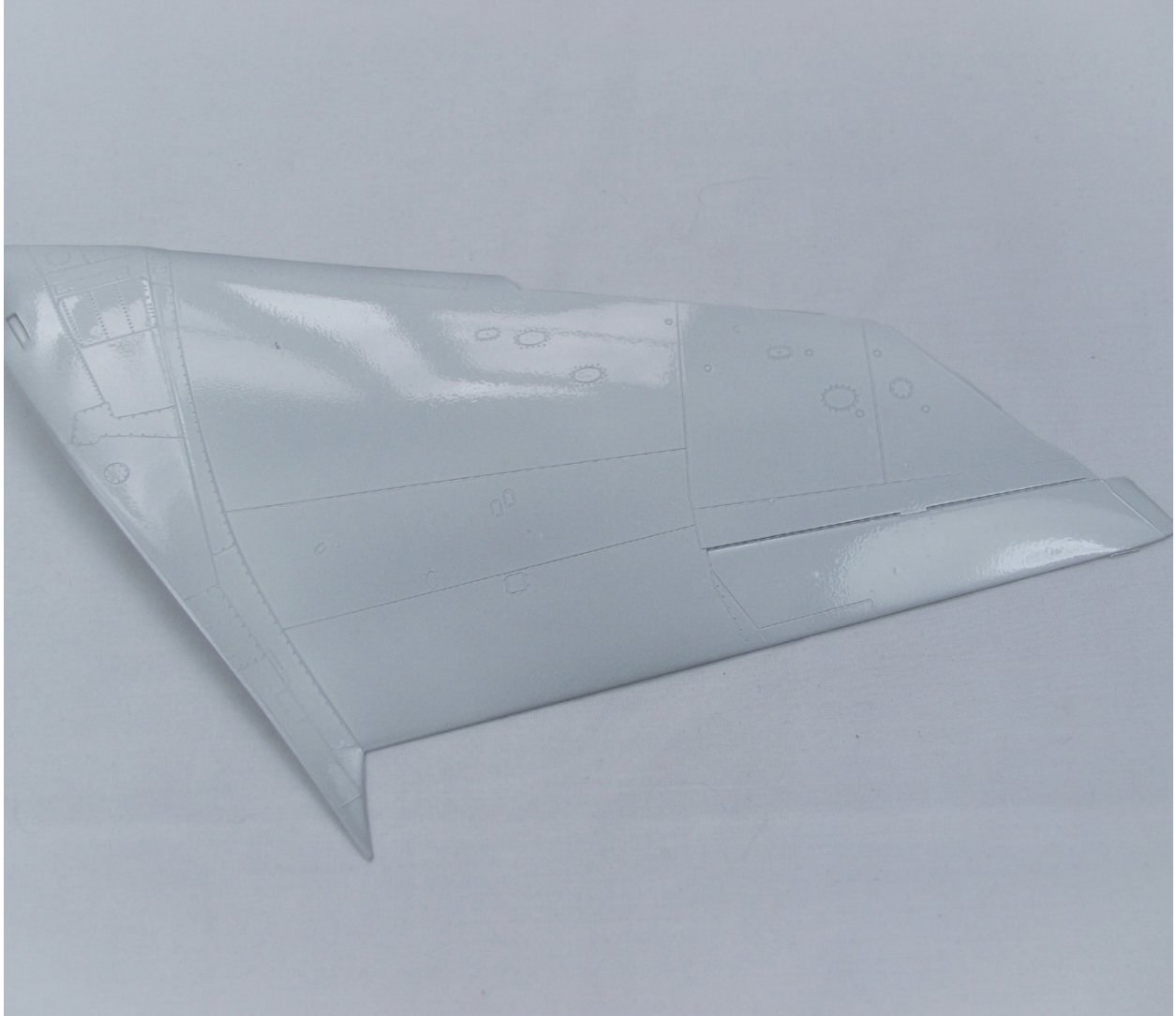
Paint and silicon react with each other, so you will sometimes get a reaction called fish eye. A single circle or group of circles will form where the paint applied does not create a solid film. If fish eyes appear during priming, you have two possible courses of action open to remedy the fault. If you are using water-based primer and the contamination is severe, then wash it off and repeat the cleaning process with a mild solvent. Otherwise let the primer dry and rub the area down, then clean with a light solvent and repair the primer.



A bad case of contamination in areas around the front half of the airframe, worse at the nose, getting lighter going aft, with nothing around the tail.



A test piece was trialled to see if the contamination came from the tissue or the cleaner.



The same batch of mixed primer, used on the airframe, was applied to the test piece with no effects, proving that the contamination was on the airframe and was spread around with the final clean.

Never leave primer in your airbrush for long periods as it will start to solidify. If you need to have a break from your work during priming, empty out the primer and flush some thinner through, leaving a little in the airbrush. Before resuming priming, empty out the thinner and refill with primer.

TROUBLESHOOTING CONTAMINATION

An incident took place during priming of the Revell Hawker Hunter 'Miss Demeanour' (featured [Chapter 7](#)), which is worth exploring as it demonstrates that even with significant experience of preparation and airbrush painting, unexpected problems can arise.

A piece of blue paper towel with an alcohol solution was used to clean down the aircraft prior to priming. Once the white primer was applied, a large area of contamination became evident. As soon as the first coat was complete, the decision was taken to stop further painting in order to consider what was happening and why.

It was evident that the contamination was worse at the nose, and the level decreased so that none appeared at the rear of the model. As the initial cleaning process started at the nose, it was assumed that either the contamination was already located on the nose before cleaning started, so, consequently, the cleaning process had spread it about, or the blue paper used to apply the alcohol solution caused the problem, the alcohol bringing some unknown contaminant out of the blue paper.

To establish the cause, a test was conducted on a spare plastic wing. Half of the wing top was degreased with alcohol applied with a blue paper towel, and the other half with alcohol on a white paper towel. The primer specifically mixed for the subject model was applied to both halves. The result for each half was no different: both sides were clean with no contamination showing. The conclusion was reached that contamination from an unknown source was already on the nose area and the cleaning process just spread it around.

This particular obstacle was easy enough to overcome by gently flattening down with 600-grit sponge sander, cleaning and re-priming. If you have a similar incident, you can test the adherence of the primer by conducting a 'tape test' when it is dry. To do a tape test, apply a strip of masking tape to the problem area and pull it off quickly, rather than back on itself. If the primer stays in place, then there is no contamination, and the top surface paint will also adhere.

Chapter Six

Paint Applications

THINNING PAINT

Because of the sheer number of different types of paint available, there is no single, reliable method of thinning paint, leaving substantial possibilities for error. There are also multiple sources of advice, but be careful which source of information you use because some are better researched than others. Just because it is published, does not make it true. Anyone can publish on the internet and there are statements out there like this: 'start by thinning your paint 50/50'. With some paints, if you start with 50/50 you will over-thin the paint and render it unusable. There are so many variables to consider: the type of airbrush, the air pressure, humidity and temperature. You also have to bear in mind how long ago the paint was manufactured, how long you have had the paint and the conditions in which it has been kept. One of the best guiding descriptions of paint ready for application is: 'your paint should be the consistency of milk'. The analogy with milk is a good one, accurately describing the consistency you need to achieve. If you swirl some milk around in a clear glass tumbler, and immediately observe the film it leaves on the side of the glass, the residue very closely resembles what you need your paint to look like. It is a thin film that you build up over several coats to provide depth and coverage.



The film that milk will leave on the side of a glass is the kind of film you need to achieve with your paint. Not all paints are the same consistency, so start thinning gradually and test it before putting it through the airbrush. As you get more experience, you will get to know instinctively when it looks right.



An old wing is primed and a paint mask is used to make a test piece; the words are appropriate for airbrushing.

To thin your paint, start by adding paint to a 1oz suction feed glass bottle or similar receptacle. Add 20 per cent of the paint's volume in thinner to the paint. Starting with a smaller quantity of thinner than you may need makes sense because it is easier to add more thinner than it is to thicken up paint. Next, swill the two liquids around the jar and let the mix settle. You will soon see if you need more thinner or not, if you make that comparison in your mind to the consistency of milk. Keep adding small quantities of thinner until you get that consistency; when you do, the mix is ready to use.

It is possible to mix paint in a gravity cup but always add a few drops of thinner in the cup first. If you have over-thinned a very small amount in a gravity cup, then you should be able to thicken it up by adding more paint. Generally, though, if you have introduced too much thinner, the result will be a large volume of over-thinned paint mix. It is better to dispose of this than to try to remedy the mistake by adding more paint. To thicken to a working consistency will take three times the amount of paint; you could use the entire colour you have purchased and still not achieve the consistency you need.

The strength of the pigment can also have an effect on thinning paint. For example, some yellow and red colours are weak, whereas greys and browns are strong. When thinning weakly pigmented colours, be aware of their transparency and adjust your thinning accordingly.



Four coats were applied to the test piece in stages, using water-based matt white, possibly the worst colour to use to cover black. The first coat is where most people go wrong. They try to cover too much too soon. As you get to coats two, three and four, you can double-track the colour gradually to get the coverage required. Use a hairdryer to flash off the coat before double-tracking.

Once you are satisfied with your mix, pour some into the airbrush and see how it sprays on an old model or a piece of card. After some experience of using your airbrush, you will become familiar with how a good consistency of mixed paint looks as you pour it into the airbrush and how your airbrush sounds when it is running with appropriately thinned paint. If the sound is raspy and the paint looks speckled or dry, then increase your air pressure. If that does not work, then you

need to thin it more. Because of the reduced amount of pigment, red, white or yellow colours work much better sprayed on to a white primer base that has no breaks in it. Breaks will keep showing through a weakly pigmented colour, tempting you to apply far too much paint, which is then liable to run.

Once all your preparation is done and the model is clean, immediately prior to painting, wipe your model down with a Tak rag. These are slightly tacky cloths manufactured as household decoration consumables, and are available from builders' merchants and DIY stores. Using one at this stage will remove any final dust that may have settled on the model. A Tak rag will leave a residue on your hands, so wash your hands before handling the model again.

Airbrushing paint finishes need to be applied in lighter coats than primer, which, as already discussed, has greater viscosity. The practice of applying paint to the surface to leave it 'just wet' applies to the final colour, as it does to primer. The paint should dampen the surface without appearing dry or grainy but should not pool or run. If you have mixed your paint correctly, your first coat will look transparent. Do not be tempted to put on more paint. Let the first coat flash off and apply the second coat in the same depth as the first, so that it is 'just wet'. Let this coat flash off. On the third coat, you can apply more paint than the first two coats but, again, do not get it too wet or the paint will run. You may need further coats.

The illustration shows a weakly pigmented colour (white) used in successive coats to build up coverage. Because of the weak pigmentation, more than three coats were applied in order to achieve the desired result. Bear in mind that as well as differences in pigmentation, paint quality and texture will vary between manufacturers, which may also have an influence on the number of coats needed for coverage.

HAS THE PAINT GONE OFF?

Having mixed your paint, when swilling it in the glass jar to test consistency, check the paint film with your finger for small grains. If you can feel them, do not put the mix into your airbrush as it may cause a blockage. If you have shaken the paint up, there are likely to be small air bubbles along with grains. If you are certain there are only bubbles, these will not cause any harm. The paint most likely to have this characteristic is old enamel, though it is possible others may react in a similar way.

Old paint that is still fit to use should feel like thick cream or butter if you insert a stirrer or stick into it. When you insert a paint stirrer into paint that has deteriorated beyond use, it will feel very lumpy or crumbly. Do not be tempted to use paint once it is in this condition, as it will not take thinners and will produce lumps that will block an airbrush.

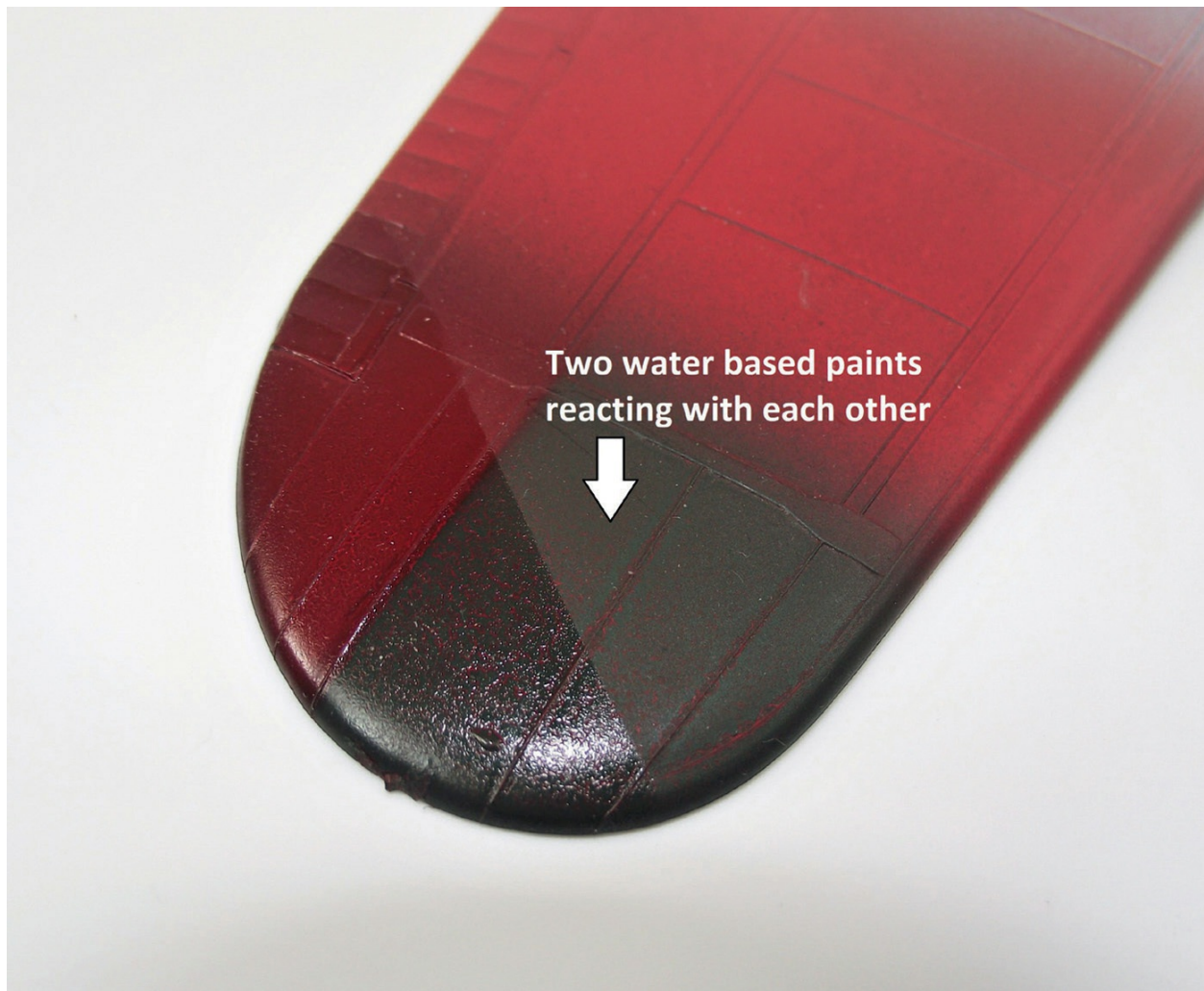
WORKING IN A LOGICAL MANNER

Start painting in all the fiddly, awkward areas, like control recesses or undercarriage bays, and then fill in the remainder. Where you have a horizontal surface meeting a vertical surface, like the wing to fuselage joint, start painting in the corner and simultaneously move outwards and upwards for a few strokes, keeping to the 'just wet' application technique. If you start painting at the wing tip, the danger is that by the time you get to the wing root, the fuselage side will become too wet and will be liable run. If you do not apply enough paint, you may create a vortex at the wing root, which will result in a

grainy finish.

ACRYLIC PAINTS

Acrylic paint consists of pigment suspended in a binder of acrylic polymer emulsion. Acrylic paints are water-soluble but water-resistant when dry. In the early years, the only paints specifically manufactured for model-making were enamels and when acrylic paints started to come on to the market, many modellers were reluctant to use them. Because of the variety of base types, learning to use acrylic paints can take a little effort. Now there are both water-based and solvent-based acrylics made for modelling, e.g. Tamiya paint contains alcohol and Lifecolor is water-borne. To make things a little more difficult, both can be washed out with water but they cannot be mixed with each other.



This picture shows a typical reaction you may get with different brands reacting with each other. A gloss clear coat highlights the problem. The crazing here is quite fine but can be much worse.

There are an increasing number of manufacturers producing acrylic paints for model-making. Other sources of acrylic paints, e.g. those made for artists and for custom car painting, are usable on plastic models. However, artists' paints and custom paints are available in colours manufactured for their respective markets, rather than the aviation or military specification colours you may wish to use. Nevertheless, if you are painting, particularly civil aircraft, they can be useful. If you choose to use them, be aware that because of the variety of base formulas, some of these paints will not adhere to each other, despite both being water-based, so that covering one type with

another can cause a chemical reaction. Even with model-specific paints, the same problem can arise. For example, Lifecolor and Comart paints are both water-based, but the carrier ingredients are different so there is an increased risk of a reaction if you try to cover one type with the other. When starting out, the best advice is to use one manufacturer's system while you gain confidence and experience with that type of product before trying to mix different products. When you are ready to use different sources of paint on the same model, do a test piece on an old kit or plastic when you want to put one colour system on top of another.



The problem with some paint bottles is that paint dries into clumps around the lip. If bits get into your airbrush, they will create blockages. It is good practice to wipe around the lip and cap before sealing up the bottle. Note the bottle at the back has the funnel-type nozzle, which is easier to use but it is harder to replace excess paint.

When opening a bottle of acrylic that you have used before, be wary of segments of dried paint falling into the fluid cup or bottle – this is the quickest way to get a blockage! Try to remember to wipe around the

lid and neck of the bottle before putting it away.

The main advantage that water-based paints have over solvent-based materials is the lack of fumes while painting and during drying. This is particularly important if you are painting in a confined space, such as your home.

RETARDERS AND FLOW ENHANCERS

Acrylic has a tendency to dry quickly, so one of the problems likely to occur is tip drying. Air pressure set too high will cause the paint to dry on the outer edge of the nozzle, creating a blockage or will cause drying on the needle, reducing the flow of paint. This is why setting up air pressure correctly is important, because you are trying to achieve a balance between the proper atomization of paint and prevention of drying out of the paint or too much overspray. There are two products that can be used with acrylics to help stop the latter from happening: a flow enhancer or a retarder can be used.

The model paint company called Vallejo produce both a retarder and a flow enhancer, which do a similar job. A flow enhancer helps to stop any drying on the airbrush tip and needle, while a retarder slows down the paint drying time, therefore improving the flow but without weakening the pigment. Using these will help blend colours when applying a camouflage scheme, and with brush painting. You only need to add a few drops of either product to each paint mix to achieve the desired outcome.

If you are using a retarder, then curing time will obviously take longer, so you need to consider how long you need to leave the paint to cure before you handle the model after each coat. When using either of these products it is useful to test out your mix first to make sure it is doing what you need. If you put too much retarder into your paint mix, it may not go off at all.

Retarders and flow enhancers for acrylic paints are available from art shops and these should work, but it may be prudent to get technical advice from the seller or from online forums to find out if

other modellers have used a particular product with success, before buying.

SOLVENT-BASED PAINTS

Solvent-based paint can come with various base materials, such as enamel, acrylic, cellulose and polyurethane. Polyurethane and acrylic can be water-based as well as solvent-based. Enamels and acrylic are the two paints most likely to be used on plastic models. All are usable with an airbrush but be careful with the amount you apply, especially with strong solvent-based paint like cellulose.

With some solvent-based paint, it is often necessary to increase the amount of thinners in successive coats, so that they melt in with the previous coat. It is this process that gives rise to many problems, as each coat applied will reactivate the solvent in the previous coat. It is necessary to let the previous coat's thinner evaporate before putting on the successive coat or a reaction can occur, which is evidenced by crazing.

Another problem that can occur with solvent-based paints is blooming. This occurs when painting in wet or humid conditions. It resembles a milky film on the surface and is caused by moisture trapped in the wet film. A few drops of anti-bloom thinner can be added to the mixed paint, which will help to prevent this from occurring.

To prevent inhalation of fumes, a cartridge mask with the filter appropriate for the particular solvent should always be used when applying solvent-based paints.

When starting out with airbrushing, enamels and water-based acrylic paints are the easiest materials for a beginner to use and are readily available from most hobby stores or online shops.

METALIZES

Achieving a bare metal finish on a plastic base, whether it represents a complete aircraft or a component, can be challenging but well worth the effort. There are companies who specialize in producing metal finishes, e.g. Alclad 2, AK Interactive and Gunze Sangyo. Metal finishes usually require different procedures, such as spraying at lower air pressures and using a glossy black base for high-shine finishes, such as chrome or polished aluminium.

Correct preparation from the bare plastic is vital because metalized finishes are very fine. To ensure that your finish has the best chance of success, check all the surfaces for glue, fingerprints, scratches, gaps or excess plastic from sprue connections. Once you are satisfied, clean the model and apply the primer. The primer should be checked again and any faults corrected and re-primed. Once the primer is dry, gently rub down all the surfaces with a buffing sander or 1,200-grit sanding pad. The primed coat should look like a semi-shiny surface, but try not to break through anywhere. The smoother your primer, the better the finish will be.

Always read the instructions on the bottle before applying the finish coats. For high-shine finishes you will need to apply the gloss black base and repeat the buffing process. This may seem a little excessive, but when applying the base colour you will have produced a spray pattern, and the smoother you make it, the better the reflection will be. Having done this, you can apply the finish coats.

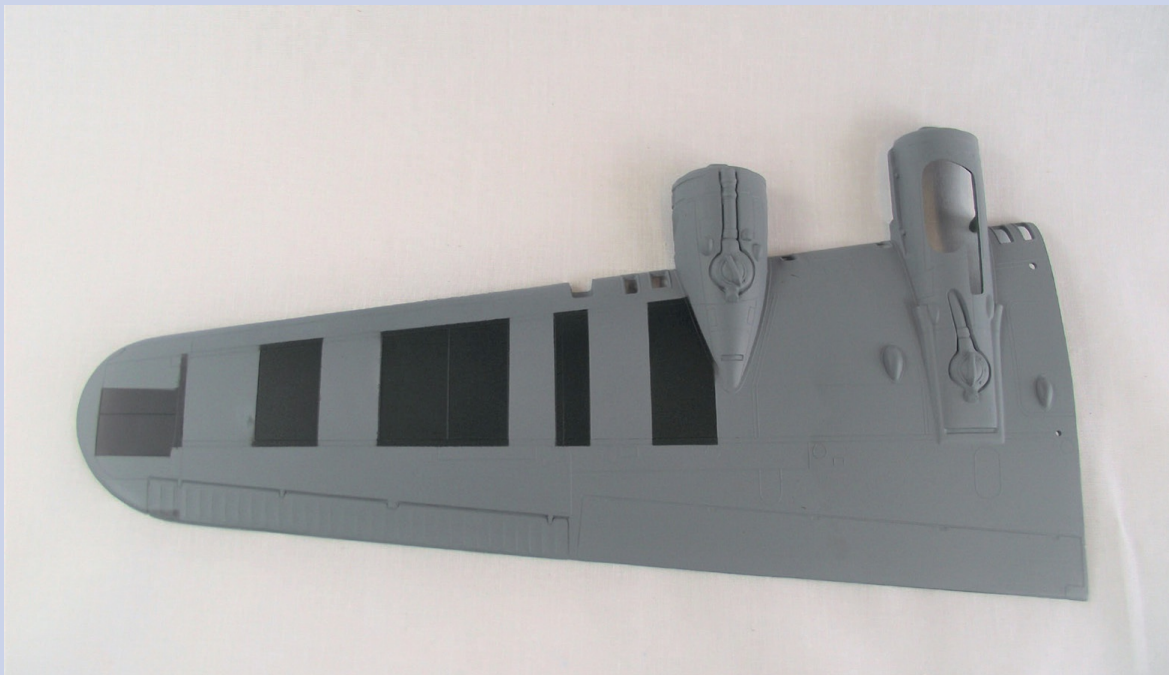
Alclad and AK Interactive are pre-thinned and most of these types of paint have a solvent base, so if you have the air pressure too high, it will dry before it reaches the surface you are trying to paint. As it is so thin, the sprayed surface will get wet very quickly, so apply the finish in light coats but make sure you are not too far away from the subject – 3–4in is an ideal distance. If you put too much on, the metal will congregate and go dark in the areas where the liquid amasses.

The advantage of these finishes is that, because you are only putting on very thin layers, if you make a mistake, you can go over it again and again and not lose detail. For standard metal colours, such as aluminium, you do not need the gloss black base and there is no need to use different shades of aluminium to get different panel variations. Instead you can apply various primer colours to separate

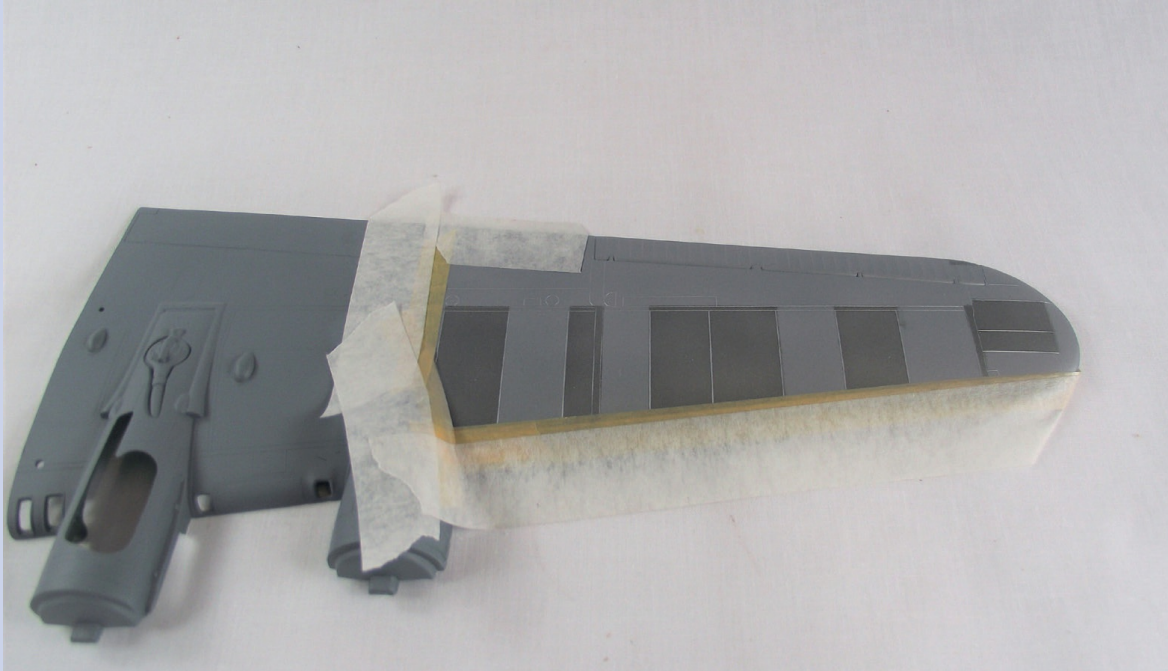
panels and then apply one cross-coat of aluminium, then mask off some areas and apply another coat and so on. When you de-mask you will find there will be tone variations where the different coloured primer was applied, all achieved from one shade of aluminium.

When you have finished, make sure you clean your airbrush thoroughly or metal particles remaining in the airbrush will attach to the next colour you use.

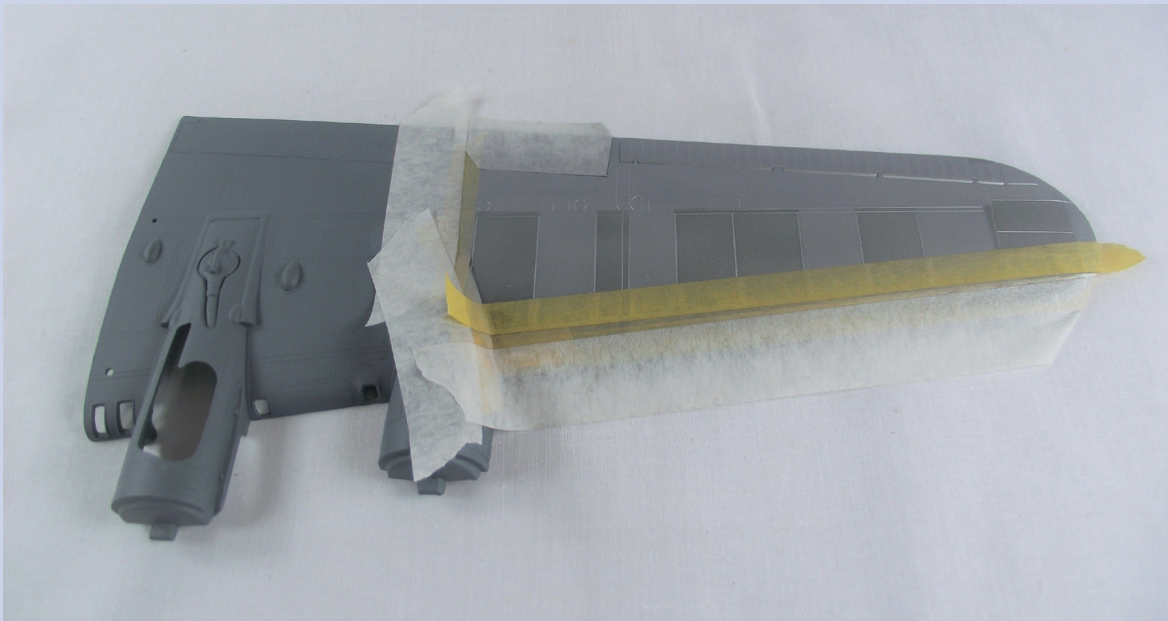
Using One Aluminium Colour to Achieve Several Different Tones



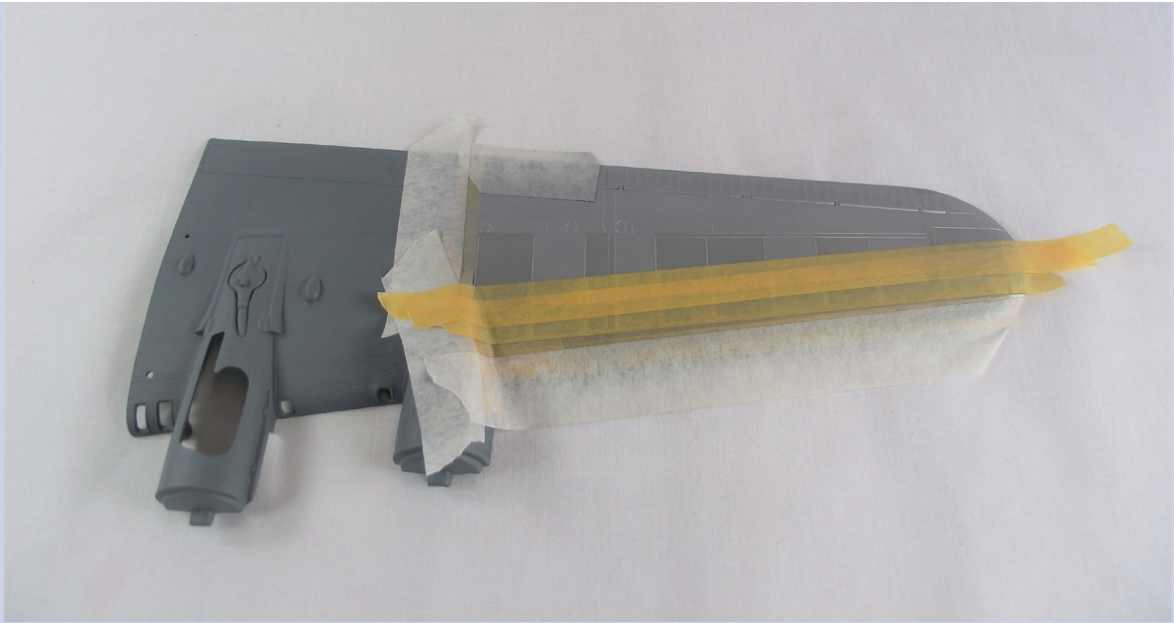
The grey primer was applied first and then areas were masked off before applying black primer.



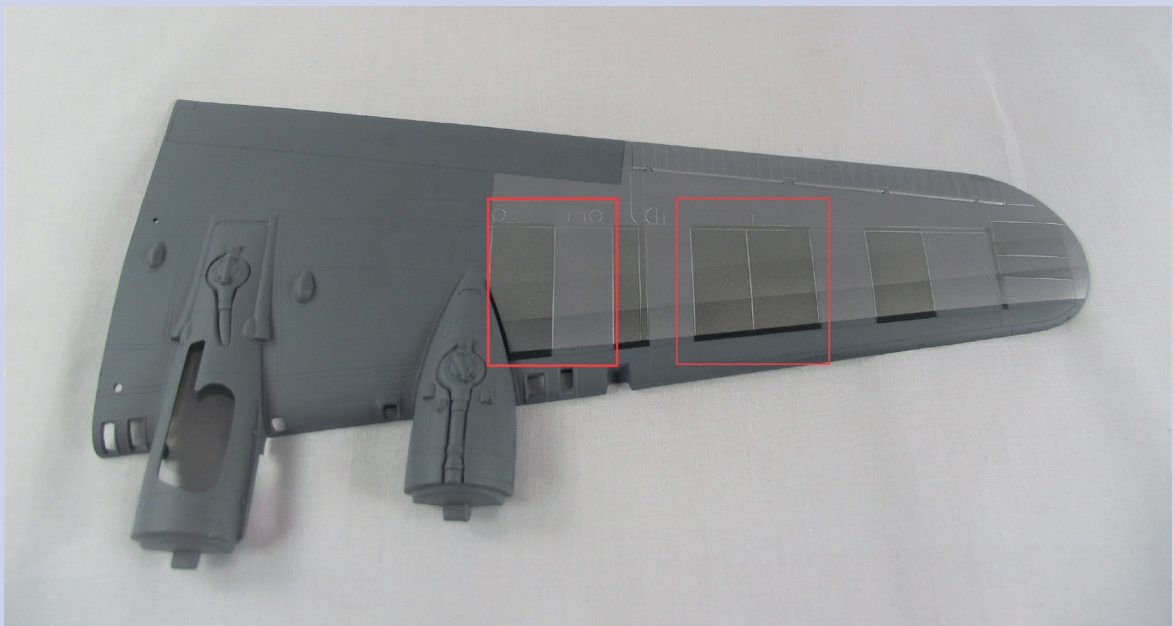
An area is masked off, including approximately 2mm of black, and then one light coat of aluminium was applied all over.



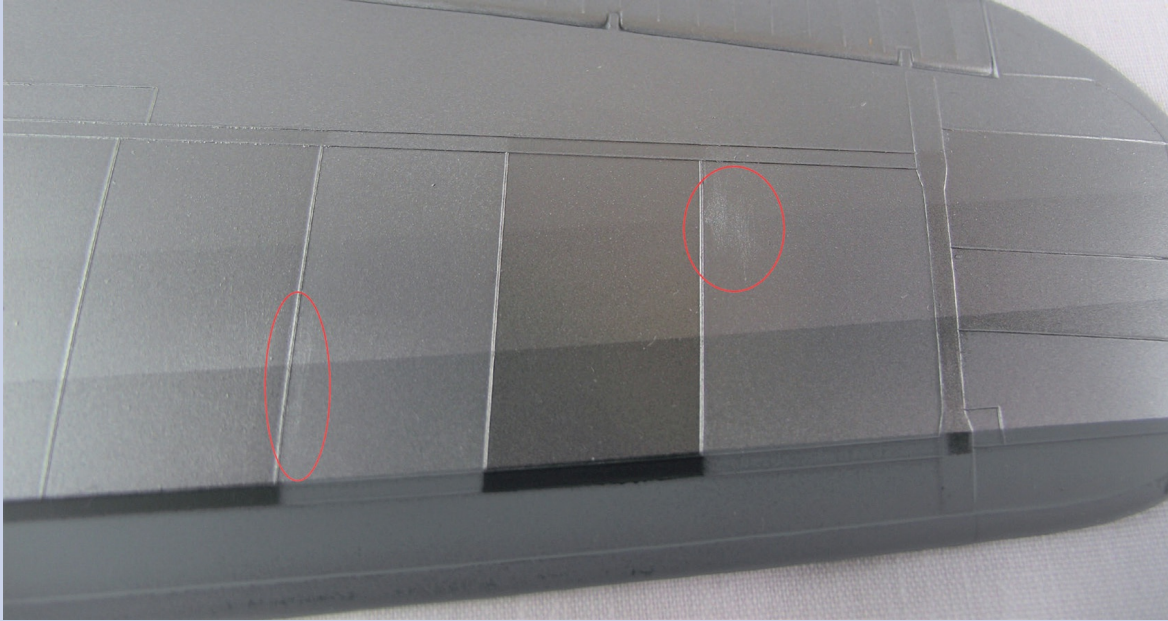
When dry, a 10mm strip of masking tape was placed over the first coat and a second coat applied.



Another strip is masked off and a third coat applied. After three coats, you will not make much difference to the density colour.



After de-masking, you can see in the red box there are six shades from one colour, just by using black and grey primer and three light coats.



Close scrutiny of the finish shows at least two places where rubbing down still shows through. A finer sanding pad should have been used. Metal finishes will pick up the slightest defects.

WARNING: ISOCYANATE

Paints that contain activator and thinners are often referred to as two-pack paints or '2K'. These, as well as some base coats and most lacquers from the motor repair industry, are likely to contain isocyanate. This is a dangerous material and a major cause of occupational asthma. You should be sure of the contents of any material you plan to put through an airbrush, and if there is any indication of the presence of isocyanate, you must take adequate precautions.

Solvents will make some rubber seals expand, so airbrushes with Teflon seals and needle bearings

are less likely to be damaged. A proper cartridge mask or full-face mask with the correct filters for gas vapours should be used, even for small amounts, and painting must take place in an area with adequate ventilation.

Disposing of waste can also be a problem, as even rollers and brushes used to apply such materials should be disposed of as hazardous waste.

Unless you really know what you are doing, avoid using two-pack paints.

PRE-SHADING

Pre-shading is a technique some modellers like to apply before completing the finish coats. The basic exercises covered in [Chapter 4](#) will be useful for those wishing to use the technique.

A dark colour, such as black or dark grey, is applied along the engraved panel lines on the model. It is not necessary to do all of them, nor is it necessary to cover the panel line all the way. The effect works well if the lines are broken up a little. Dots and small patches of the darker colour can also be randomly applied, especially on areas that on the full-sized aircraft would get wear and tear, such as walkways, regular access panels and fuelling areas. Pre-shading can also be applied to deep recesses and to undercarriage bays.



The amount of preshading to use will be down to individual preference. For a reasonably clean finish, on this example, it was kept to the minimum.

The bigger the scale of the model, the easier it is to get a realistic effect. Use a picture from your research of the real thing to look for darker areas of shade. After you have applied the pre-shade areas, apply light coats of the finish colour, allowing the dark colour to show through. This method often requires paint to be slightly thinner than a usual top coat, depending on the opacity of the colour. Some paints that have strong pigments, like Alclad II Mil-spec colours, will easily cover preshading, or multi-camouflage colours can easily lose the effect. If this happens, then post-shading can be applied after the finish colours. Keep checking the areas you are painting and concentrate on random areas to get the coverage you are looking for.

Post-shading will be discussed more in Chapter Nine, Weathering, where it is more appropriate.

CHIPPING EFFECTS

To achieve chipping effects, modellers originally used graphite pencils, silver pastel pencils or fine paint brushes to simulate chipped paintwork. All those work well but, of course, chipping occurred from the top of the paintwork and to be realistic we should be exposing what is underneath. Techniques have improved immensely over the years, so now it is possible to use hairspray, and products are available on the market that produce chipping effects, e.g. liquid masking solution like Maskol, Wilder Quick Mask or from AK, Worn or Chipping Effects.

The AK chipping solution and hairspray methods were applied to an engine cowl as a test piece. After priming, the cowl was painted in aluminium. A grey colour can also be used. One or two coats of chipping solution were applied. The camouflage colours were painted next in water-based acrylic paint and set to dry. The various coats of paint in this condition are stable and if light scratches were attempted, nothing would happen.

If an area is then dampened with a cotton bud or brushed with water, however, a variety of tools can then be used to make small or large chips and scratches very easily, exposing the aluminium or grey colour underneath. Once the water evaporates, the coatings become stable again.

With enamel paint, white spirit needs to be applied to dampen the area and only small areas should be worked on at any one time.

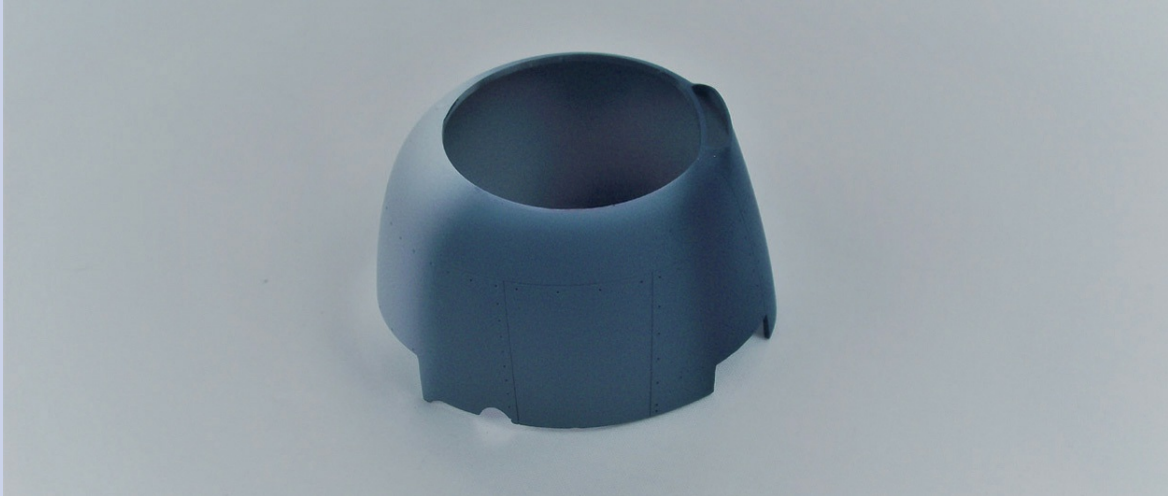
Maskol and Wilder Quick Mask are liquid rubber-like solutions, and when painted on to a surface they dry as semi-transparent and can be peeled off after painting using a cocktail stick or a coarse piece of scotch bright. Small quantities of the solution can be applied to a painted surface and when dry, coated over with a camouflage colour. Once the paint is dry, masking tape can be used to remove the rubber

solution by dabbing the tape on to it. Both Maskol and Wilder Quick Mask are also handy when used in conjunction with masking tape to mask up awkward areas. However, if these rubber solutions are left on a model for more than three days, they can set like glue and are very difficult to remove, especially from clear parts, such as canopies or windows.

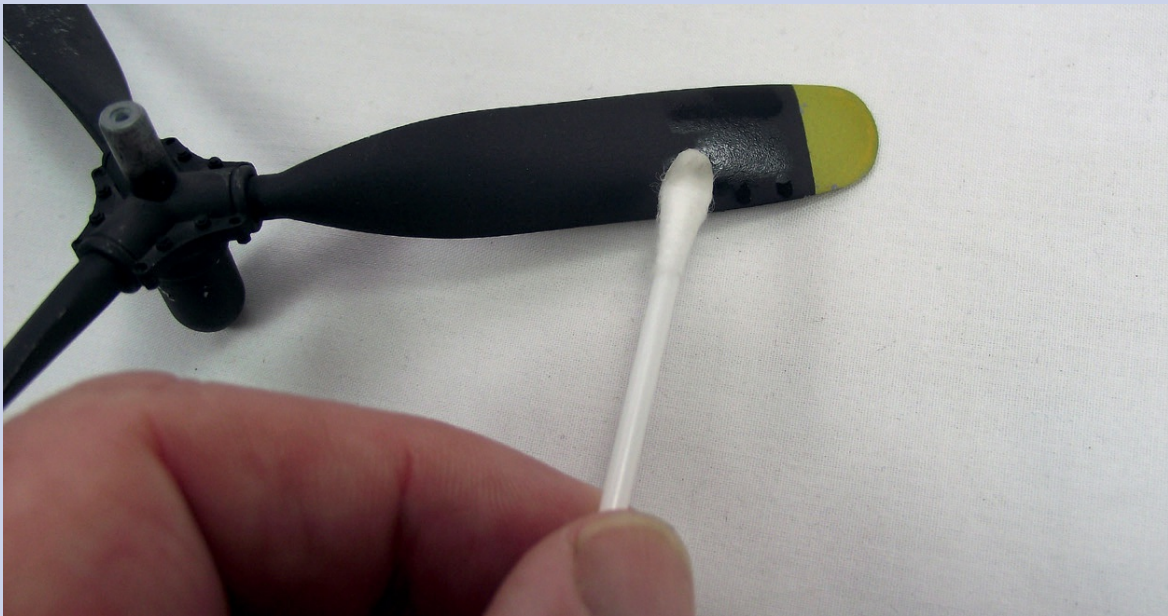
Application of Chipping Solutions for Chipping Effects



Chipping solution from AK was applied to the cowling and two propellers used as test pieces.



Once the chipping solution was dry, paint was applied as usual.



Dampen the area you want to work on with a cotton bud. Be careful from here, as once you dampen the paint, it is easily removed.



Using a variety of tools, start chipping, scraping or gentle rubbing to get the effect you want.

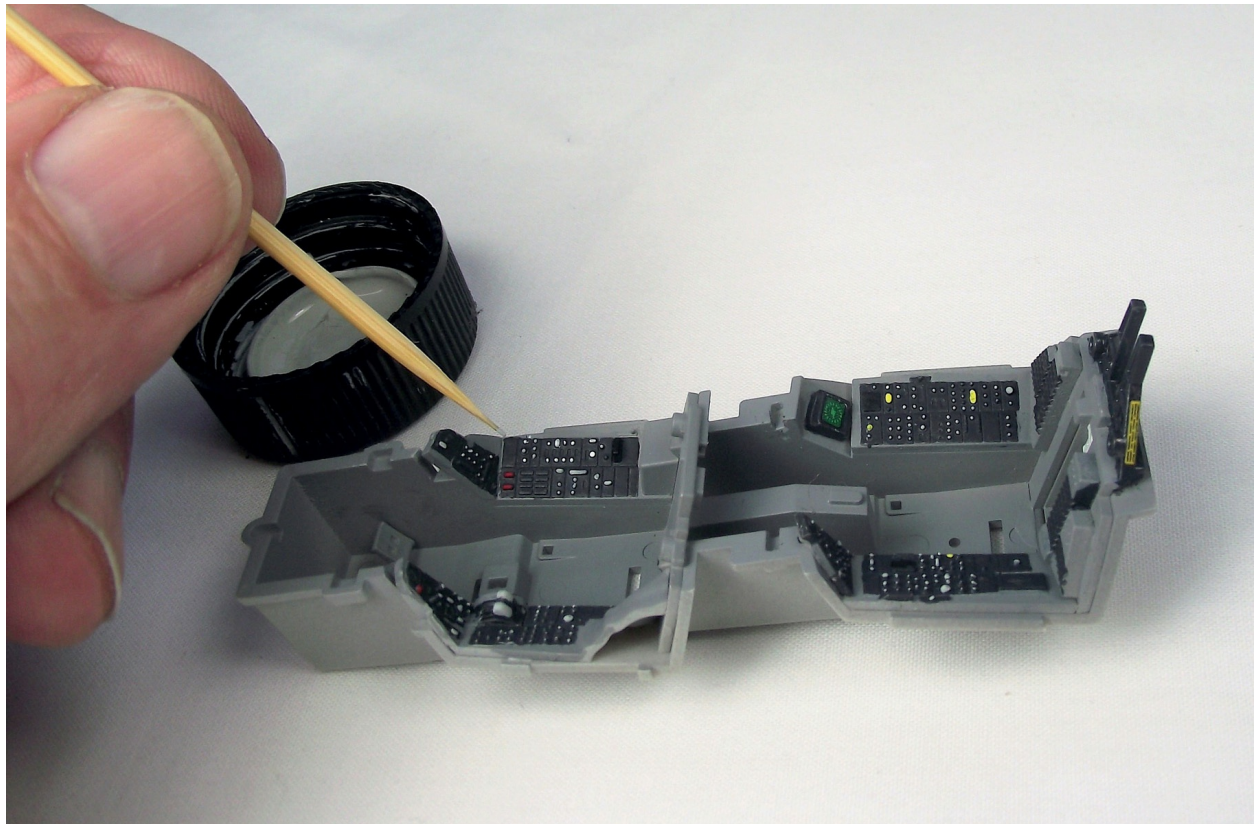


Try to be realistic with chipping. Think about where it would be most appropriate, and keep the chipping to scale, if possible. Propellers will erode from the leading edge of the blade but chips can appear anywhere on a blade.

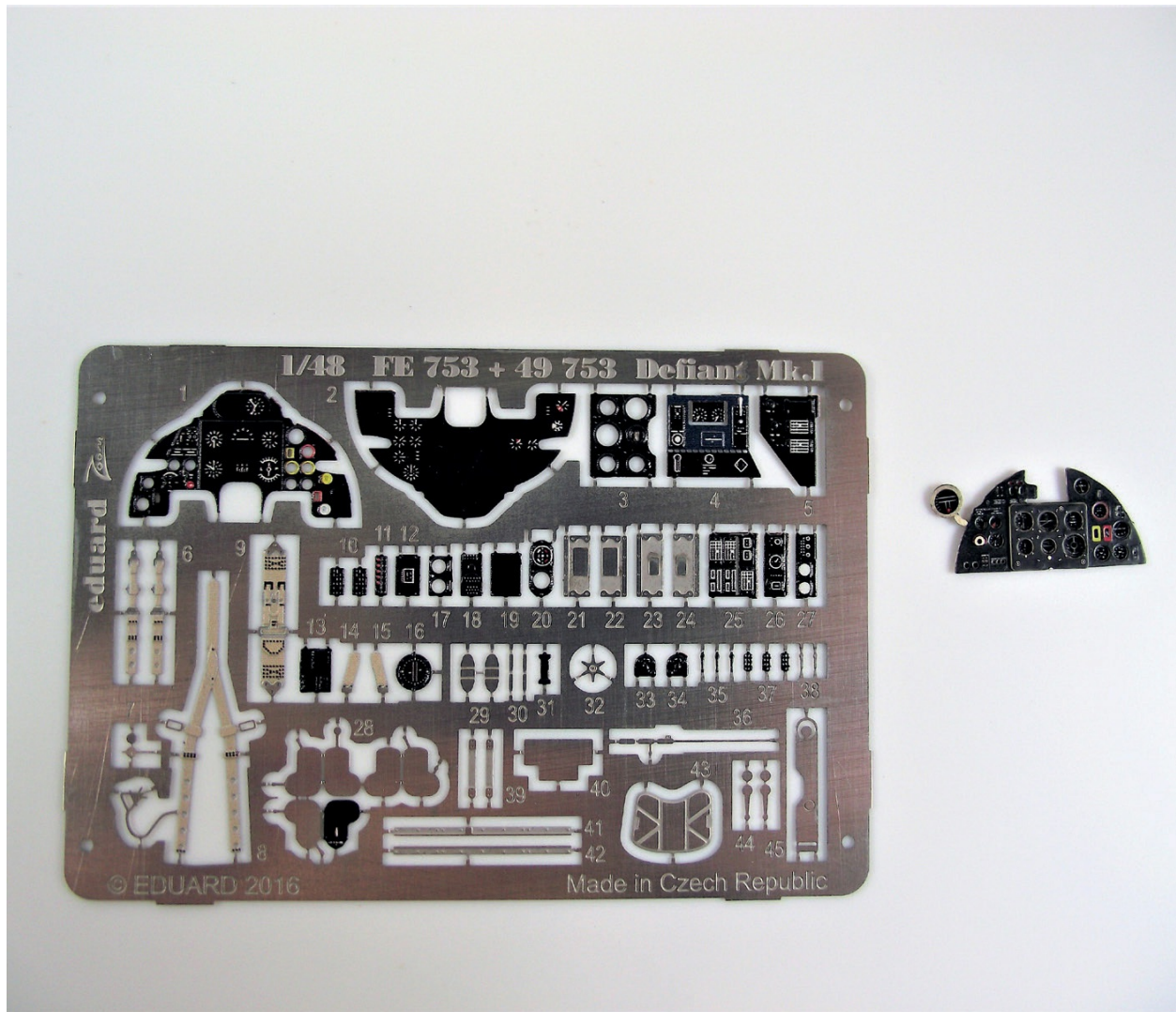
PAINTING COCKPITS

One of the first things you will have to assemble when building a model aircraft is the cockpit. This, of course, will need painting and how much you can do with an airbrush depends upon the scale of your aircraft kit. Most of the detail work will need to be painted with a fine paint brush, but the main cockpit area, cockpit tub and side walls can be airbrushed.

Areas like instrument panels, seats and bulkheads can be airbrushed as sub-assemblies, completed by washes and dry brushing to make details stand out. A sharp cocktail stick can be used to apply very small dots to knobs and switches; this is especially effective in 1/48 and 1/72 scale. The cocktail stick will only pick up the minimum amount of paint, so it is easier to control how much you put on.



Using a cocktail stick to apply paint seems unnatural, but even a very fine brush, when loaded with paint, can be too much for the finest details.



Pre-painted instrument panel sets can be the answer for people who struggle with hand–eye coordination or their eyesight.

If you are not confident enough to paint fine detail, as an alternative you can purchase colour photo-etched instrument panels and side consoles. There are a few manufacturers, including Eduard, who produce these. Using colour photo-etch makes it much easier to achieve a high-quality finish in smaller scale cockpits. Individual decal instruments are also available from companies like Airscale. They produce accurate instruments for vintage and modern aircraft, along with cockpit placards, which adds extra detail to cockpits.

PAINTING WOOD EFFECTS

To make plastic look like wood can be achieved easily with an airbrush using stencils, or with a mix of airbrush and paint brush. RB Productions have produced two different patterns of etched brass stencil of wood grain, each in two different sizes. The hard part is getting the right colours for the type of wood you wish to portray. Colour pictures of the real thing can help here but, of course, there are not too many World War I aircraft around in original condition. Sometimes model companies offer helpful advice, e.g. Wingnut Wings' leaflets, in the construction stages, and these often incorporate pictures of the original as the kit manufacturer may have better access to worldwide museums from around the world.



*Instruction books can help with choosing appropriate colours.
Searching online for images of specific wood, like plywood, will give
you some idea of colours required.*

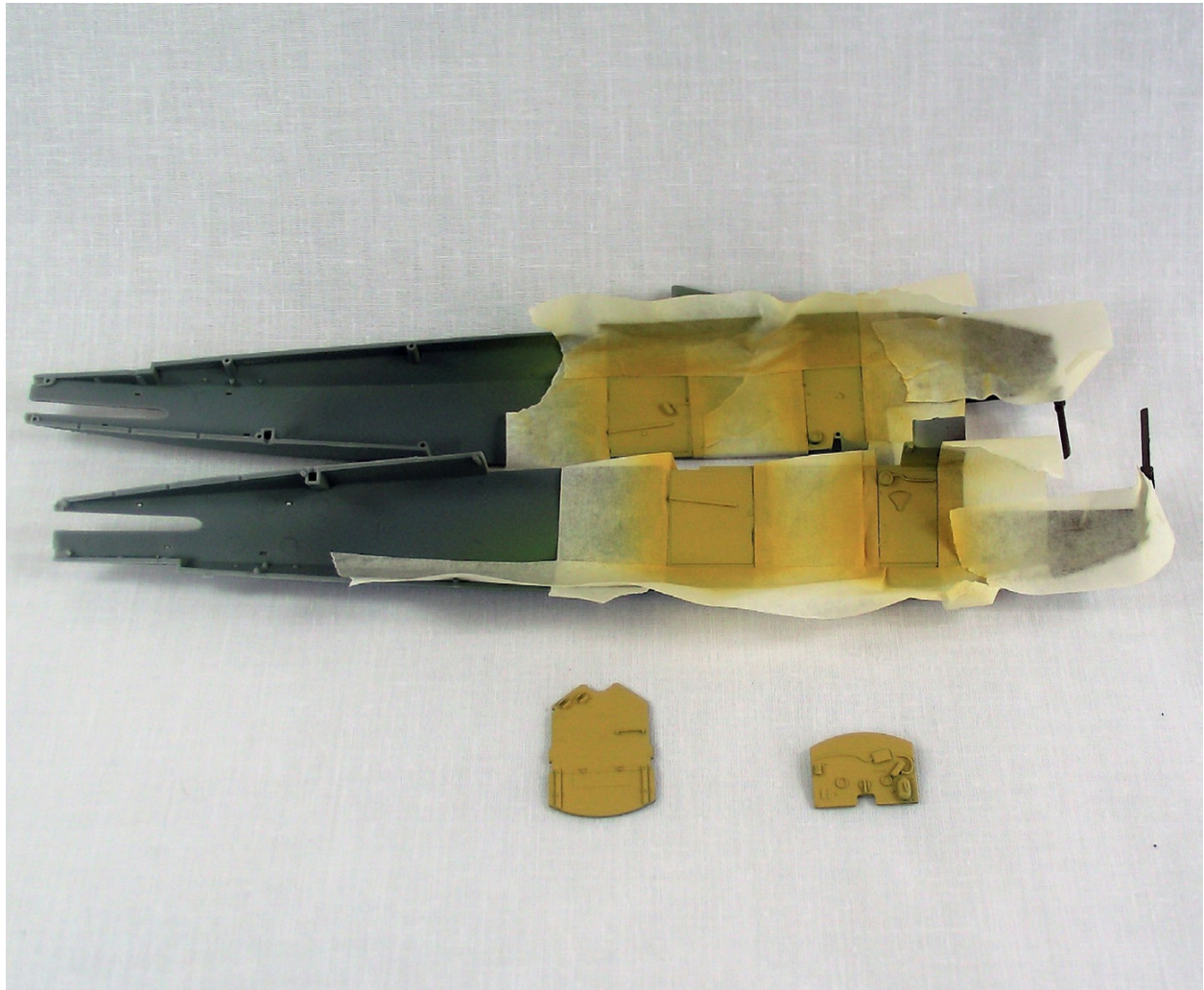


RB Productions produce these etched-brass stencils to aid the replication of wood finishes; they work and last surprisingly well.

Think about where the wood is placed on the aircraft and the wear it would have sustained. Floor boards are going to get dirty from muddy boots, therefore will be darker than a wooden box installed behind a seat. Even World War II aircraft had wood used in flooring in places, often painted, but boots or movement of heavy equipment would scrape and chip the surface, exposing the wood underneath. A few

model paint manufacturers have produced paint sets especially to represent wood, Vallejo and Lifecolor being two of them.

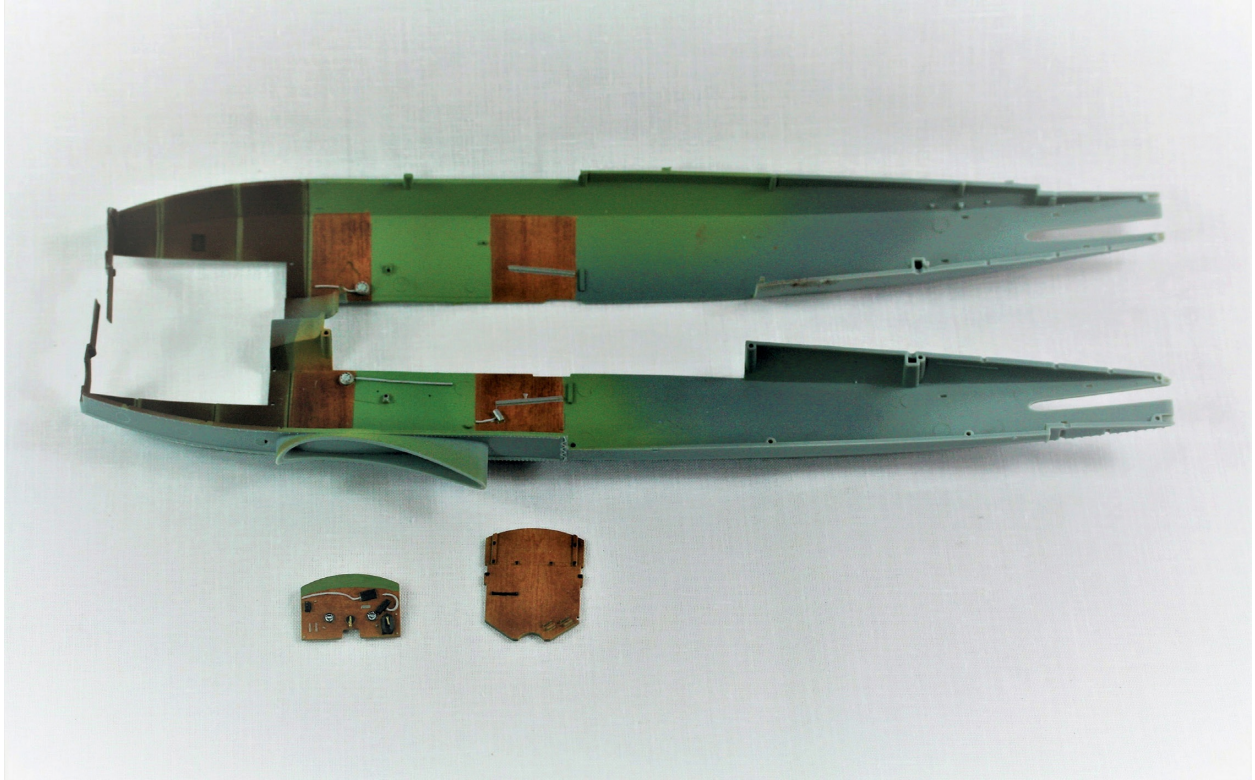
When it comes to selecting colours, an imaginative approach to selection of colour can be helpful. Description of the colour provided on the bottle should not prevent the use of a particular paint if the colour fits the requirements.



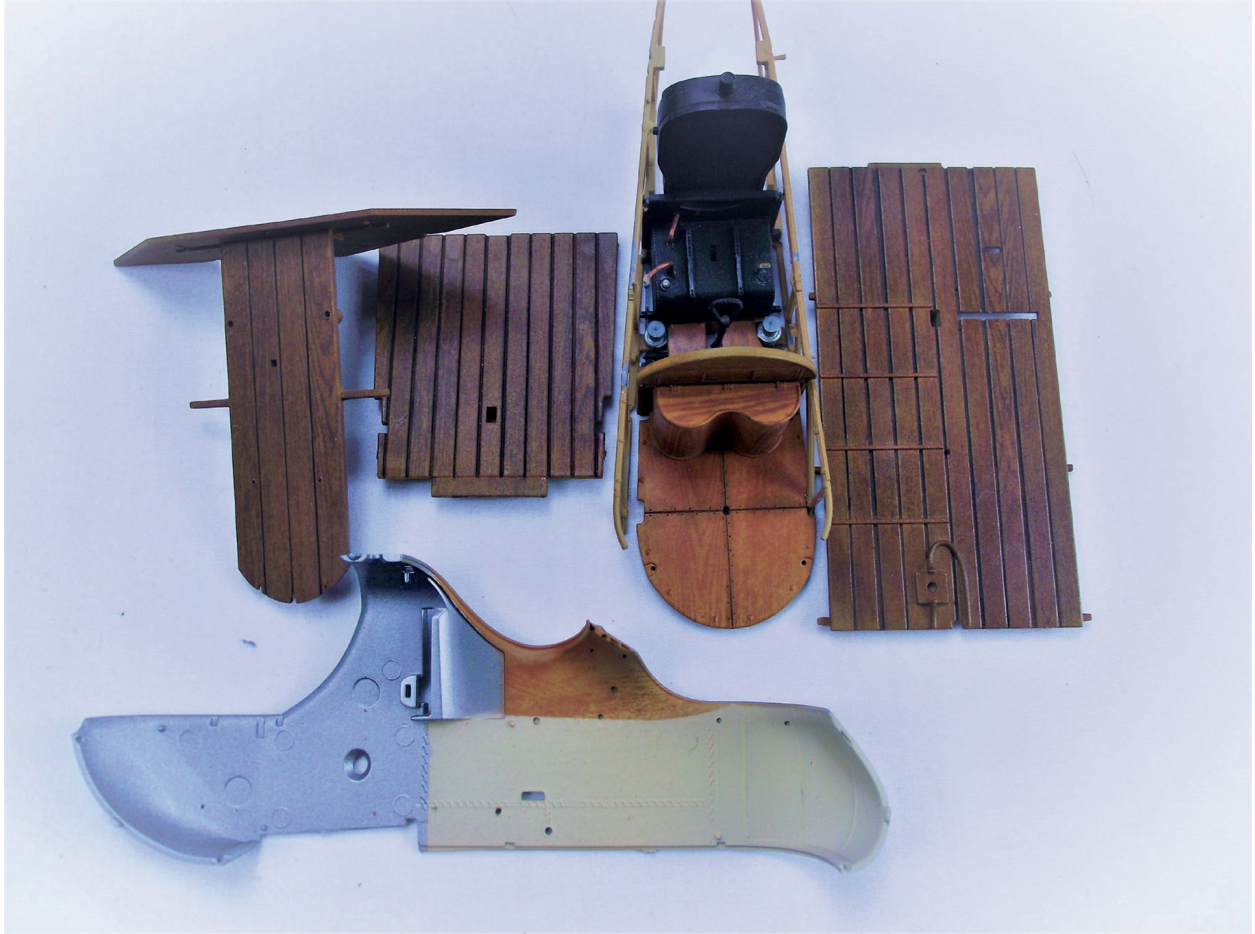
Mask off areas where wood finish is not required and apply the base colour.



After painting through the stencil, the image looks very stark and off-putting.



Over-paint the starkness with the same colour but only put on a dust coat. Once the other cockpit details are painted in, it starts to look effective.



A selection of kit parts with wood effects applied.

To achieve a wood effect, the paint mix needs to be slightly thicker than usually used. You may need to increase the air pressure to apply this more viscous material. If the paint is too thin, the air pressure will blow it around under the stencil. Using a piece of plastic card first to practise should help. After you have painted through the stencil, the effect will be very pronounced. The next step is to apply a light, almost dust-like coat to blend it all in; go carefully when doing this as it is easy to ruin the effect. Once further details are painted or added it will start to look more realistic; floor boards can be weathered with washes to enhance them further.

VARIED WOOD GRAINS

In the wood colour board illustrated, each line was painted with a base colour. The boxes to the right were then painted with various different colours through the stencil, and then oversprayed with a light dust coat of the same colour, to blend in the pattern. The choice of tone becomes virtually limitless, and the look can be further refined by adding filters and washes to make a grubby appearance, or by adding a clear coat for a clean, varnished look.

- **Line 1**

Box 1. Base colour Lifecolor UA080 Italian mimetic yellow 3 (light base dark grain)

Box 2. Lifecolor UA729 Dark wood stock

Box 3. Lifecolor UA907 Burned rust

Box 4. Tamiya X-26 Clear orange

- **Line 2**

Box 1. Base colour Lifecolor UA107 Italian sand

Box 2. Lifecolor UA713 Wood warm dark shade

Box 3. Lifecolor UA714 Wood warm base colour

- **Line 3**

Box 1. Base colour Lifecolor UA637 Hull red

Box 2. Lifecolor UA726 Gun red reflection and clear coat

Box 3. Lifecolor UA726 Gun red reflection and Tamiya X-26 clear orange

- **Line 4**

Box 1. Base colour Lifecolor LC16 Matt Raw Siena (dark base light grain)

Box 2. Lifecolor UA428 Russet brown

Box 3. Lifecolor UA211 Rotbraun

Box 4. Tamiya clear orange and clear gloss coat

Box 5. Clear gloss coat only



SCALING **SOFT-EDGE** BLENDING

For British built aircraft, the soft-edge camouflage guidelines according to the military AP 119-0601-0C state that the blend of colours where they meet

should not be more than 2in deep. To translate that to the scale you are working in is easy. Divide the scale of your model into the 2in for scale, e.g. 2in divide by 48 scale = 0.041in (41 thou) or 1.041mm.

- 2in divide by 72 scale = 0.027in (27 thou) or 0.69mm
- 2in divide by 48 scale = 0.041in (41 thou) or 1.041mm
- 2in divide by 32 scale = 0.062in (62 thou) or 1.56mm
- 2in divide by 24 scale = 0.083in (83 thou) or 2.083mm

SCALE EFFECT

Some model-makers advocate lightening the colour tone to reflect the reduced scale of a model. The concept is intended to replicate the effect that distance has on colour perception, in a similar way that tones change through a watercolour picture of a landscape to achieve the illusion of depth. Deciding whether to use this advanced technique is a personal preference.

CAMOUFLAGE

Each country with an air force uses its own camouflage scheme for its aircraft. Many schemes are similar, with just a slight change of colour and national markings added to distinguish the identity, but some countries use unique and often colourful schemes.

Camouflages have changed from era to era and on a frequent basis, depending upon the purpose for which the aircraft concerned are to be used. Sometimes water-based, temporary camouflage is

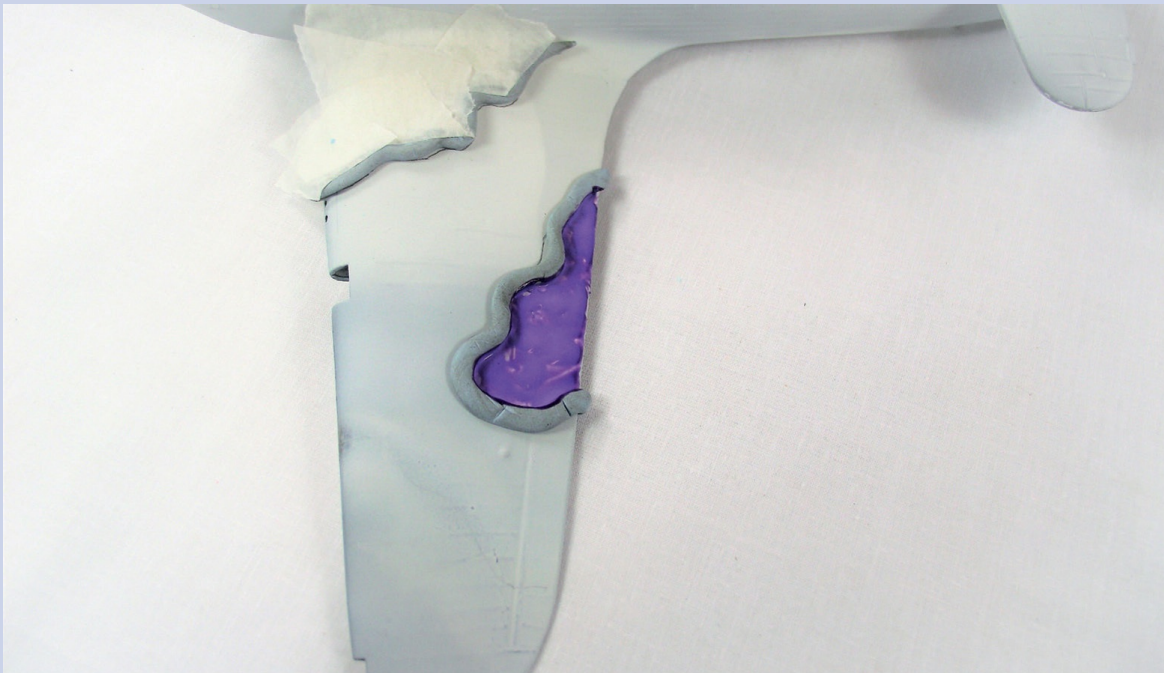
painted on top of the original paint finish and washed off once the mission or exercise is finished. The chipping method is a good way to simulate the temporary scheme, as water-based colours are easily eroded during a mission, leaving the original colours visible underneath.



Guideline Publications have published many books on aircraft in their Combat Colours range, and their Camouflage and Markings volumes. These include pictures of the real aircraft together with top and side profiles of popular subjects. GUIDELINE PUBLICATIONS

sanctioned at group level. This gives a variety of opportunities for modellers to apply different schemes to the same type of aircraft. The famous JG 1 squadron 'Richthofen's Flying Circus', which flew over Northern France during World War I, got its nickname from the many colourful schemes applied to its aircraft. There are many different publications available that can help with choosing a scheme by giving colour profiles and often pictures of the real aircraft. Specialist decal suppliers can also give excellent information on specific aircraft. It is not possible, within the context of this book, to cover every scheme of camouflage, but some of the most common ones are described along with tips on the best approach to apply them.

Practical Ways to Achieve Camouflage Schemes



Roll Blu Tack or White Tack into sausage shapes and conform it to the camouflage pattern you have marked in pencil. Mask out areas with liquid masking or masking tape.



Applying the paint from this angle will give a soft feathered edge.



Applying paint from this angle will give a sharper edge.

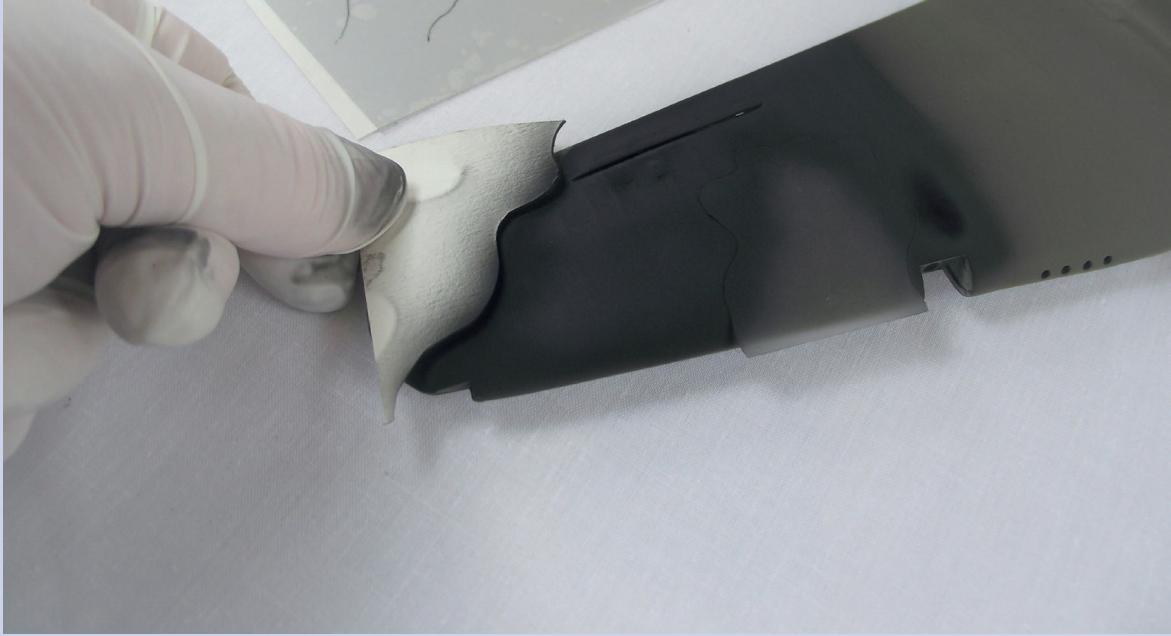


Gyro-Cut has a revolving blade that will enable you to cut curves easily, with no staggered edges.





Sometimes manufactures will put a camouflage diagram in the kit in the same scale as the model, like this Tamiya 1/48 scale Spitfire. This makes it easy to trace for cutting out from self-adhesive vinyl.



Alternatively, scan and scale the camouflage pattern from the instruction sheet, print on to card sheet and cut out templates for freehand application for a soft edge, or cut from self-adhesive vinyl for a sharp edge.



Chapter Seven

Painting Full Schemes

This chapter will cover the process of painting full schemes on to, mostly military, aircraft. Some camouflages can be daunting, but with a little patience and know-how an airbrushed military scheme can be very satisfying. Civil aircraft schemes, like those applied to airliners, tend to be one or two basic colours, such as white or grey, and the colourful components of the scheme are applied with waterslide decals. A civil scheme applied to the very colourful Hawker Hunter Miss Demeanour is illustrated, providing a good opportunity to practise blending colours.

GERMAN WORLD WAR II EARLY SPLINTER SCHEME

Kit Used Eduard 1/32 scale Bf 109 E1. Airbrush Used Iwata Eclipse CS 0.35 needle and nozzle, air pressure 18–22psi.

The scheme for this JG 26 Bf 109 E1 aircraft is RLM 65/02/71. The aircraft was written off after an emergency landing in France during the Battle of Britain. The model is depicted with a clean factory finish with minimal weathering. The paints used were mostly Lifecolor water-based acrylic:

- Ultimate grey primer
- Vallejo RLM 02 (used in the cockpit only)
- Lifecolor Hellblau RLM 65 UA503
- Lifecolor Grau RLM 02 UA504

- Lifecolor Dunkelgrun RLM 71 UA502
- Lifecolor Schwarzgrun RLM 70 UA501
- Lifecolor Tyre black UA733
- Lifecolor Satin black LC72
- Lifecolor Matt red LC06
- Lifecolor Thinner
- Alclad II Aqua gloss ALC-600
- Finescalemodelworld Master matt water-based clear coat

Preparation

The work started with cleaning the model and applying one or two coats of primer. The canopy was a good fit, so the decision was taken to paint and fit it after painting the airframe. This made masking off the cockpit easier, and so the interior paintwork was fully protected. The primer was left to dry and the model inspected for any defects, giving the opportunity to rectify any found. At this stage, as the model was deemed ready for paint, this was a suitable time to consider pre-shading or chipping effects. In this example, pre-shading was used.

Paint Application

The major colour chosen for this scheme was RLM 65, which was used to cover all the underwing surfaces and fuselage sides. Three coats were applied, varying the coverage to let some of the pre-shading show through. Once the RLM65 was dry, the demarcations lines for the splinter camouflage were marked out and masked up. There was no need to mark out the separation lines for the RLM02/RLM71 colours. Initially, the light colour RLM02 was applied in two or three light coats to cover the whole area. Once dry, then the area where RLM71 was to go was marked and masked out. Ultra-mask and masking tape were used to mask out the splinter scheme, and two light coats of RLM71 applied. Note that if the slats have moved into the 'out' position, then the splinter lines need to be adjusted. In the illustration, RLM71 was deliberately painted in the incorrect position to demonstrate this.



Only a small amount of pre-shading was carried out on this aircraft model, just enough to take its appearance away from monotone.



The first coat of RLM 65 has been applied. Note how the black shows through. Do not be tempted to put on more until the first coat has flashed off.

When the paint was dry, the aircraft was demasked and checked all over for mistakes in masking so that local corrections could be made. Once these were completed, two coats of gloss clear coat were applied. The gloss clear coat is required for application of decals. Decals applied to a matt finish will get silvering around the edges but a

clear gloss coat prevents this from happening. When the application of the decals was completed, two coats of Master matt were applied for the final finish.



After three coats, the desired effect has been achieved. At this stage, the undercarriage bays were masked out and painted RLM 02.



The RLM 65 on the lower surfaces, fuselage and fin has been masked off and two coats of RLM 02 applied.



The splinter camouflage has been marked out and masked up, and the first of two light coats has been applied.



Now the main part of the painting is complete. Masking tape is removed, with the exception of the cockpit. A check is made for mistakes or overspray in places where it should not be. Then two coats of gloss clear coat are applied to assist with the application of decals.



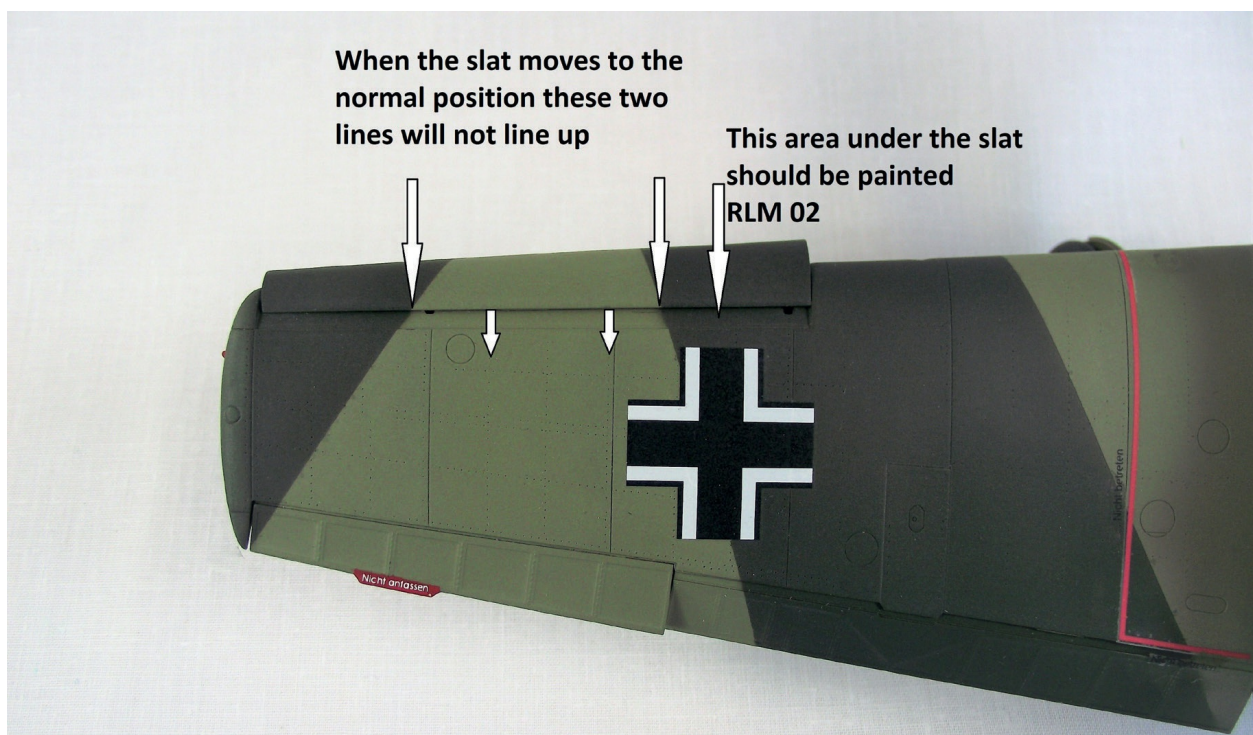
After the placement of decals was completed, two coats of matt clear coat are applied.

Remember that if the canopy frame is a different colour to the outside colour, then you must paint the interior colour first and then the exterior colour. Applying the interior colour first allows you to see the correct colour when the canopy is open. If any weathering is to be applied to the aircraft it can be done before or after the matt finish is applied.

On this model, weathering was kept to the minimum, with the addition of some exhaust stains, and a few oil and grease stains.

Finally, the canopy frames were masked out using pre-cut masks supplied in the kit. The insides of the canopies were covered with ultra-mask.

German aircraft camouflage schemes often included mottling. This effect can be achieved with the use of a stencil, or freehand with a fine needle and nozzle set-up, using the same techniques as used in the basic exercises in [Chapter 4](#). If you are going to use the stencil, be aware that on the real aircraft, mottling was often done crudely in the field and rarely had crisp edges. The scale of the aircraft will be a factor in how the mottle should look: the smaller the scale, the more it would appear to have a sharper outline; the larger the scale, the easier it is to do freehand. If you are going to use a stencil, place it loosely on the aircraft, allowing overspray to give you the feathered edge.



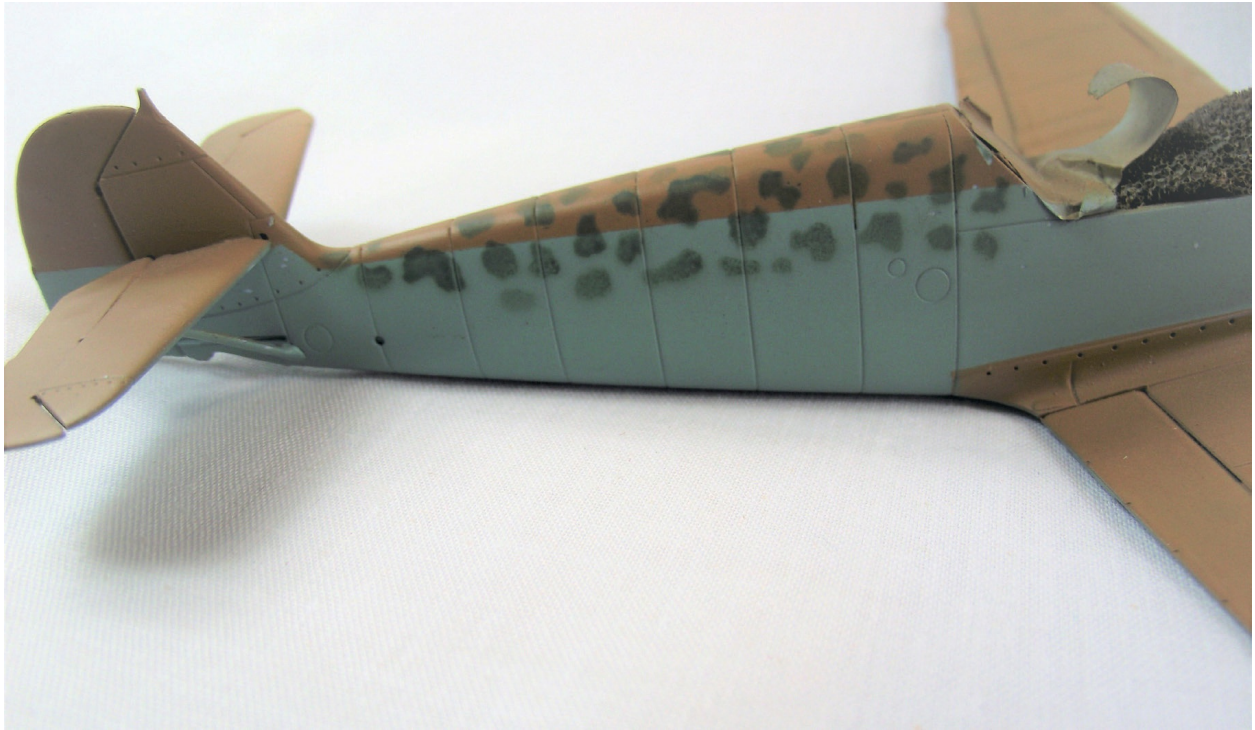
Mistakes are easily made, but even the two demonstrated can readily be repaired.



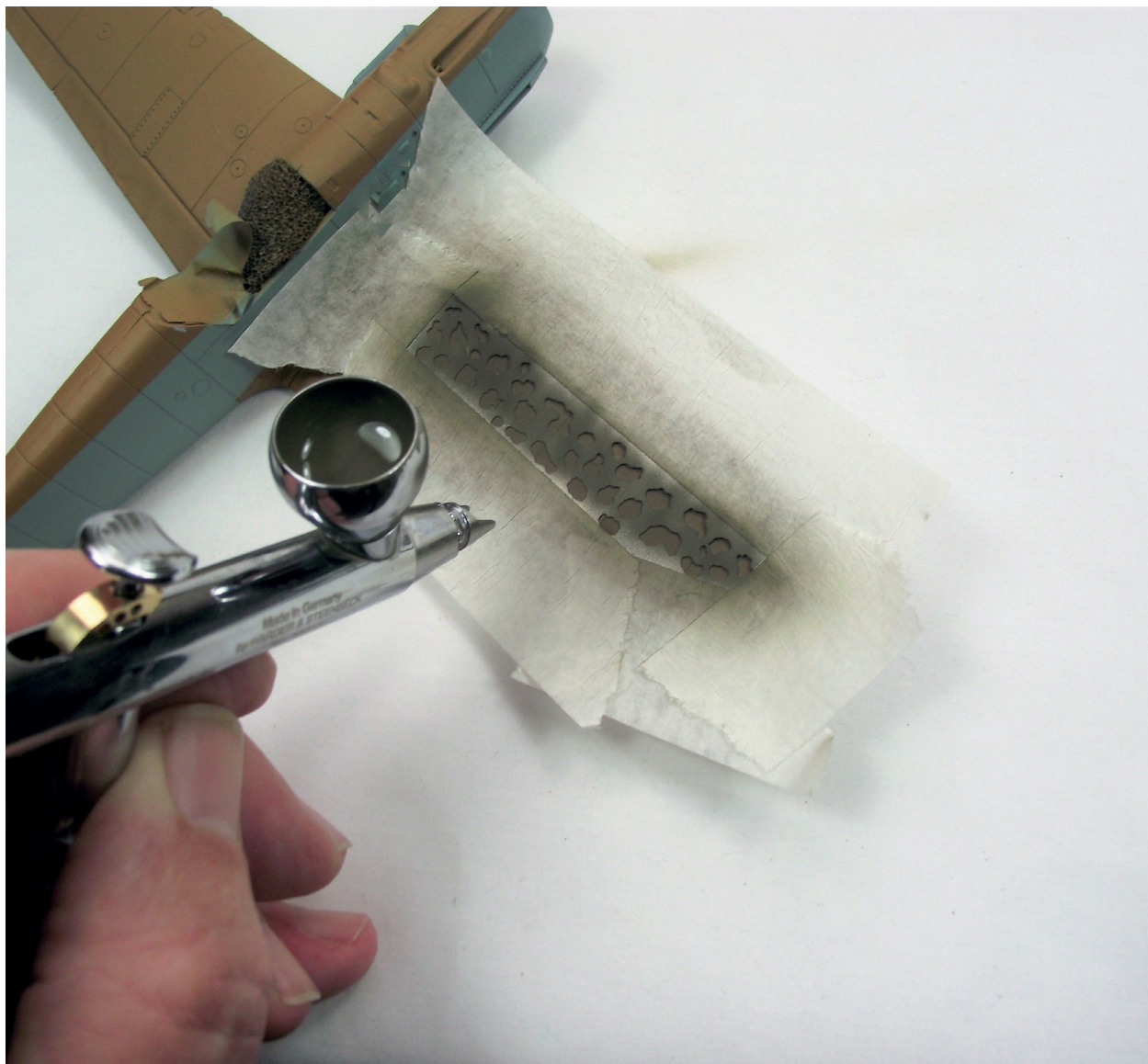
This reusable stencil set is etched from stainless steel, which makes cleaning up easy. The set is designed for 1/32 scale aircraft but will be used on a 1/48 scale test piece. There is also a set available for 1/48 and 1/72 scale aircraft, available from Hannants.



Place the stencil so it is not tight up to the fuselage. Having a small gap allows the overspray to give a soft edge.



The result should look something like this. At this stage it looks a little stark but once it is complete, with national markings and stencils applied, the eye will be focused elsewhere, which will reduce the impact.



When applying paint through a stencil, keep the coats light. It is one occasion when you do need to be 90 degrees to the surface, and not at the angle shown in the picture.

PRACTICAL ADVICE ON AIRBRUSHING

Before applying full schemes to your models, here are a few words of advice:

- If you are not in the right mood for airbrushing, do not start it.
- Do not attempt more than one task at a time.
- Do not start painting if you are under pressure to go somewhere – you will end up rushing the job.
- Do not be too discouraged if things go wrong.
- Practice makes perfect and most problems can be resolved. In the paint schemes used for the purpose of illustrating this book, mistakes and accidents occurred. Some of them are explained and the repairs illustrated, and some of them left so you can see the effect and learn from the pictures.
- Most of all – enjoy the finish you will get with airbrushing.

BRITISH WORLD WAR II FIGHTER SCHEME

Kit Used Revell 1/32 scale Spitfire Mk IIa.

Airbrush Used Devilbiss DAGR 0.35 needle and nozzle, air pressure 18–22psi.

This model is based on the only Mk IIa Spitfire currently flying, serial number P7350. This aircraft is a true veteran of the Battle of Britain. During the Battle of Britain it flew with 266 Squadron with the codes UO–T. It now belongs to the Battle of Britain memorial flight.

The paints used were Alclad MIL-SPEC paints, which are ‘airbrush ready’ enamel paint. This means they are produced at a viscosity intended to go straight into the airbrush without thinning, though if you use them, it is wise to ensure the consistency is as you require, adding thinners if necessary.

- Alclad II Grey primer with micro-filler ALC-302
- Alclad II MIL-SPEC ALCE 012 British interior grey-green
- Alclad II MIL-SPEC ALCE 011 RAF sky type ‘S’

- Alclad II MIL-SPEC ALCE 021 RAF dark earth
- Alclad II MIL-SPEC ALCE 013 RAF dark green
- Alclad II MIL-SPEC ALCE 102 matt black
- Alclad II MIL-SPEC ALCE 101 matt white
- Alclad II Aqua gloss ALC-600
- Alclad II Klear Kote Matte

Preparation

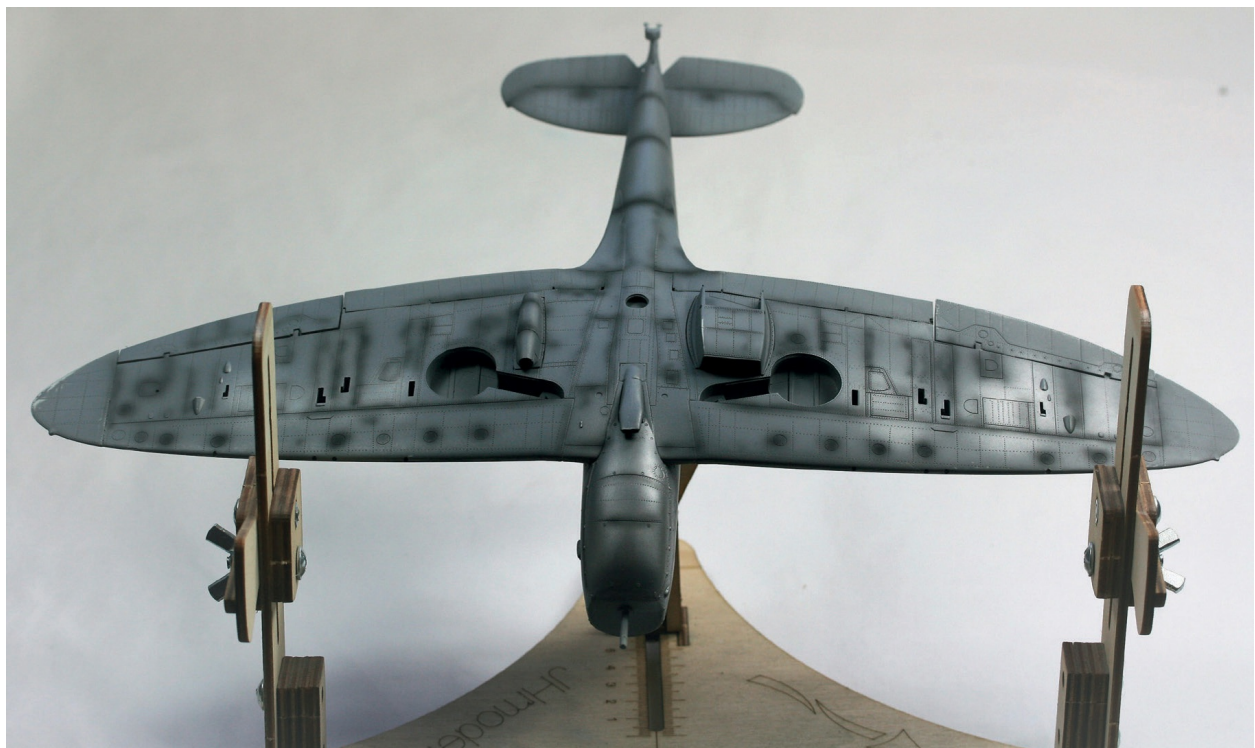
RAF fighter camouflage schemes and colours have been a point of controversy for many years. Most of the model paint manufacturers have put out for sale their version of these colours in recent years. Alclad II is a manufacturer that has built its reputation for metal finishes and primers, but has recently released the Mil Spec colour range, which includes Battle of Britain colours. These have been used on this Spitfire project. These paints have the advantage of being pre-thinned, so the possibility of getting the paint mix wrong is minimized, and for enamel paints they are also quick-drying.

Paint Application

The usual checks on the build quality of the aircraft were carried out, and any flaws found were dealt with. Then the main airframe and some loose components were primed with Alclad II grey primer. At this point, a coat of Alclad II aluminium was strategically painted on to areas where chipping was to be carried out. When this was dry, a coat of chipping fluid was applied to those areas and set aside to dry. After checking for any flaws and for areas that needed filler, all the under surfaces were cleaned and wiped down with a Tak cloth. Two coats of Alclad II sky type 'S' were applied. What was very noticeable when using these paints was that the pigments of these colours were very strong, and two coats was more than enough.



This is how AML present their Spitfire paint mask set. Two sheets of masks and a colour diagram explaining which one goes where.



Primer has been applied and a small amount of pre-shading with

some aluminium for the chipping process.



Due to the strength of the Mil-Spec pigments, after two coats the pre-shading has disappeared; this is not a problem, as the weathering process can provide the necessary tone changes.

With British camouflage patterns there are both soft-blended edges and hard-edged schemes. It is important to check references, if possible, to see which one is applicable to the aircraft chosen for the model. Once the decision was made about the type of masking to be used, the underside colour was masked up, two coats of dark earth were sprayed on the entire upper surfaces and set aside to dry. Pre-cut paint masks from AML were used to replicate the upper surface camouflage pattern. The pre-cut paint masks were placed into position according to the paint mask instructions. Some larger parts of the

camouflage pattern may be produced in more than one mask, so care was taken to ensure the patterns connected and flowed correctly. If you choose the same method, and the mask pattern goes over a recess or protrusion on the surface of the model, you may need to cut the vinyl to make sure it flows. Make your cut, press it down on to the surface and put a piece of tape over the cut you made, again making sure the pattern line is consistent.



When the sky type 'S' is dry, the lower surfaces are masked off, ready for the application of dark earth.



The dark earth has been applied and is in the drying process.



The AML paint masks have been applied and the first coat of dark green has been started.

It is standard practice on painting camouflage to paint the darker colour on top of a lighter colour. Consequently, the dark green was painted on top of the dark earth. The Spitfire scheme chosen has hard edges, but this sequence of putting the darker colour on the light is especially important with soft-edge camouflage schemes. If the colours are applied in reverse, the light colour does not blend with the darker one, but merely sits on top of it. Two coats of the dark green were applied, keeping the paint light where it met the paint mask to avoid a large build-up, which would be visible when the masks were removed.

If there is a build-up of paint at the paint mask edge, it could be cured by gently flattening down along the edge with a 1,000-grit sponge sander. Alternatively, if the build-up occurs in an area where decals are to be applied, the gloss coat for decal application could be introduced, then flattened down along the edge. The main aim is to avoid the paint build-up edge being visible through the decal. As decals are usually quite thin, they will conform to any edge if one is present.



Two coats of gloss coat were applied and, when dry, the application of the decals was carried out. Gloss clear coat will make colours appear darker. Notice how deep the colours are compared with the next picture where the matt coat has been applied.



Two coats of matt clear coat have been applied to all the top surfaces. The bottom surfaces were kept in gloss clear coat until after the weathering process.

At this stage there is the opportunity to carry out a chipping effect, if any chipping solution has been used. Before the application of decals, a gloss coat is applied. After this has dried, any weathering required could be carried out. Alternatively, this can be done after the application of a matt clear coat.

There are several other ways to paint British-style camouflage patterns. The following step-by-step guides will cover painting the more common ones.

HAWKER HUNTER MK 58 MISS DEMEANOUR

Kit Used Revell 1/32 scale Mk 9/Mk 58. Airbrushes Used The Iwata Revolution TR2 0.5 needle and nozzle, Iwata Eclipse CS 0.35 needle

and nozzle. The TR2 was used for priming and the larger areas of colour, and the Eclipse for the small bands of colour and fine touching-in. Air pressure for priming and painting overall white 18–22psi, and 15–18psi for applying the colours.

Miss Demeanour is an aircraft you either love or hate. The application of a bright and varied colour scheme was a daring departure from the usual military schemes. The scheme chosen represents the initial colourful presentation painted in 1999. Miss Demeanour has been repainted since then (in approximately 2008) so there are now slight differences shown in online pictures. The colour blending is much sharper now. During the process of writing this book, the aircraft Miss Demeanour was sold to a Canadian company, and at the time of writing it is not known whether it will stay in the same scheme.

For model-makers with a purist approach, there are Hawker Hunters in military schemes to replicate, but this one is a really eye-catching model. There are many more aircraft with complex schemes to try if you want to turn heads on the competition tables, or just to satisfy a desire to do something different. Painting a model such as this is an exercise in blending colours. The paint scheme looks more complex than it really is. There are only nine basic colours used, excluding the primer and clear coat:

- Ultimate white primer
- Humbrol 34 White
- Humbrol 154 Insignia yellow
- Hannants X014 Red Arrows red
- Hannants X031 Post Office red
- Humbrol 196 Satin light grey
- Pantone Electric blue
- Hannants X030 Roundel blue
- Hannants X023 Oxford blue mixed with Colour coats ACJ08 Mitsubishi cowl blue black
- Humbrol Metalcote 27002 Polished Aluminium
- Humbrol Acrylic Clear gloss varnish

The configuration of this model was planned to be in a flying mode, so the build was considerably easier than most: flaps up and undercarriage up. An MDF board with a 13.5mm brass tube inserted vertically into it served as a painting stand. The brass tube was inserted into the exhaust pipe as a slightly loose fit, which enabled rotation of the aircraft during painting.



White primer acts as a good base for the colours, especially for reds and yellows. Try to achieve the smoothest finish you can, so any flatting down is minimal.

Two coats of white primer were applied, as the white brings out the top colours better than a dark ground. The model was checked over for defects and the primer gently rubbed down with fine-grade sponge sander (220 grit or finer). Any breaks through the primer needed spot priming again on those areas. Another option would be to put a gloss white coat on top of the primer.

It was important when applying the colours and blending them not rush the task, but rather to be slow and methodical. It is inevitable to

make mistakes with a complex scheme and, occasionally, it was necessary to go over areas again, but these were readily touched in. Dry patches were taken care of when the clear coats were put on. The reward for patience is a good replica of this classic aircraft.

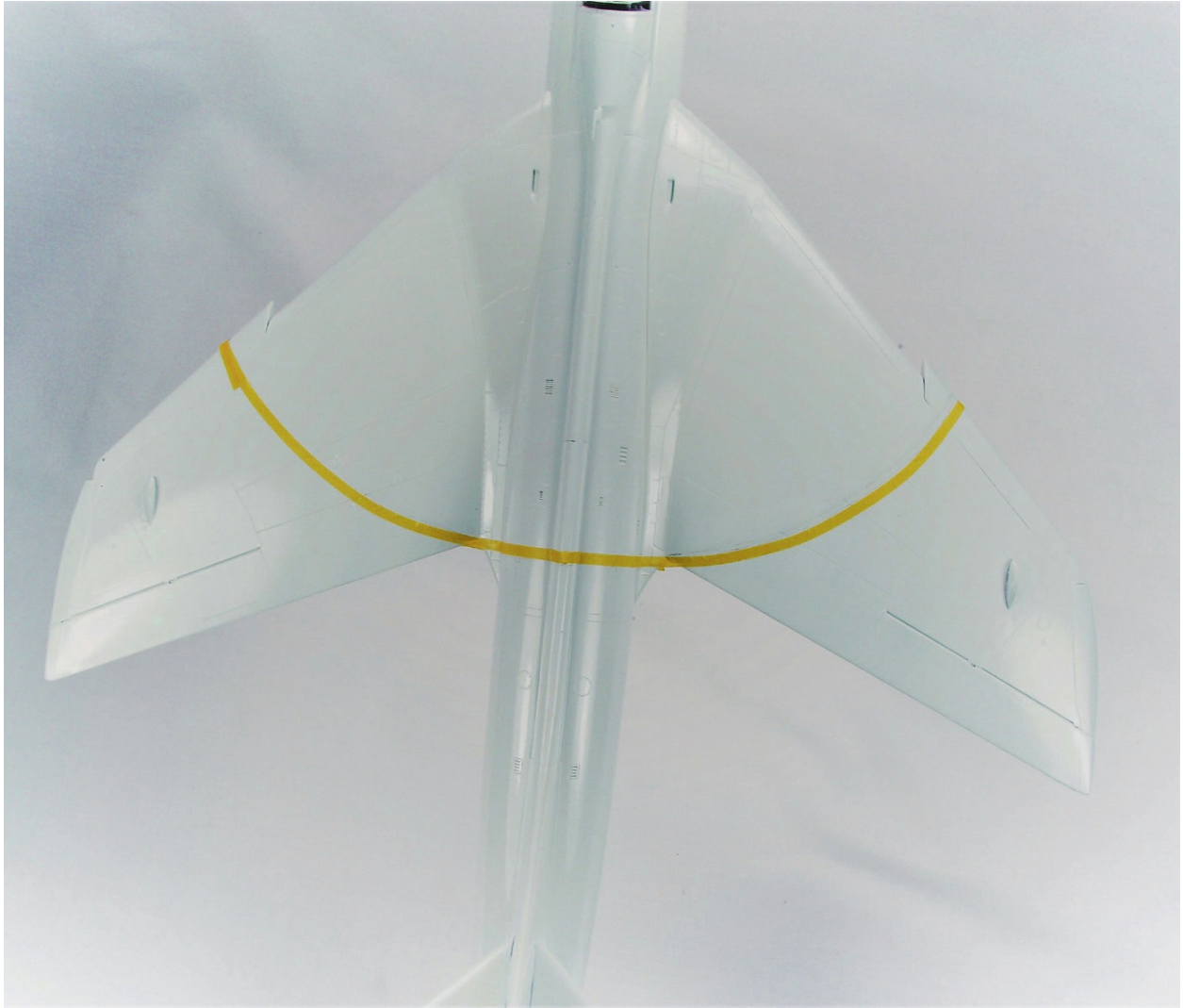
Preparation 1

The paint scheme can be painted in two sessions, but it is possible to stop at any point and pick up the scheme again at a later session. Using a pencil and a piece of string, an arc was created across the wing surface top and bottom. The centre point for the top surface is immediately behind the cockpit and should end approximately 20mm outboard of the dog tooth on the wing leading edge. Care was taken to ensure the pencil marks did not extend over the fuselage. The line stopped at the trailing edge where the wing joins the fuselage, and a straight line was drawn manually over the fuselage; this appears vertical from the side view. Once the arcs were marked out, the rear was masked off using a 2mm fine line tape. It is possible to use 3mm tape to create the arc area for painting.

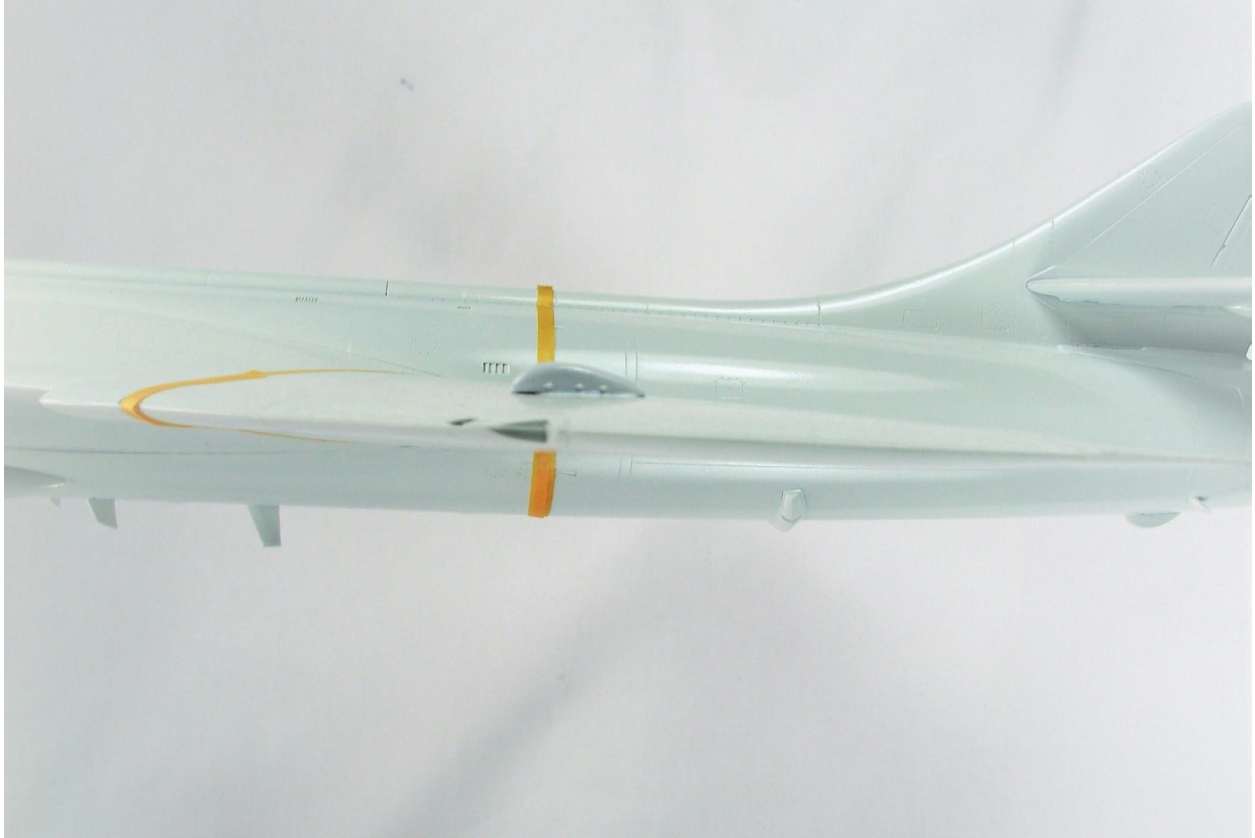
White to yellow

Different paint systems will vary in pigment strength so the following mixes may need to be adjusted. Using the white and yellow paint, three mixes of yellow were made up, one 50/50 yellow and white, one 25 per cent white/75 per cent yellow and one 100 per cent yellow. To ensure overspray was kept away from what had just been painted, the airbrush was used with its nozzle pointing slightly rearwards. Paint application started at the front, leaving the nose cap white, and two light coats of 50/50 yellow were applied to half way through the cockpit area. The second coat was started a little further back from the nose to improve the white to yellow blend. Some of the 50/50 mix was put to one side and kept in case it was necessary to make corrections. Then, using the 25/75 mix yellow and starting just in front of the windscreen, a light coat was applied, getting heavier as the airbrush moved rearwards. The idea was to blend the darker yellow into the lighter yellow, leaving no distinct line where the two yellows meet. The

100 per cent yellow was then blended as far back as outboard of the intakes, following the arc. Having a cardboard template of the arc is handy in these stages. Some of the 100 per cent yellow was kept for the next stage.



Start with marking out the wing first. It is important to get this right, as the whole scheme works from this arc.



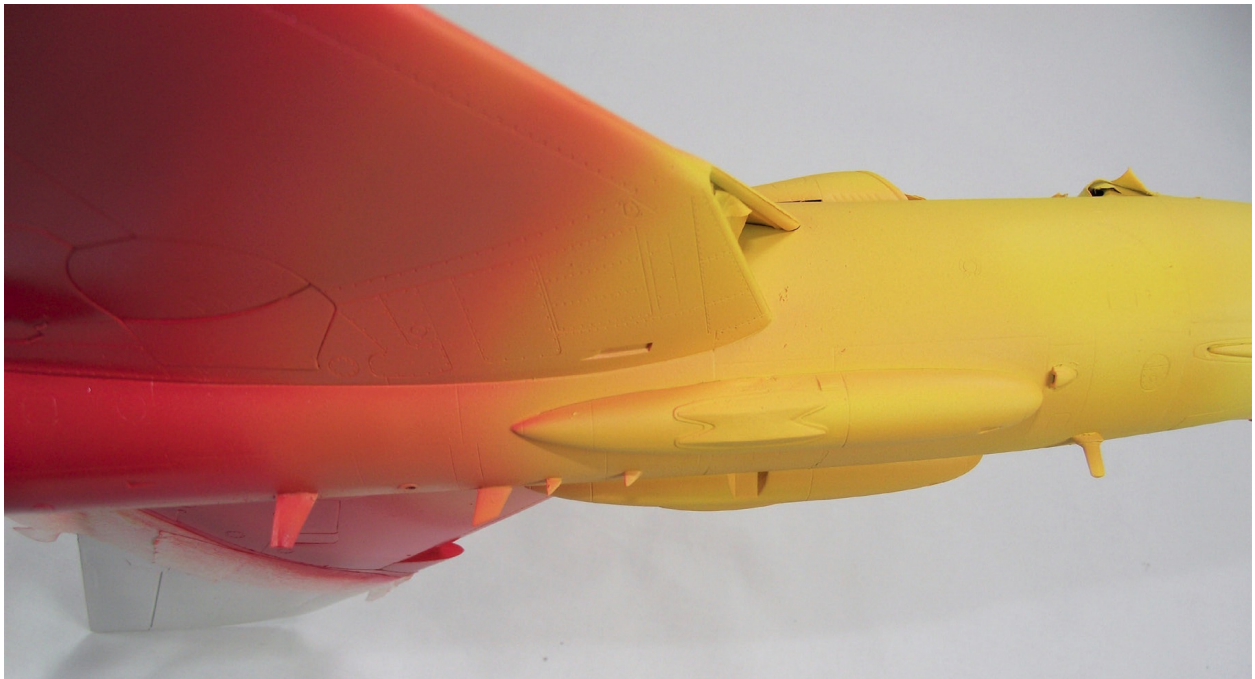
From the side view the line should be vertical. There is the rear fuselage joint close by to act as a reference point.



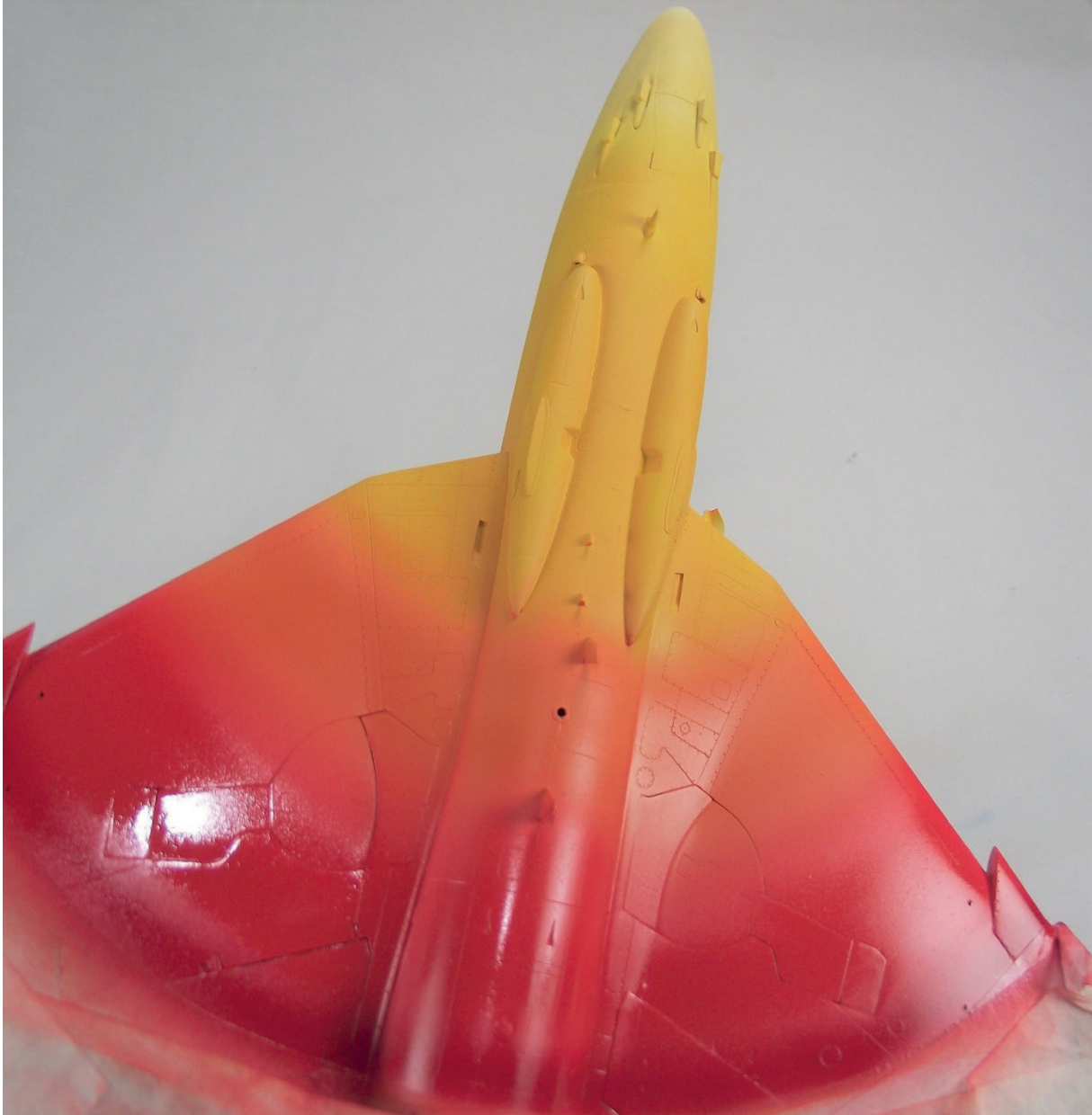
Once you are happy with the lining out, mask off the rear fuselage, making sure it is well sealed, so as to avoid overspray getting on to the rear fuselage.



Before starting the yellows, mask off the intakes, which should be kept white. The three shades of yellow have been applied in this picture, but the last 100 per cent yellow coat is not finished.



In this picture, you can see where the orange colour meets the gun blisters and travels up the blisters in the corners. These will need careful touching in with the 100 per cent yellow, keeping the pressure low, so as not to get yellow overspray on the orange.



In this view, the orange and reds have just been completed. When they were dry, a gloss clear coat was applied to check the blending.

Yellow to orange

The red and yellow were mixed together to gain the orange colour, but care was taken to ensure the red was not dominant. The red pigment is strong so the red was mixed in cautiously and gradually. The colour orange was blended into the yellow gradually, so some of the yellow was mixed with a small amount of orange and that colour used to

start, again following the arc. The orange colour was taken up to the halfway point between the intake and the dog tooth. Where the paint met components like the gun blisters, care was taken in using control of the air and the paint to ensure the colour did not shoot up into the corners, either forwards or rearwards. If any had crept into inappropriate areas, careful touching in would have resolved the problem.

Orange to reds

Red was blended with the orange, taking the red up to the taped arc. It was important to ensure there was no build-up of paint next to the tape, to ensure there was not 'step' effect. Finally the dark red was blended into the previous red, again, keeping it light at the tape edge. To test the blending had worked well, a coat of clear coat was applied over the paint surfaces. As all looked well, the model was left to dry fully before being de-masked. When de-masking, the tapes were gently pulled back on themselves, that action cutting a neat line.

Preparation 2

To mask off the front colours, the masking tape was placed inside the Post Office red band. This gave an opportunity to gently rub down the tape edge had this been required. This next stage was all about control again. The string that was used to make the pencil mark on the wing was used attached to the airbrush; it is also possible to use a card template, which is easier. Care was taken to make sure everything was stable and correctly aligned before applying paint.

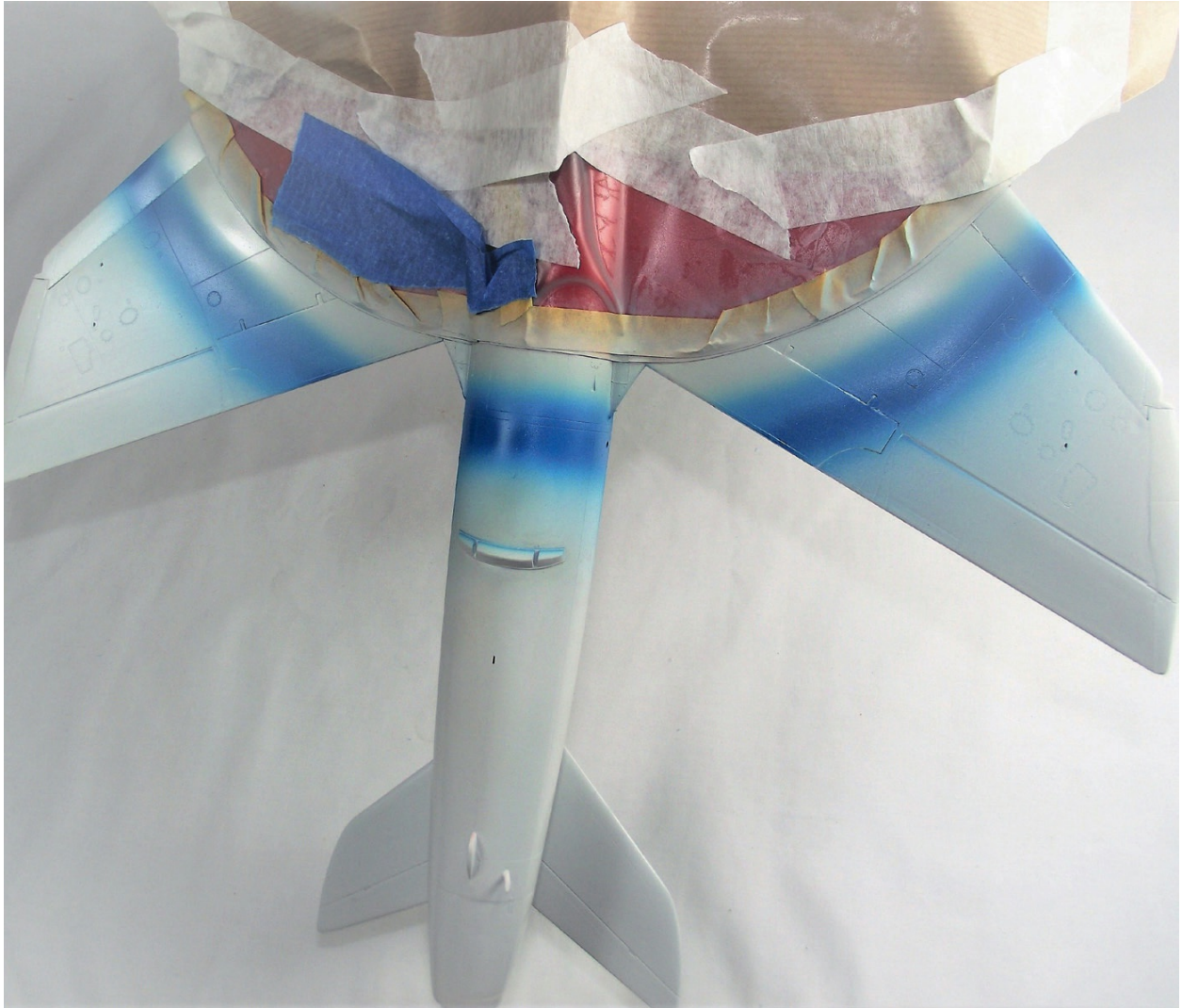


The front half has been de-masked and then re-masked for painting of the rear section.

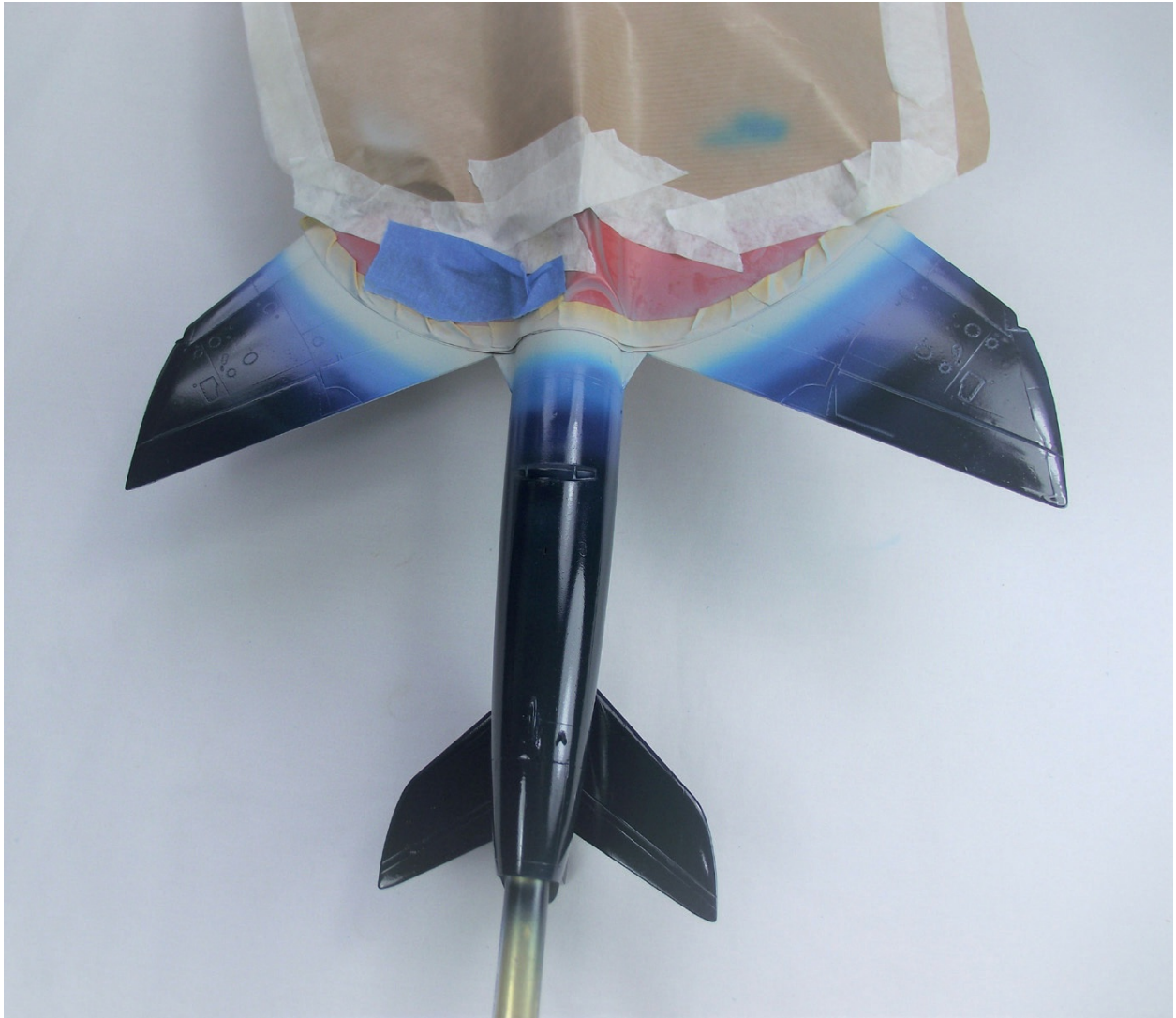
Grey to the blues

A band of grey was applied following the arc, with special attention given to the joint to the fuselage. Following this, the light blue was applied in bands approximately 10–12mm wide, blending each band as it was painted. The roundel blue band, to a width of approximately 15mm, was next and finally the dark blue was applied over the

remaining parts of the wings and fuselage.



The grey and light blue have been applied, together with the start of the roundel blue. This section of painting was the most challenging, requiring patience and perseverance.



Once the roundels blue and dark blue are being applied, the process becomes easier. After the dark blue is dry, a coat of gloss clear coat was applied to check the blending.

As before, a coat of clear coat was applied to check the blending. Once this was dry, the front half was de-masked, and checks made to the complete aircraft for any defects.

Odds and ends

The gun ports and tail cone rim can be masked for spraying, but in this demonstration they were painted in Polished Aluminium by hand, to represent stainless steel. With exception of a small amount of roundel blue blended in towards the front, and a white nose cap which was

formed by white triangular stripes, the tanks and air brake were painted dark blue. The outer tank pylons were represented as dark blue and the inner pylons red and dark red.



After de-masking the front half, a very light rubbing down of the clear coats was followed with two more coats of gloss clear coat.



All the loose accessories were painted in their respective colours, ready for decal application.

The illustrated model incorporates a final set of custom-made decals, which were applied and set to one side to dry. Because several commission models of this aircraft have been completed by the author in the past, sets of custom decals were produced, and it is possible some unused set may occasionally appear for sale on the second-hand market. Alternatively, decal star sets are available and can be adapted for 'best fit'. The stripes on the tanks can be airbrushed after masking.



The decals have been applied, then three further coats of gloss clear coat.



*The accessories have been assembled and put on to the airframe.
Finally, the whole model is placed on to its new base.*

Finally three more coats of clear coat were applied to finish the aircraft before mounting it on its permanent base.

BRITISH MK IVA MUSTANG BARE METAL SCHEME

Kit Used Tamiya 1/32 scale P51D Mustang.

Airbrushes Used Iwata Eclipse CS 0.35 needle and nozzle, and Harder and Steenbeck CR plus 0.2 needle and nozzle. Air pressure was set at 12–15psi.

This aircraft is a P51 D Mustang, which, with minor modifications, made a Mk IVa. It is depicted as Wing Commander JA Storrer's personal mount in May 1945. At that time, this aircraft was one of fourteen patrolling the sky above the Channel Islands, while army and navy forces liberated the islands. The real aircraft would have had the wing rivets puttied over and the wing painted aluminium. The rest of the airframe, with the exception of the fabric-covered rudder, anti-dazzle panel and canopy frames, were bare metal, reportedly kept clean and polished. The paints used were from the AK Extreme Metallic paint range, AK True Metal tube paint range and Humbrol Metal Cote:

- AK Extreme Metal AK 471 Black base
- AK Extreme Metal AK 477 Chrome
- AK Extreme Metal AK 479 Aluminium
- AK Extreme Metal AK 480 Dark Aluminium
- AK Extreme Metal AK 481 Polished Aluminium
- AK True metal AK 455 Aluminium
- AK True metal AK 456 Dark Aluminium
- Humbrol Metal Cote 27001 Matt Aluminium
- AK Intermediate Gauzy Agent shine enhancer
- Galeria acrylic matt varnish

Preparation

Bare metal finishes require very good preparation so that no underlying fault is visible through the finish. The bare plastic was checked for imperfections, as some manufactures leave a fine grain to the plastic surface or scratches, where plastic parts have rubbed together in the bags. If either is visible, it requires flattening out with 1,200 wet and dry or, alternatively, a medium polishing compound can be used. With the AK range, the black base is a primer coat, but it is

possible to prime the aircraft first with a standard primer. The black base was applied and, when the primer was dry, the primer was flatted to a smooth finish using a 1,000-grit sanding pad.

Finish Coats

These metalized types of paints are pre-thinned, so need a good shake before they are loaded into an airbrush. Be aware that some of these metal finishes require application at lower air pressures. To ensure the best chance of success it is advisable to read any application instructions that may be on the bottle.

Because the model kit used had been waiting on the sidelines for three years to be painted, a good clean down with a mild alcohol and water solution was followed with two coats of AK Black base and left to dry. After this, the black base coat was examined for orange peel or bits. Either of these faults in the black base will need to be flatted out with 1,200- or 1,500-grit wet and dry paper or, alternatively, use an Alclad II micromesh polishing pack. The glossy black base coat is there to give a reflective finish to the metallic top coat, in much the same way that a mirror works.

The chrome and polished aluminium colours were applied in two coats, by painting some curved areas like the wing to fuselage fillets in chrome, and other areas with the polished aluminium, including the ailerons and flaps. The bulk of the wing only received one coat of aluminium and was then left to dry. Then the model was checked over again for seams showing or scratches. Because metal finishes are very thin, they are very good for showing these up. This type of paint is also very easily damaged, so it is best to wear cotton or latex gloves when handling a completed project, to avoid leaving fingerprints.

Bare aluminium would have weathered at different rates, especially around areas with heavy wear, such as the cockpit entry, fuselage fuel filler cap and those areas subjected to frequent wiping down and polishing. To simulate aging differences, it is effective to isolate individual panels with a different metallic shade. This is achieved by using accurate control of the airbrush, as described in [Chapter 4](#), and a piece of card (about the size of a business card). Hold the card

against the edge of a panel and lightly apply a different shade, keeping within the panel. On the aircraft depicted, the coverage was deliberately kept uneven. Once the desired finish is achieved, a double-track coat of Intermediate Gauzy Agent is applied to keep the shine locked in. This technique was used on the aircraft illustrated.



The required areas were masked off and the model was cleaned before commencing priming.

The next step was to mask off the wing fillets and fuselage. Liquid masking was used on the wing fillets and also on the fin to eliminate the risk of using masking tape directly on to the painted surface. The adhesive on masking tapes, and also on masking films, have been known to affect metal finishes, whereas liquid masking does not seem

to affect metal finishes at all. The wings and rudder were painted with Humbrol Matt Aluminium Metal Cote, even though this ran the risks associated with mixing paint systems. Because both paints used were enamel-based, the risks were reduced. Matt Aluminium Metal Cote was used because, when the colour was dry, it had just the right contrast of a painted aluminium wing against the bare metal fuselage. Once the wings were complete, a double-tracked coat of Intermediate Gauzy Agent was applied prior to applying the roundels, stencils and yellow leading edges.

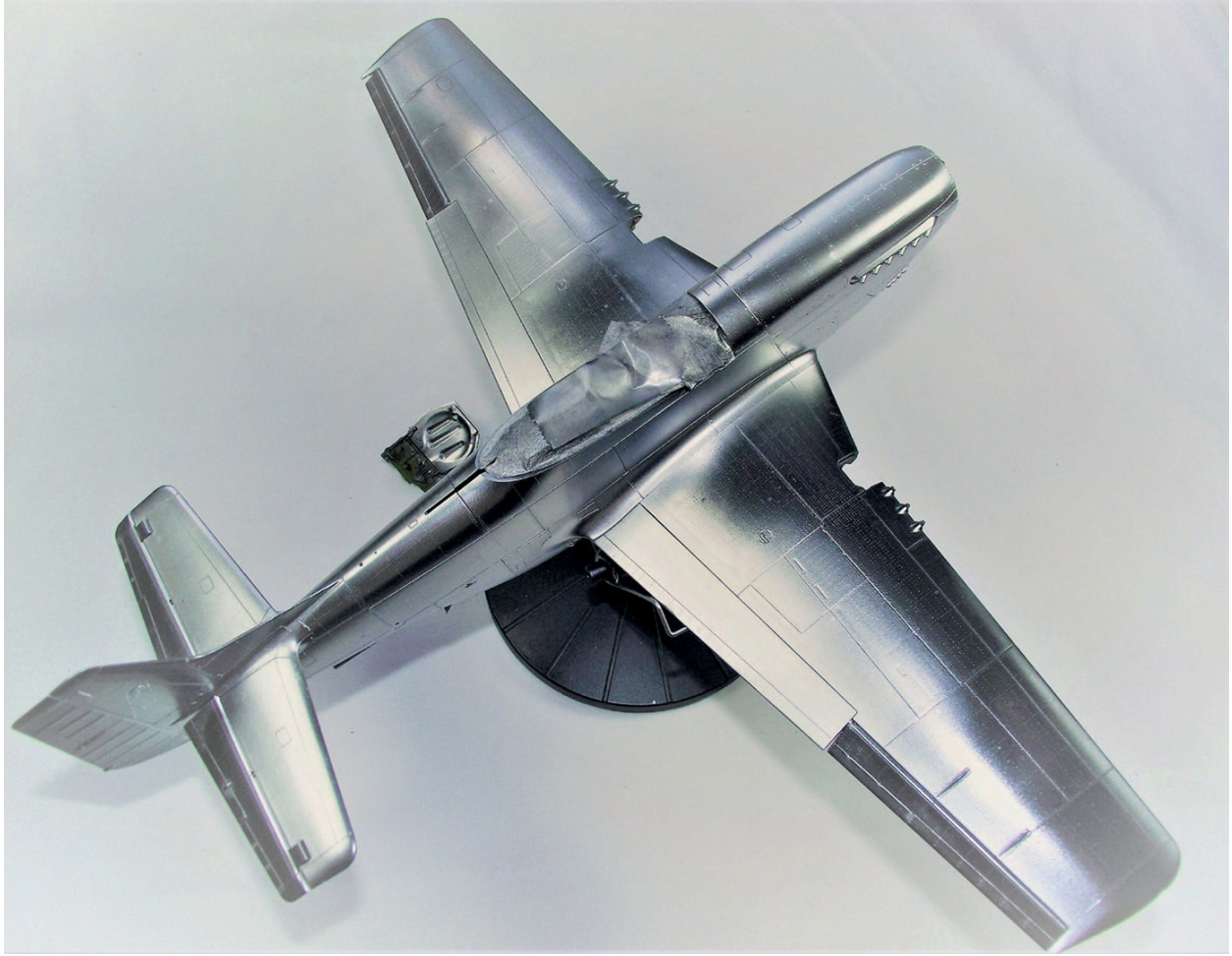


The black base has been applied to the main airframe and some ancillaries.

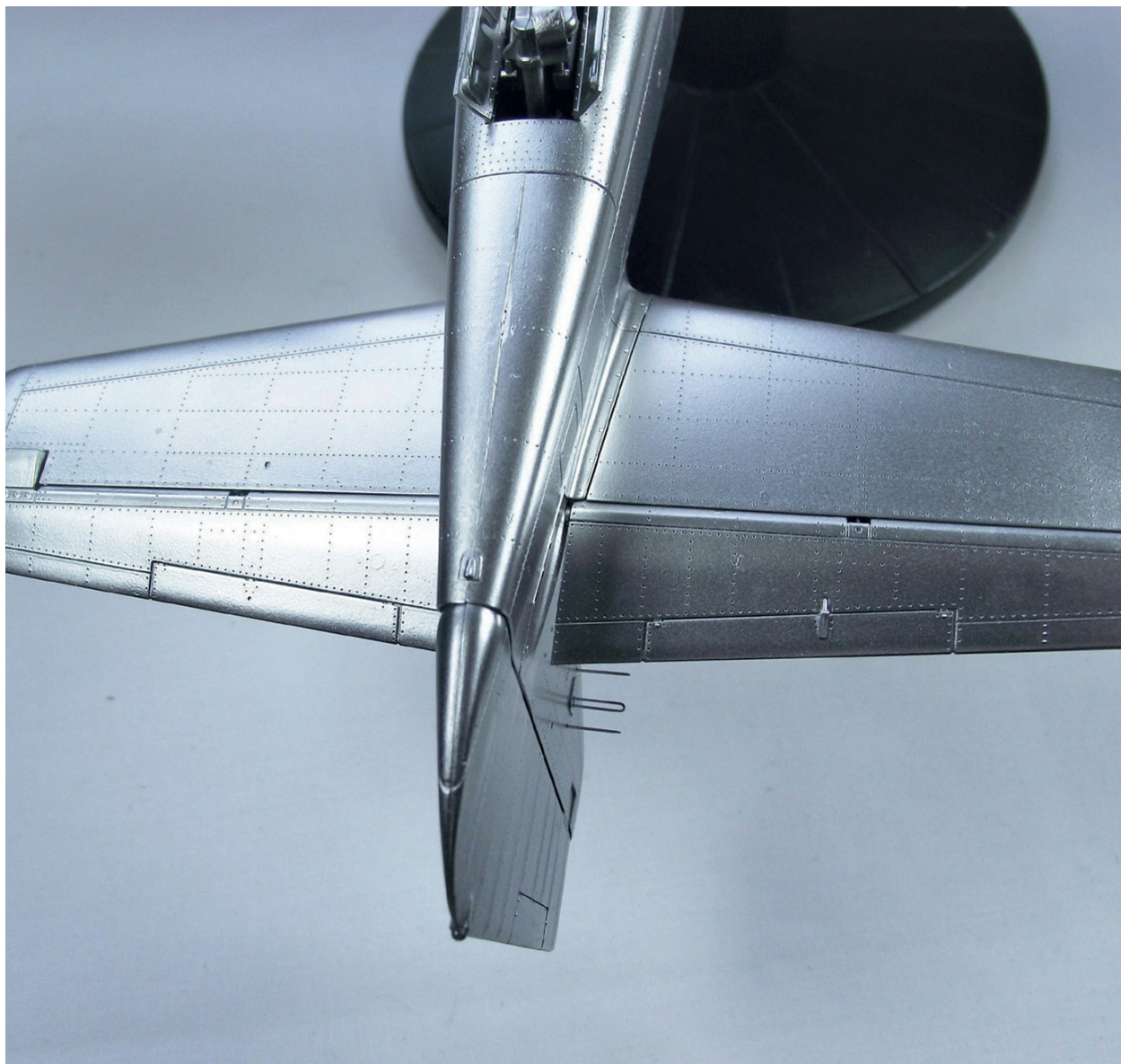
The choice of colour used to depict the anti-dazzle panel, canopy and windscreen frame has been controversial for many years. There

is a dispute between manufacturers as to whether it was either olive drab or light blue edged in dark blue. The blue scheme looked more attractive, and the two blues fitted with the Squadron Leader pennant colours, as well as with the two blues of the personalized code letters 'JAS'. In the illustrated model, the panel forward of the windscreen had also been repainted or replaced in a different shade.

The areas were masked off and the blue colours mixed and applied. The dark blue edging was done with decal stripes. When it came to painting the anti-dazzle panel, an easily made mistake occurred. The area was masked off as normal and painted light blue. The small dark blue cheat line was then masked out for painting. During the masking process, a piece of masking tape on the light blue was misplaced and when it was lifted, the light blue came off with it. The mistake was made because the area was not keyed up to take the light blue. Clear coats are quite hard when cured, so paint applied over the top has nothing on to which to grip. The problem was easily repaired, by initially pulling off as much of the blue as would detach. The anti-dazzle panel was re-masked, and the whole area flattened down, with care taken to feather out any remaining blue edges, using a 600–800-grit sponge sanding pad. Next, a thin coat of primer was applied, but it may have been possible just to repaint the light blue had the damage been slight. Finally, a double-track coat of Galeria Matt Clear Coat was applied to the wing and to all the roundels, which otherwise appeared a little too glossy.



Polished aluminium and chrome have been applied; the wing has only one coat, as this will be painted matt aluminium later.



This seam under the tail was not visible when prime. Metal finishes will pick up the slightest mark or seam if they are present. From this stage onwards, wear gloves when handling to prevent marring the surface.



Various tones have been added to the airframe and the wing has the matt aluminium applied.



The major work is now done, decals applied and weathering has been started with the exhaust stain, and a small amount of grey wash around some panels.

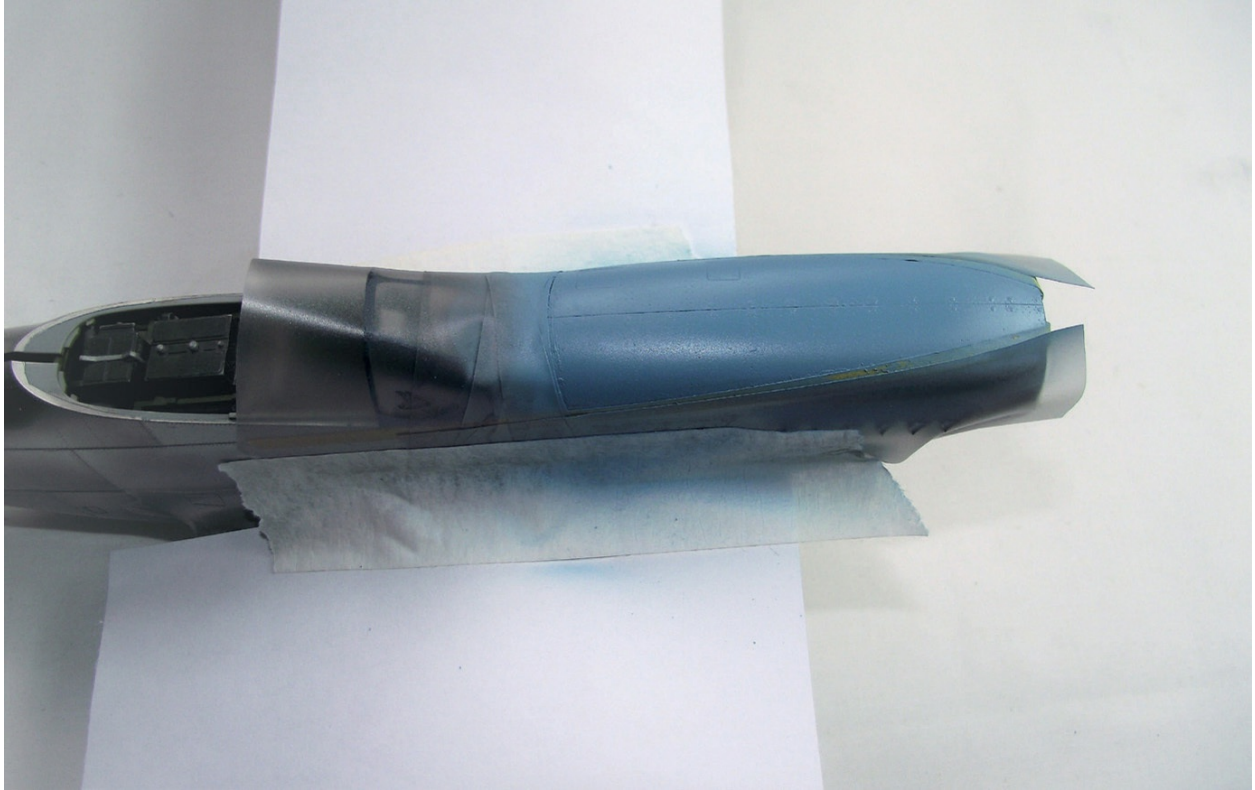


This picture was taken at the US Air Force Museum at Duxford, which nicely demonstrates the contrast between the painted wing and the bare metal fuselage. The fuselage has had a lot of corrosion treatment carried out, making it look slightly unnatural.



Disaster strikes! While masking off the anti-dazzle panel, a misplaced piece of masking tape revealed the paint was lifting. The best solution was to remove all paint that would come off and start again. The cause of the paint failure was that the surface had not been keyed up to accept more paint.

As stated earlier in this chapter, the Mustang aircraft was kept clean and polished by ground crews, so on the demonstration model, weathering applied to the model aircraft was kept to where leaks and spillages were likely and to walkways, which were likely to have experienced heavy wear. A wash of grey dark dirt was applied to various areas, highlighting some panels and rivets. Grey washes work well with metallic finishes, and grey paint mixed in with aluminium will give an anodized aluminium look.



After preparing the area, it was locally masked off, re-primed and repainted.



After de-masking the correction, you would be challenged to know the problem ever existed. The thin dark blue line was created using decal stripes.

WORLD WAR I BIPLANE

Kit Used Wingnut Wings 1/32 Junkers J1.

Airbrush Used Iwata TR2 0.5 nozzle and Harder and Steenbeck Infinity CR plus with 0.2 needle and nozzle. Air pressure 18–25psi. This model is quite large in 1/32 scale, especially the upper wing, so a little more air pressure was used when priming.

The kit was purchased as water-damaged stock directly from Wingnut Wings. This meant the waterslide decals were unusable and alternatives needed to be sourced. There are some companies

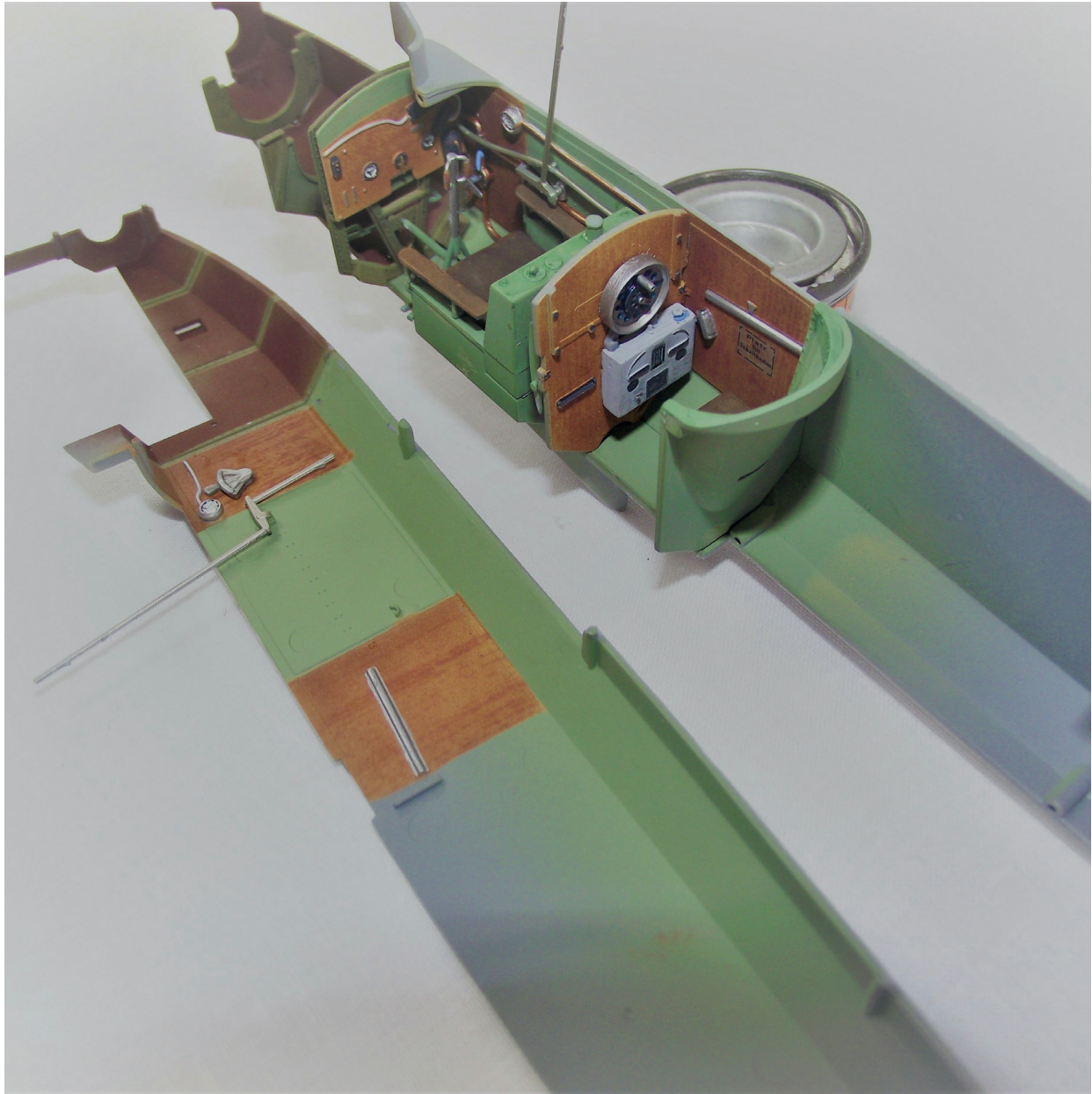
producing mask sets for individual aircraft but none were available for the Junkers J1, so an alternative supply was needed. Connections with the hobby materials' producer Scalewarship Limited were exploited and a custom set of paint masks were computer cut using Ultra Mask masking material. Enamel paint colours used were from the Hannants' range of World War I colours, Alclad II Mil-spec and Lifecolor Acrylic:

- Ultimate grey primer
- Hannants X243 German World War I underside blue
- Hannants X241 German World War I topside green (struts only)
- Hannants X242 German World War I topside purple
- Lifecolor UA004 Interior green
- Lifecolor UA080 Italian mimetic yellow 3
- Lifecolor UA729 Dark wood stock.
- Alclad II MIL-SPEC ALCE 101 matt white
- Alclad II MIL-SPEC ALCE 102 matt black

Preparation

Because of the external structures and detail visible, using airbrushing to successfully finish World War I aircraft models requires a little planning before starting the assembly. Study the assembly sequence and work out what needs painting and when. Most World War I aircraft have a wooden framework or panels from the engine bay to beyond the cockpit area. Some are painted, others are varnished wood with painted metal brackets. This means there are likely to be a number of sub-assemblies and areas needing to be painted and then masked up for additional colours.

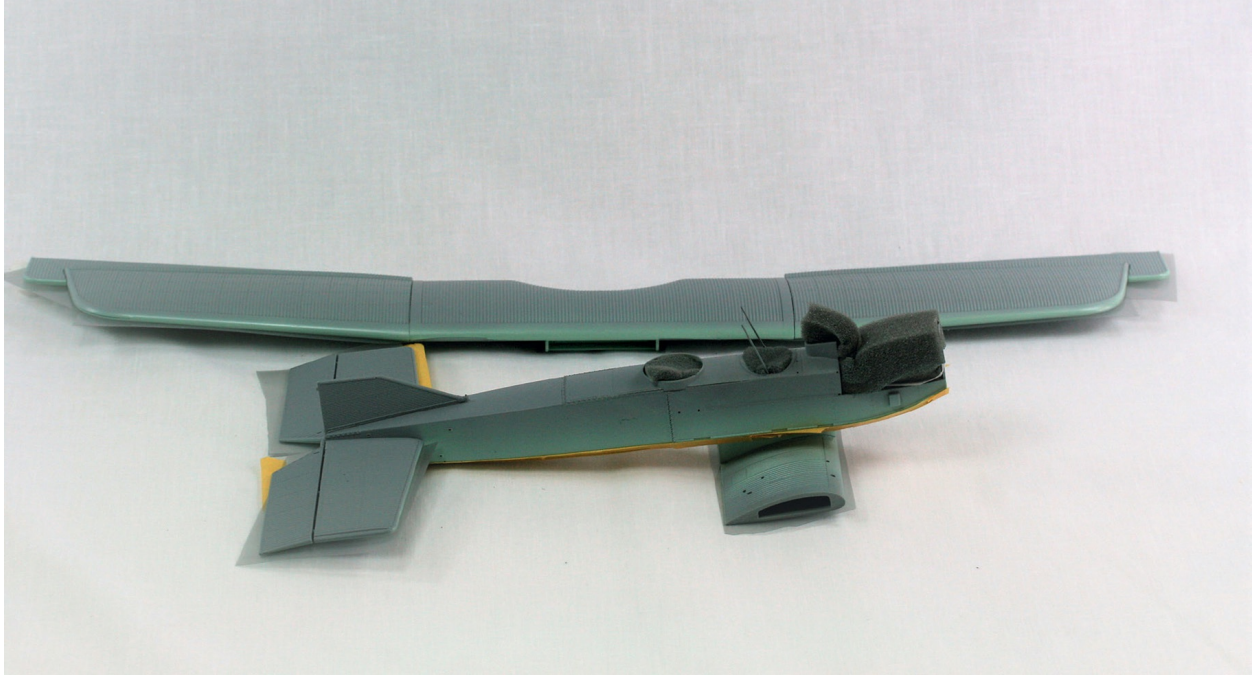
This model demonstrates the principles of freehand camouflage and the use of paint masks for national markings. To achieve this it was necessary to paint enamel on top of water-based Lifecolor for the exterior camouflage. There should be no difficulty in doing this as long as the first colour is fully cured.



Assembly and painting of the interior is relatively quick. These early aircraft had very basic instruments and controls.

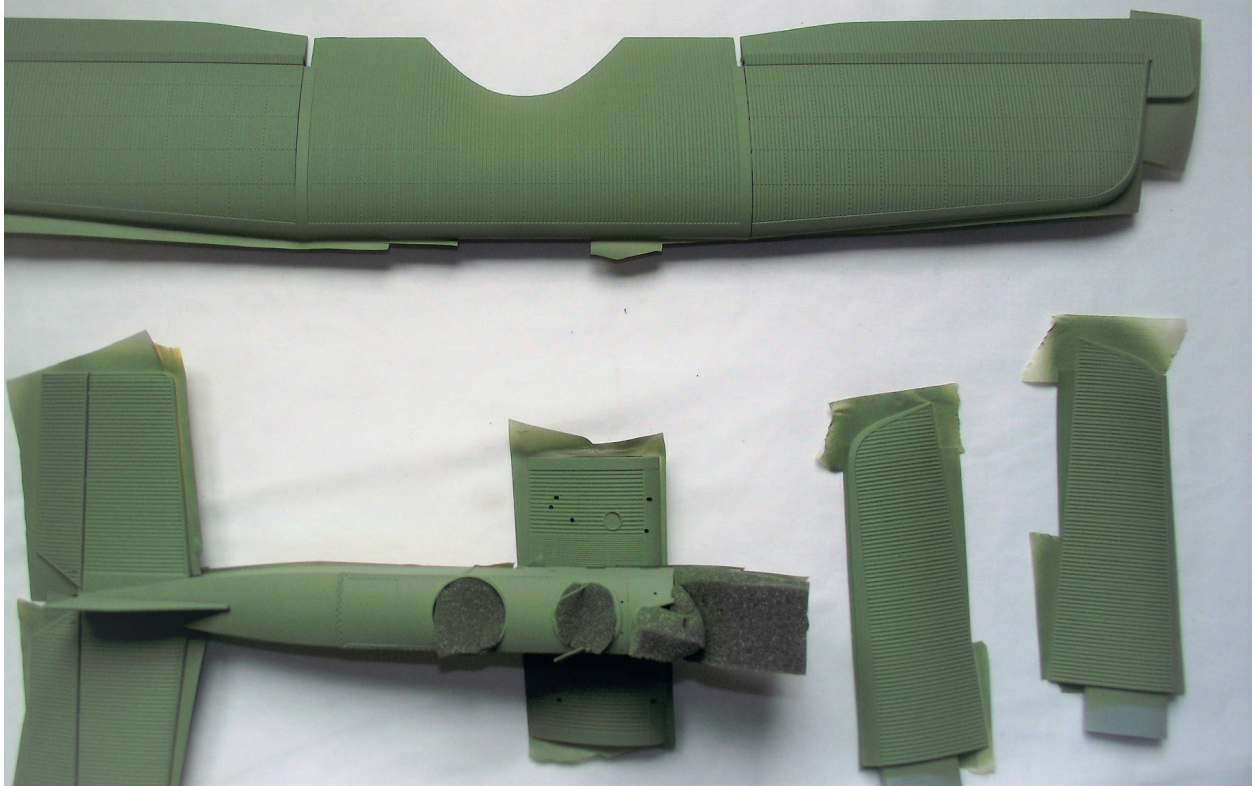
During the painting of interior parts, all of the main planes, stabilizers, elevators and aileron assemblies were built and primed ready for the camouflage. The interiors of these early aircraft were fairly basic, with very few instruments and controls. This interior was assembled and painted, and the fuselage halves joined together. When the glue was dry, the cockpit was masked up and the fuselage

assembly primed.



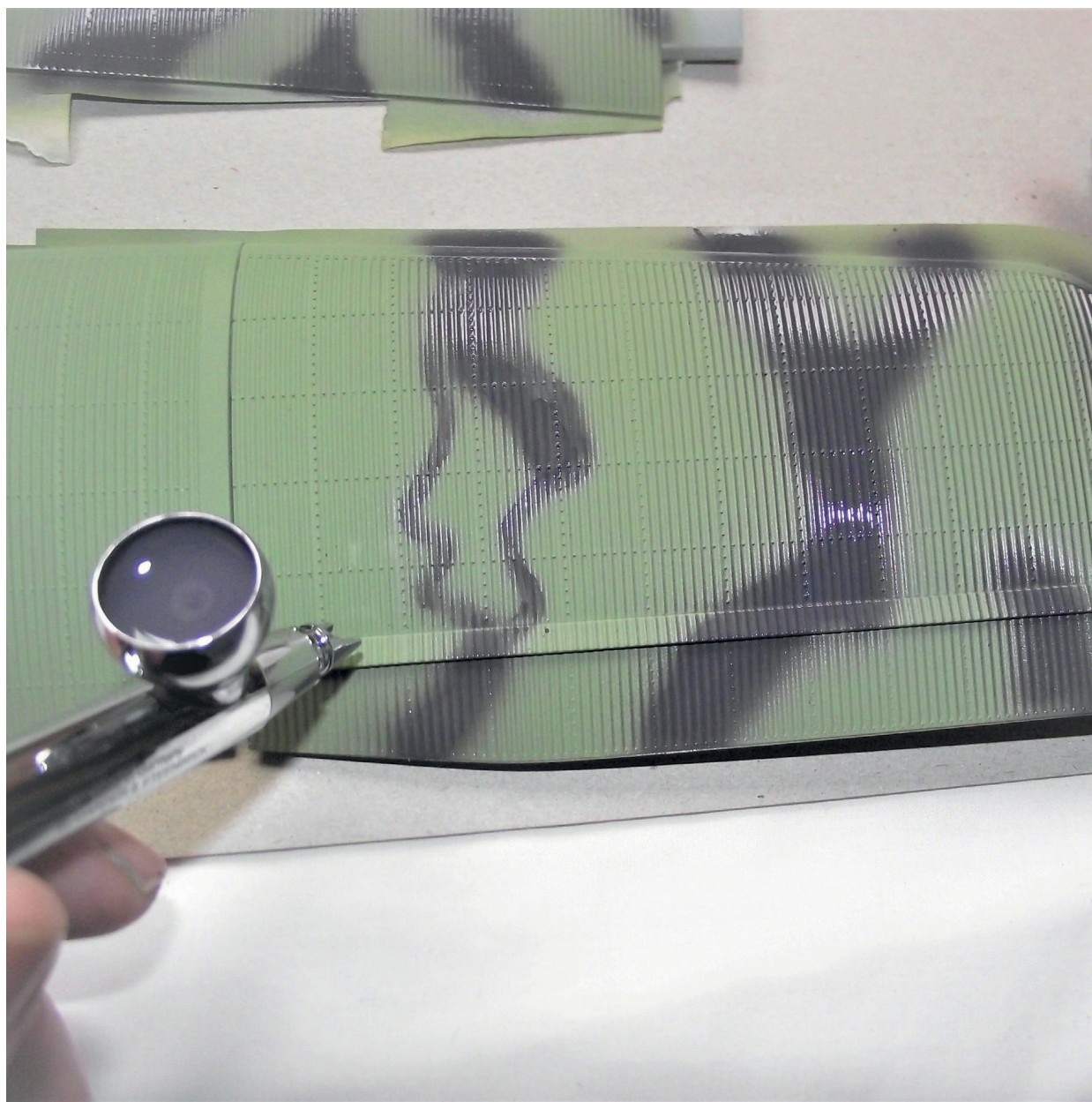
After the fuselage has been assembled and primed, all the sub-assemblies' lower surfaces were painted in German under-surface blue, and when the paint was cured, masked up for the upper surface green.

Once the fuselage was assembled and the usual checks on the primer completed, the underside blue from the Hannants' enamel range was applied, with a few drops of cellulose (lacquer thinner) added to the mix to aid the drying process. The model was then left, as enamel needs to cure for at least 24h.



Lifecolor interior green has been applied on all the upper surfaces and is ready for the purple camouflage to be applied.

Once cured, the underside was masked off. The Lifecolor green (the lighter colour) was then applied to all upper surfaces and then set to dry. Unlike the enamel paint, Lifecolor does not need 24h to cure and the demonstration model was left for 3h only. Occasionally, drying was sped up by using a hairdryer. The next job was to apply the topside purple freehand.



Freehand purple camouflage being applied.

According to the Wingnut Wings' instruction book, no two aircraft camouflage schemes followed the same pattern, but the styles were very similar. Consequently, freehand application was considered an appropriate method. Because of the availability of a finer level of control, the Harder and Steenbeck infinity airbrush was used for this task. The air pressure was kept between 12 and 15psi but care was taken to ensure proper atomization. With a corrugated surface, paint is

liable to creep down the corrugations, giving a blurred effect, or it will run if it is too wet. This was also likely to have happened when paint was applied to the real aircraft, but to keep a neater, soft edge to the camouflage, and to prevent runs, the purple colour was applied with rapid movements.

Using Paint Masks for the Insignia

When making the decision about whether to paint insignia rather than to apply waterslide decals (if these are available for your project) consideration should be given to both effort and effect. Although the painting process requires patience, the outcome can be very pleasing and realistic. Painting insignia also avoids silvering around the edges or between letters.

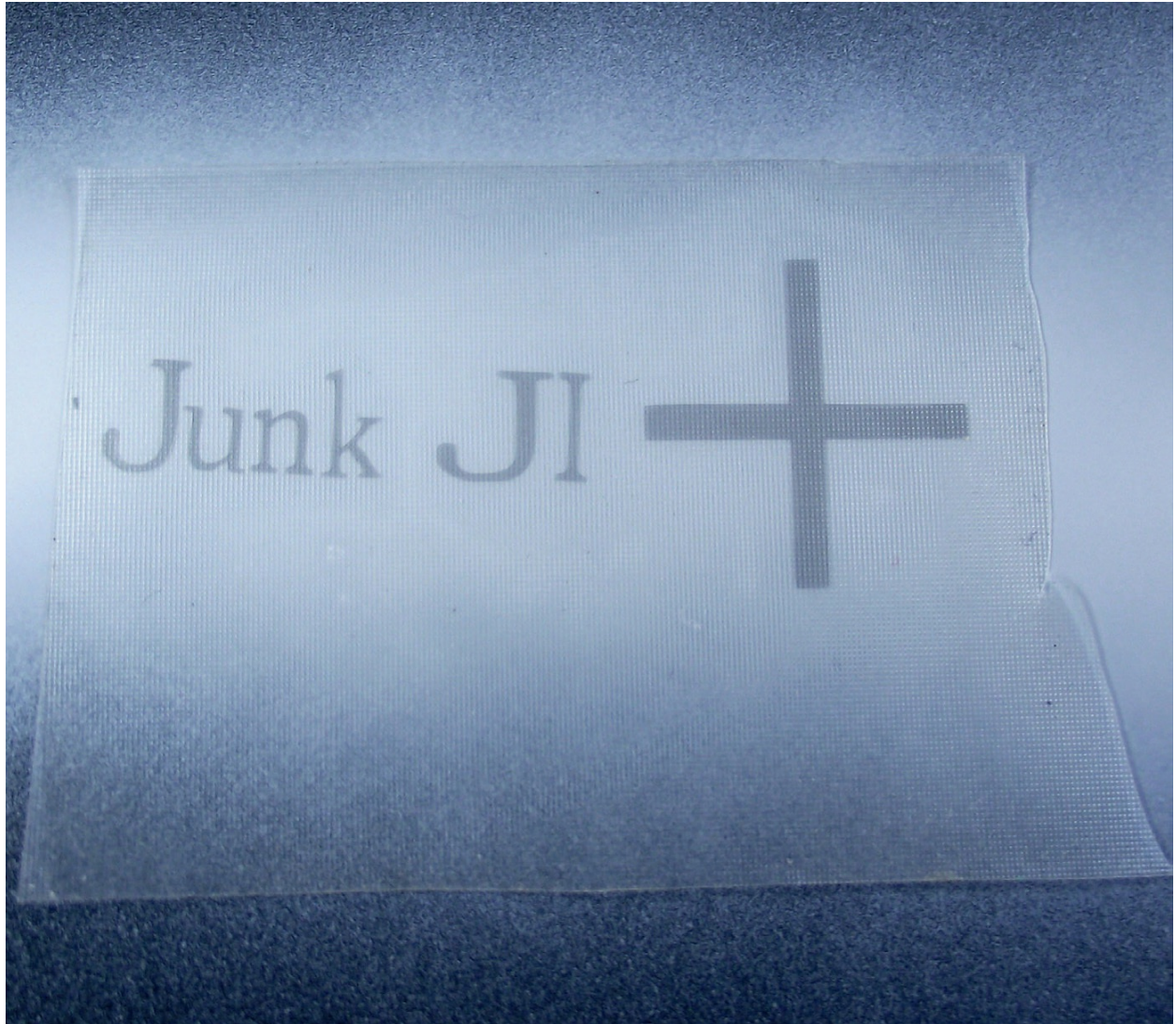
The Junkers J1 kit was chosen to demonstrate the use of paint masks because the J1 aircraft was originally made using corrugated metal. The Wingnut Wings' kit reproduces this effect beautifully, but the surface presents a degree of difficulty on to which to apply a paint mask. The following technique overcomes the obstacles and, because this model represents a challenge, other more straightforward projects should be readily accomplished.



Sub-assemblies and main airframe are all complete and ready for the markings to be painted.



The paint mask has been covered with application tape, ready to be peeled off the backing paper and place on to the required colour.

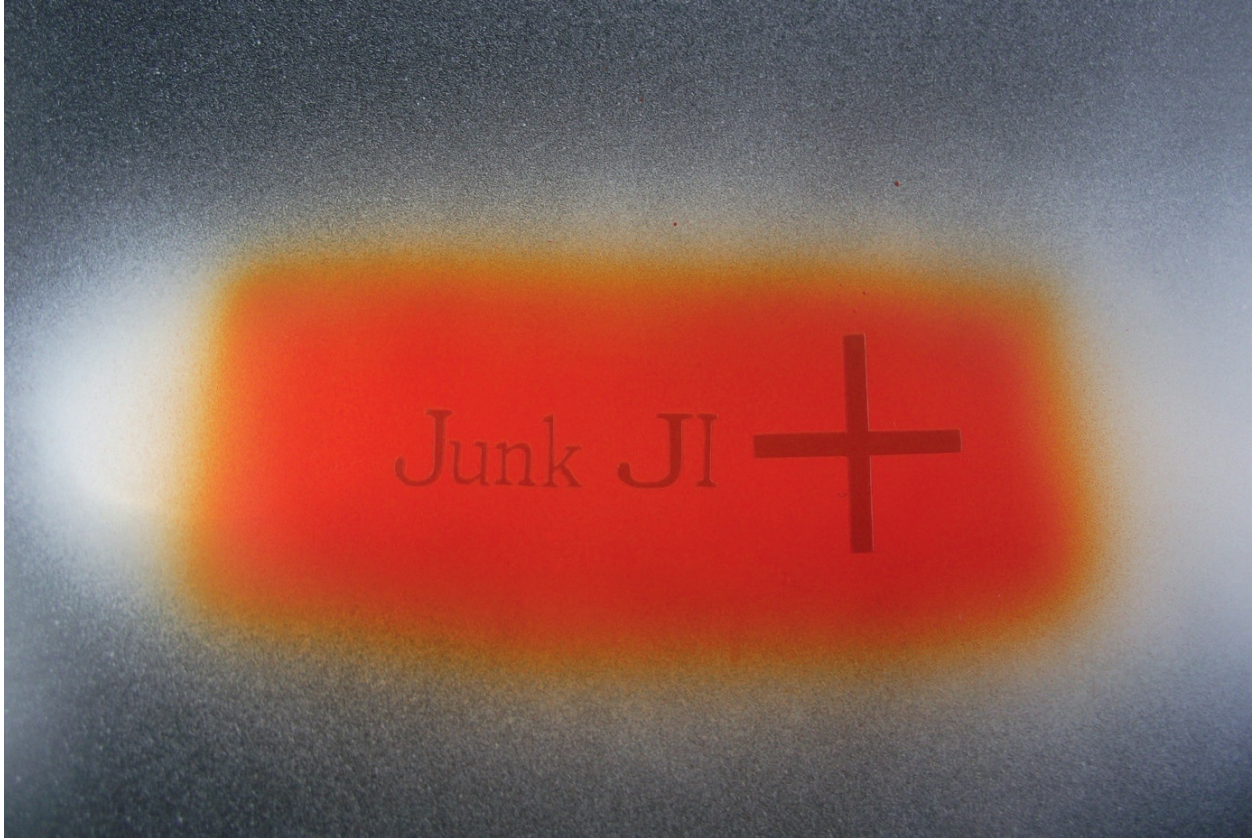


Transfer tape has been applied to the stencil, removed from its backing paper and placed on to the prepainted area.



When removing the transfer tape, pull the tape back on itself slowly; make sure all the images have transferred. With your finger, press down the letters after the tape has been removed to seal the edges.

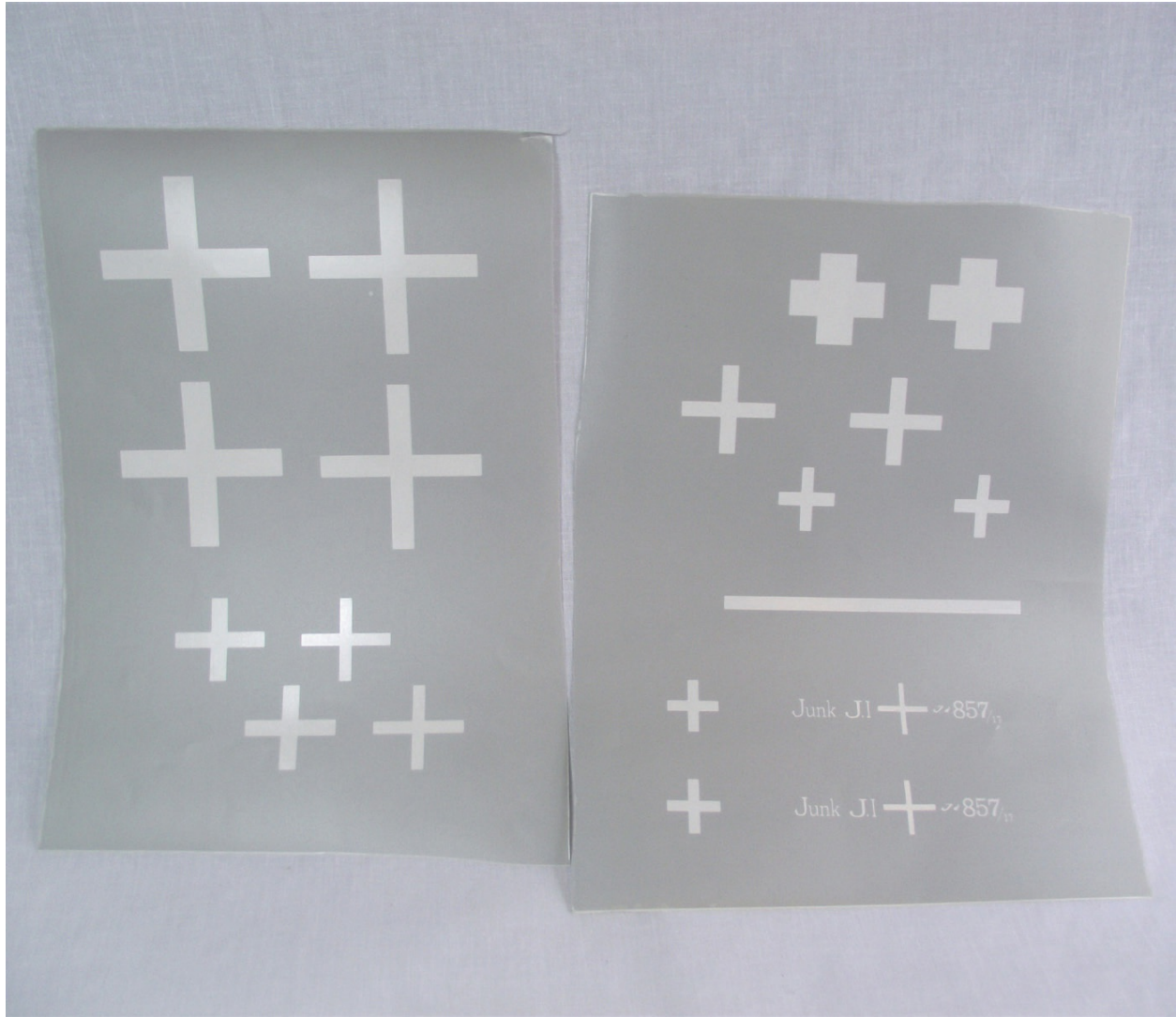
A paint mask can be used as either a positive or a negative. By positive, it is implied that the background material of the mask is taken away and the required letters are left and used, e.g. 'Junkers J1'. The colour that the letters are required to be is painted before the mask is applied to the model. The mask is removed after painting the surround, and the original colour is exposed. If there are several parts to the mask, e.g. a string of words, then low-tack transfer tape will help lift the full image off the backing paper, ready for application to the painted surface.



Two coats of red paint have been applied and set aside to dry.



When the red was dry, the letters were carefully removed, exposing the white paint underneath.

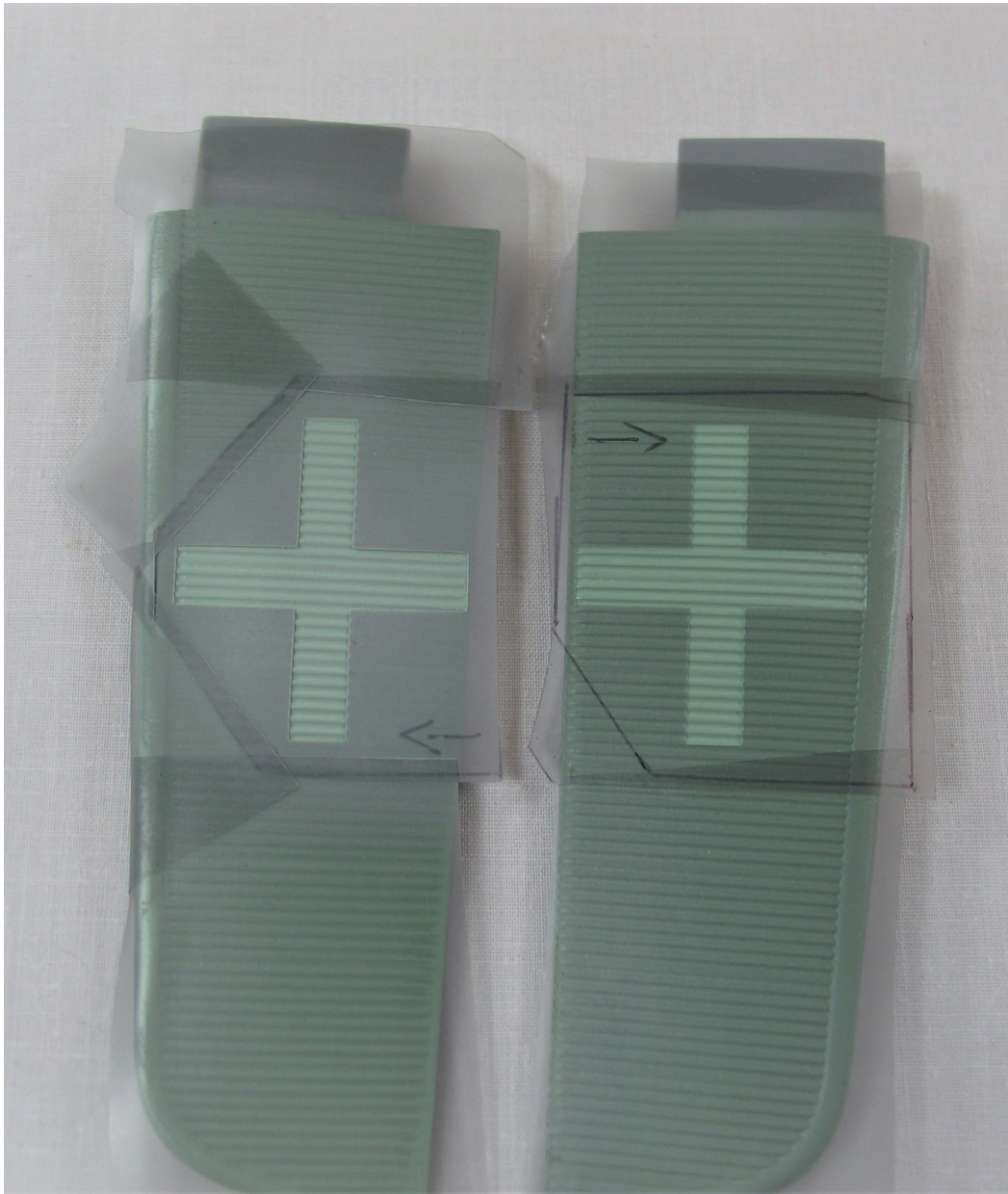


A computer cut paint mask set kindly supplied by Scalewarship Ltd.

On the J1 model, a negative mask was used to apply the German cross insignia. The camouflage colour was applied as normal. This insignia required the application of both black and white, and the mask for white was applied first. Application tape was only fitted to the fuselage masks and the second part to the wing crosses (the black portion). It is important to mark the orientation of each mask as mistakes are easily made, and where masks are repeated on the left and right side of the wing top, take measurements for correct placement.

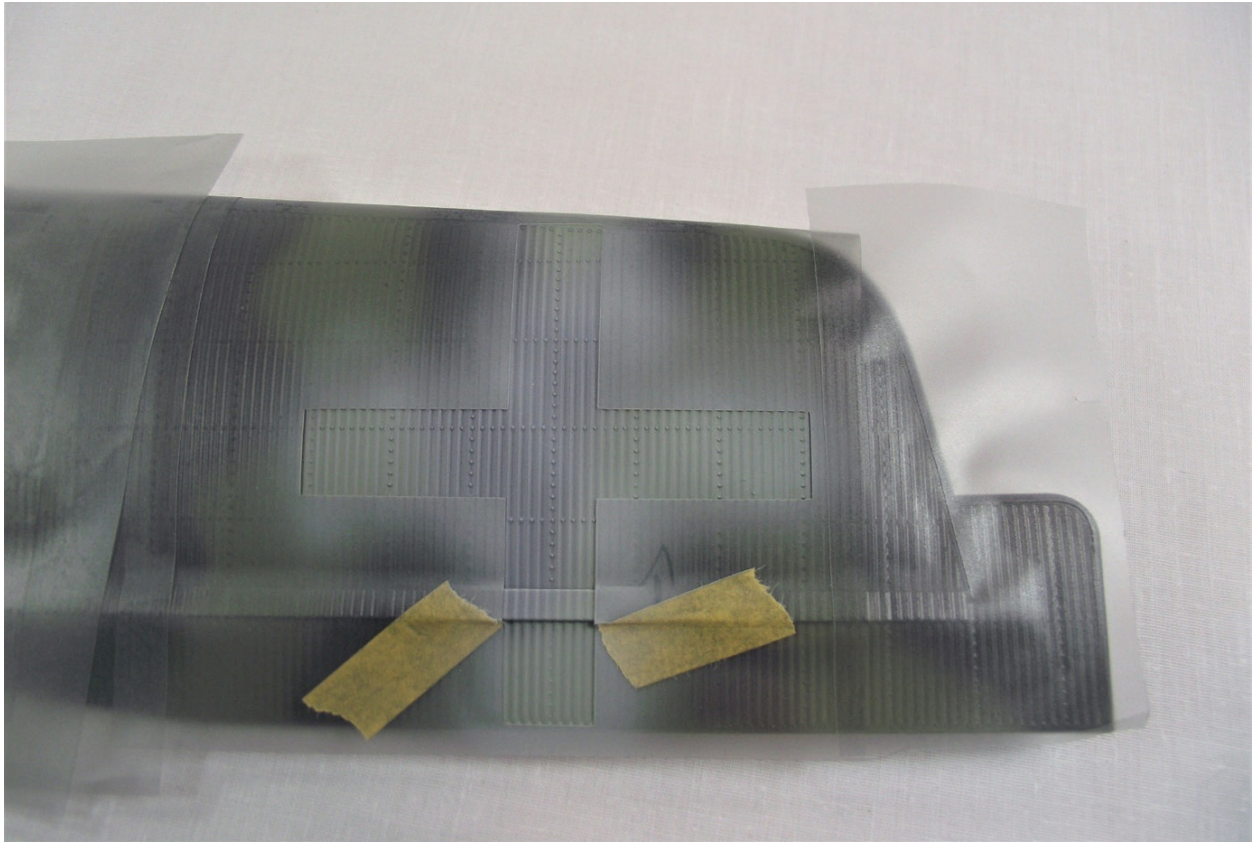
The mask was placed in the required position and pressed down using the fleshy part of a thumb. This or a cocktail stick works well on

such an uneven surface. Particular attention was paid to the edges against which paint was to be applied. The surrounding area was masked and a light coat of paint applied along all the edges. The airbrush was kept at 90 degrees to the surface and not too close. Great care was taken not to get the surface too wet, to prevent bleeding under the mask. The paint was kept slightly dry and was further dried with the air from the airbrush. A hairdryer would also be suitable, and would help to seal the edges.

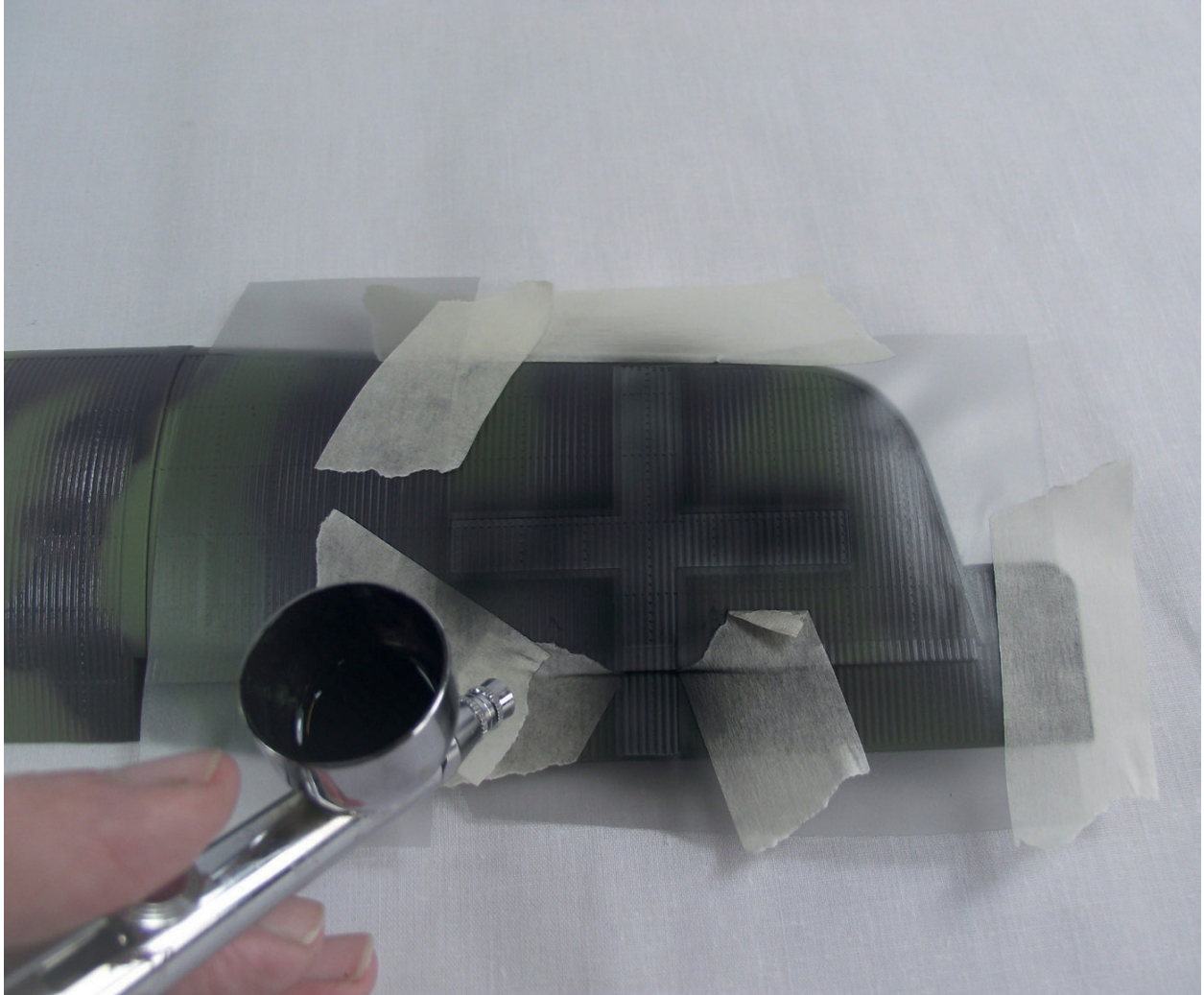


The background white was applied first. Note the arrows, which have

been drawn to make sure the masks are in the correct orientation.



Where the paint mask falls over a deep ridge or edge, cut the mask, press it down and place a piece of tape over the cut. Keep the paint coats light and paint at 90 degrees to the surface. There is no need to try to get a brilliant white tone, as that will just encourage stepped edges and creeping under the vinyl.



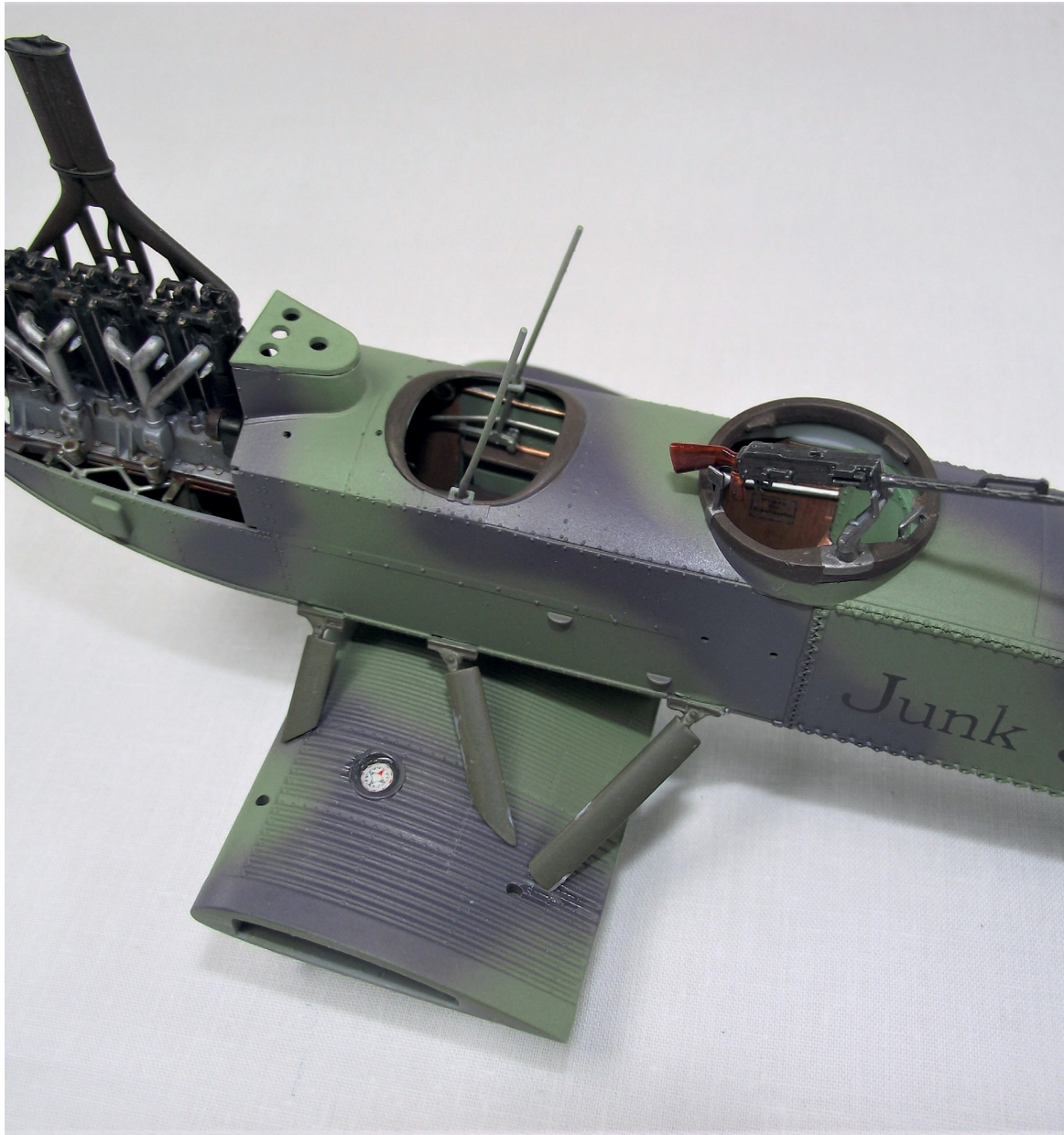
The white mask has been removed and the black mask overlaid. Apply the black in the same way as the white. Again, keep the coats light.



De-masking the black overlay exposes a minor touch up is required but overall, a satisfying result.



The fuselage mask was far easier to apply, as it was going on to a smooth surface. Only a very minor touch-up required.



Final finishing of the cockpit coamings and fitting of the engine and struts.



Everything has now been assembled and matt-coated, ready for weathering.

Another coat was applied, getting slightly heavier to the required colour density. The airbrush was kept at 90 degrees to the surface and not too wet. In this example, it was decided to de-mask the white to make it easier to overlay the black crosses. Once they were in place, the same procedure as was used for the white was carried out for the black, pressing down well and the application of the paint kept light. The whole insignia was de-masked, and any necessary touching up was completed.

MODERN UNITED STATES AIR FORCE SCHEME

Kit Used Tamiya 1/48 scale F-16C.

Airbrushes Used Iwata Eclipse with 0.35 needle and nozzle and Harder and Steenbeck Infinity CR plus with 0.2 needle and nozzle.

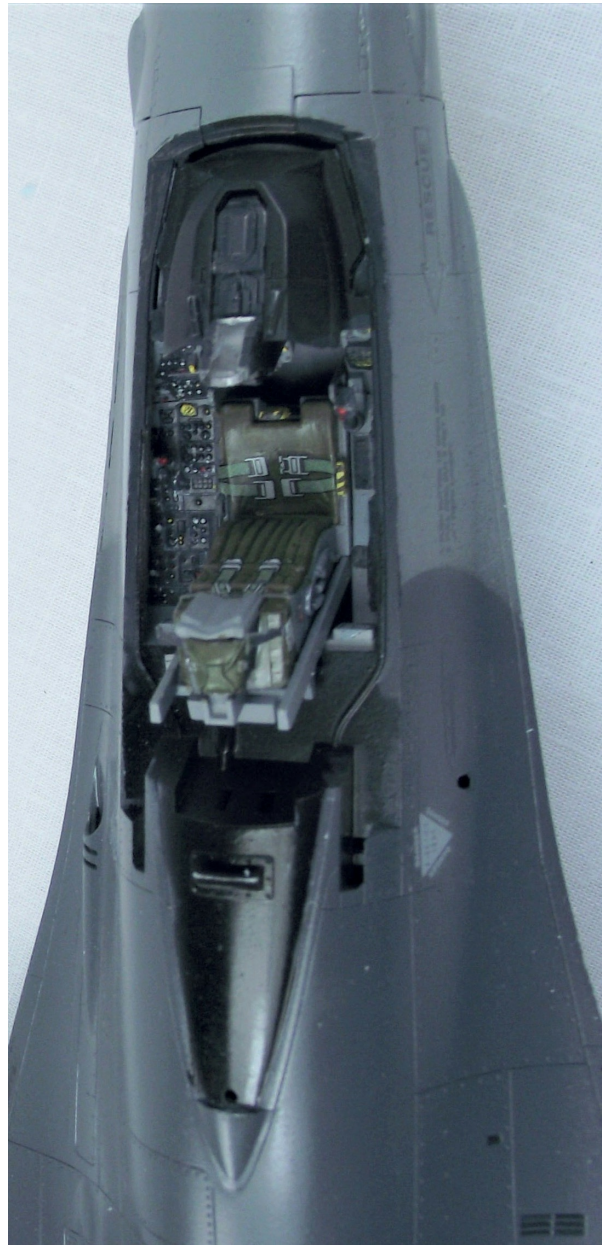
Because of the high quality of Tamiya kits, it is usually fairly safe to assume the fit of parts is going to be good, so these can be painted before trying a dry fit. All the parts were left on their sprues and were set up on a large board. They were then primed with Tamiya grey fine surface primer. The F-16C is another kit where sub-assemblies are put together and painted, to be fitted at a later stage. Most modern jet aircraft are usually painted in two or three greys and can look rather bland. To add interest to the model, the scheme chosen from the three supplied in the kit was the Arkansas Air National Guard aircraft livery. This had a red upper fin with a boar's head emblazoned on it, which adds a splash of colour to three greys. The paints used on this aircraft are largely from the Vallejo Air acrylic range:

- Tamiya Fine surface primer
- Vallejo Air 70.615 Light ghost grey FS.36440
- Vallejo Air 71.097 Medium gunship grey FS.36118
- Vallejo Air 71.275 USAF Medium grey FS.36270
- Vallejo Air 71.273 Ocean grey FS.36176
- Vallejo Air 71.120 Dark ghost grey FS.36320 (cockpit Interior)
- Vallejo Model Color 70953 Flat yellow (cockpit Interior)
- Lifecolor UA735 Deep cockpit black (cockpit Interior)
- The Army Painter WARPAINTS Pure red (vertical fin)
- Alclad II Aqua gloss clear coat
- Finescalemodelworld Master matt water-based clear coat

Preparation

This aircraft is included not for the main colour scheme, but to focus on paint application on selected areas, such as the exhaust,

armaments and on weathering. There is a temptation to add these items to a project without paying attention to their details.



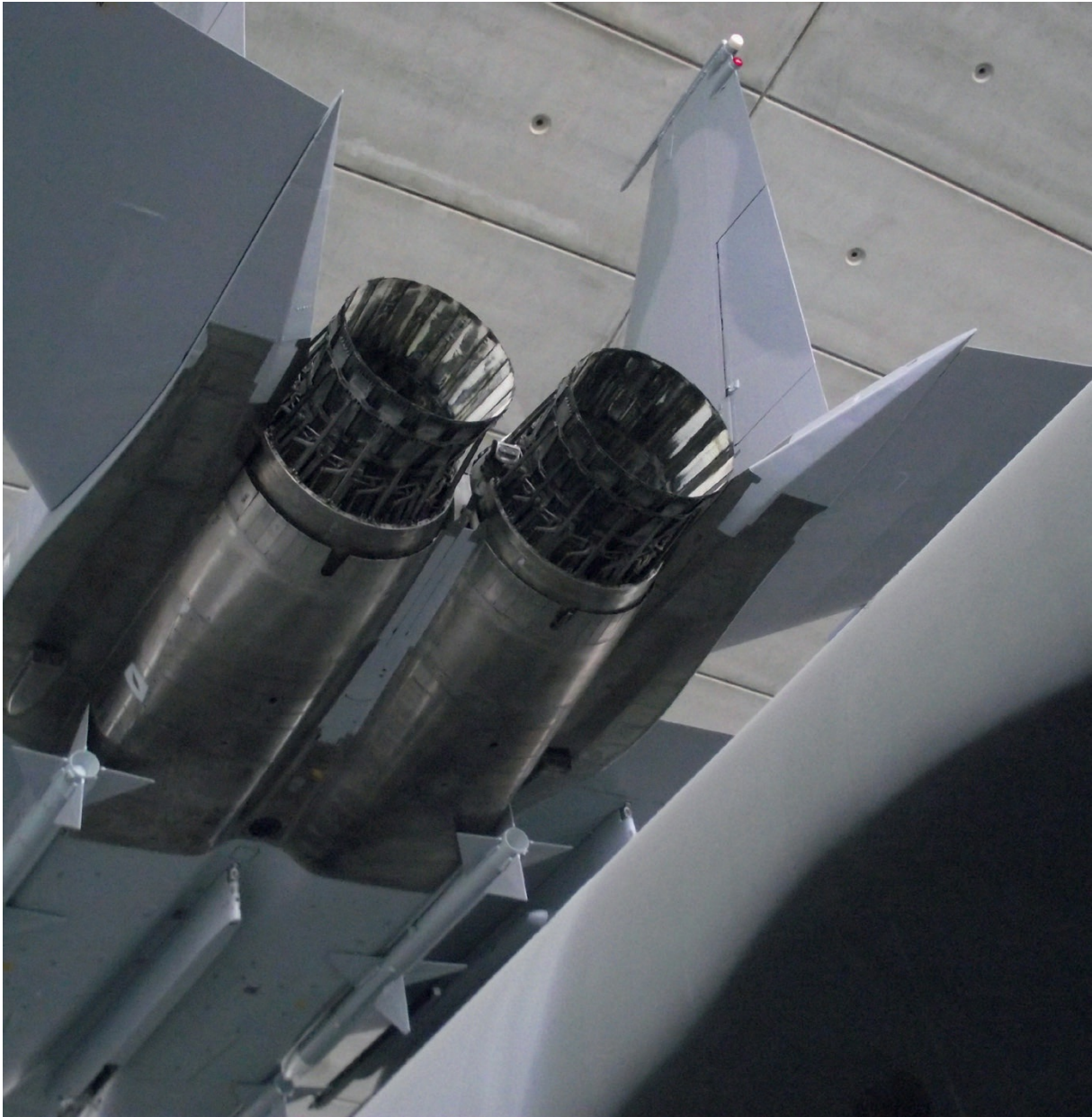
Although the cockpit is small and well hidden, the little details show up well and the decal seat belts look effective too.

The cockpit area was assembled and airbrushed with dark ghost grey. The switch and instrument consoles were painted deep cockpit black. Because the kit is in 1/48 scale, the cockpit is very small and is hardly seen once assembled and in place. Using a sharpened cocktail

stick, tiny spots of light grey, red and yellow were strategically placed around the cockpit, simulating lights and switches. Using a cocktail stick to apply this level of detail is easier than using a brush when working in smaller scales. The kit's decals were used for the seat belts, which at a glance look very effective. The paint scheme is very simple, consisting of three main colours for the upper and lower camouflage areas. This was achieved using Vallejo Air paints. The masking and paint application process is the same as described in previous applications. Vallejo Air, even though it is manufactured as a material ready to spray from the bottle, may still need to have a small amount of thinner added. The only extra parts applied to this kit were the brass Pitot tube, AOA probes and Static Discharge Wicks from Master.

Jet Exhausts

The F-16 exhaust has been given a high degree of accuracy by Tamiya and the detail can be further enhanced if it is painted with some patience. The advantage of metallic finishes is they are extremely thin but cover quickly. This means that applying several coats will not bury the fine detail. It is better to start with darker colours first on the outer surface, getting lighter as you progress. On the inside surface, the reverse is true – it is better to use the light colours first, then to apply the darker tones.



Tamiya instruct that this type of exhaust should be painted flat white, but the reality is that once the aircraft is in service, the exhaust is more likely to look like this. Note on the F-15 Eagle, the outer plates (turkey feathers) are removed.

This kit's exhaust is essentially a short tube, with an after-burner inserted into a blanked-off end. Airbrushing into a tube is not easy but the following method will help to make painting a realistic finish easier. On the blanked-off end, mark the thickness of the after-burner with a

pencil. Carefully cut the end piece off with a razor saw. It is now possible to spray from both ends of the tube.

On the illustrated model, an off-white colour was applied to the interior first, followed by Alclad II Jet Exhaust in tapered streaks. If you copy the method but it doesn't look right, you can always re-spray the off-white and start again. The inside face of the after-burner nozzle was painted in a similar way but using washes and Inktense pencils for the white parts, trying to emulate the F-15 picture taken at Duxford. Inktense pencils are water-based, blendable and a permanent method of applying colour; the ones used in the illustration are manufactured by Derwent. More information is contained in Chapter 9.

The outside face of the after-burner nozzle has plates fitted, which are often called 'turkey feathers'. There are so many tones visible after a metal has been heated that it would not be possible to replicate them all. Very small quantities and light coats are advised, because if too great a quantity is applied, then the subtlety of tones will be lost and the look will be too stark. In the model illustrated, these were painted using Alclad II tones varying from pale gold to stainless steel, plus Hot Metal Blue to represent the blue heat-staining. Alclad manufacture a range of 'Hot Metal' colours specifically to represent the different tones that can be visible on these types of exhaust, from red through to violet. Between the turkey feathers and the fuselage on the demonstration, small concentric rings of metal colour were painted. Masking off concentric rings may seem tedious but it will enhance the overall effect. The more you experiment with these metallic finishes the more you will learn.



To make painting this tube easier, mark out the rear part to the same thickness as the after-burner part, which will be fitted later.

Once painting was completed, the cut section was glued back and the outer surface was then given a coat of Alclad II Aqua gloss for the metallic sheen. The fitting of the after-burner piece ensured the cut made was fully hidden.



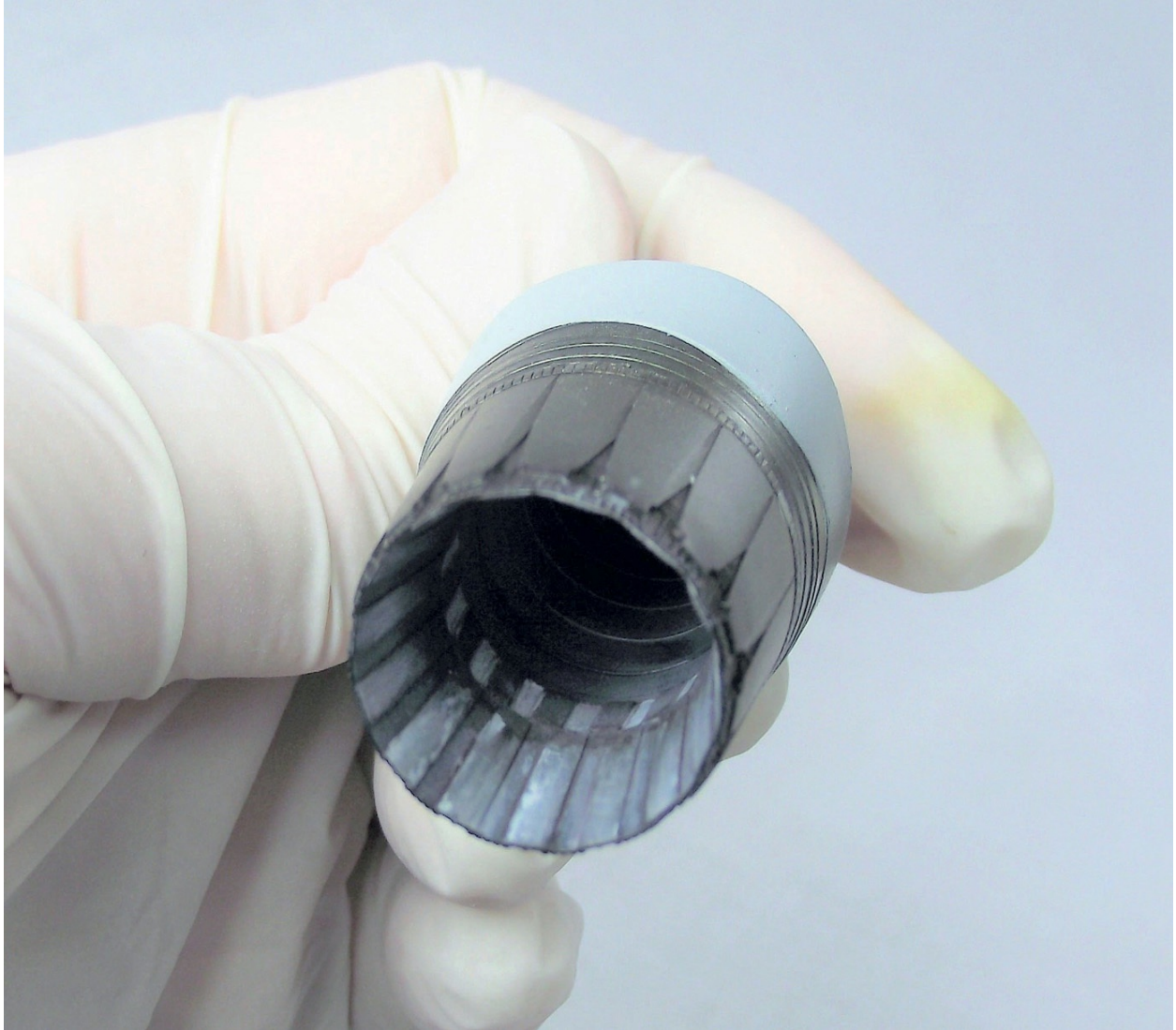
When cutting a tapered tube, make several cuts, rotating the tube occasionally. Then join the cuts up. This will avoid making a wedge-shaped cut.



Clean up the edges from sawing. If there is a small step in the cut, however, leave it in place, as it will help locate the correct position when gluing back on.



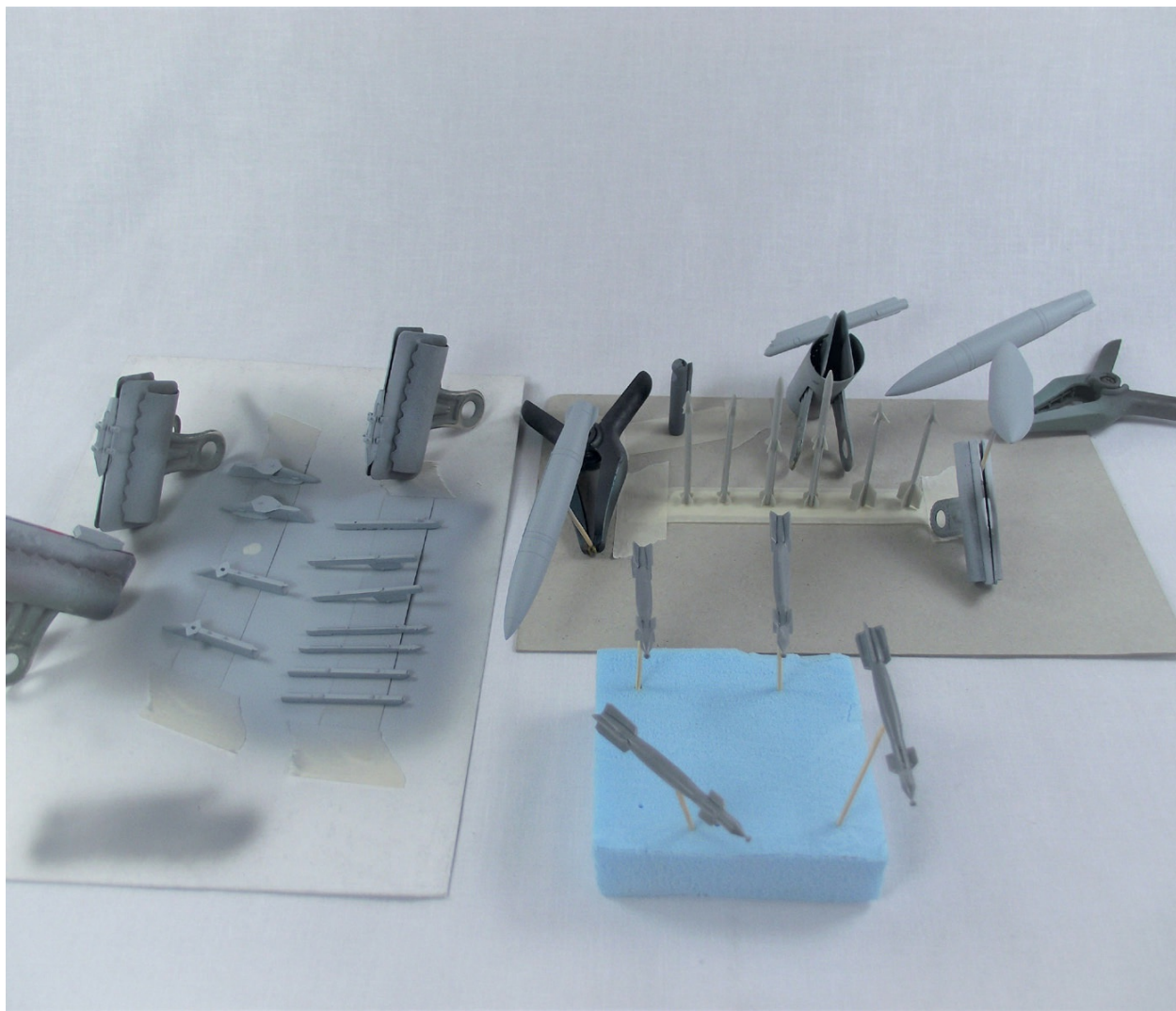
Practise painting tapered shapes like these on a piece of card. Keep the airbrush horizontal to the surface you wish to paint, and then, in one swift movement, push down for air, pull back and immediately release. The shapes should look something like these.



Tamiya would have you paint the inside surface solid white, but with patience and perseverance you can achieve a more realistic appearance, which will look better than painting solid white.



Armaments are tedious to paint but, with patience, the effect is worth the effort. After gluing all the pylons and weapons together, check them for injector pin marks and seams.



Mounting the weapons for painting takes a little thought but usually there is a tab or hole somewhere on to which a clamp or cocktail stick can be fixed. Primer and finish coats are being applied here.



The weapons and AN/ALQ-184 ECM Pod after painting. Decals and a dark grey wash have been applied.



The pylons have been fitted to the aircraft and weapons displayed, ready for mounting. The weapons will not be fitted until after the weathering process is complete on the airframe.

All the pylons, missile rails, fuel tanks, bombs and missiles were assembled and placed on to cocktail sticks or clamps, then given another coat of primer to check the quality of seams or injector pin marks. Six colours were required for the basic live rounds, missile rails and pylons: Light Ghost Grey, Medium Grey, Gunship Grey, Olive Drab, white and black. If you want to add more colour, the missiles or bombs could be painted medium blue to represent practice or dummy display rounds. The quantity of blue on these can vary, so please check your references. Tiny amounts of other colours for minor touching in on metal fittings and cables will add overall interest to the finish. The more details you can add, the better they will look.

Decal Application

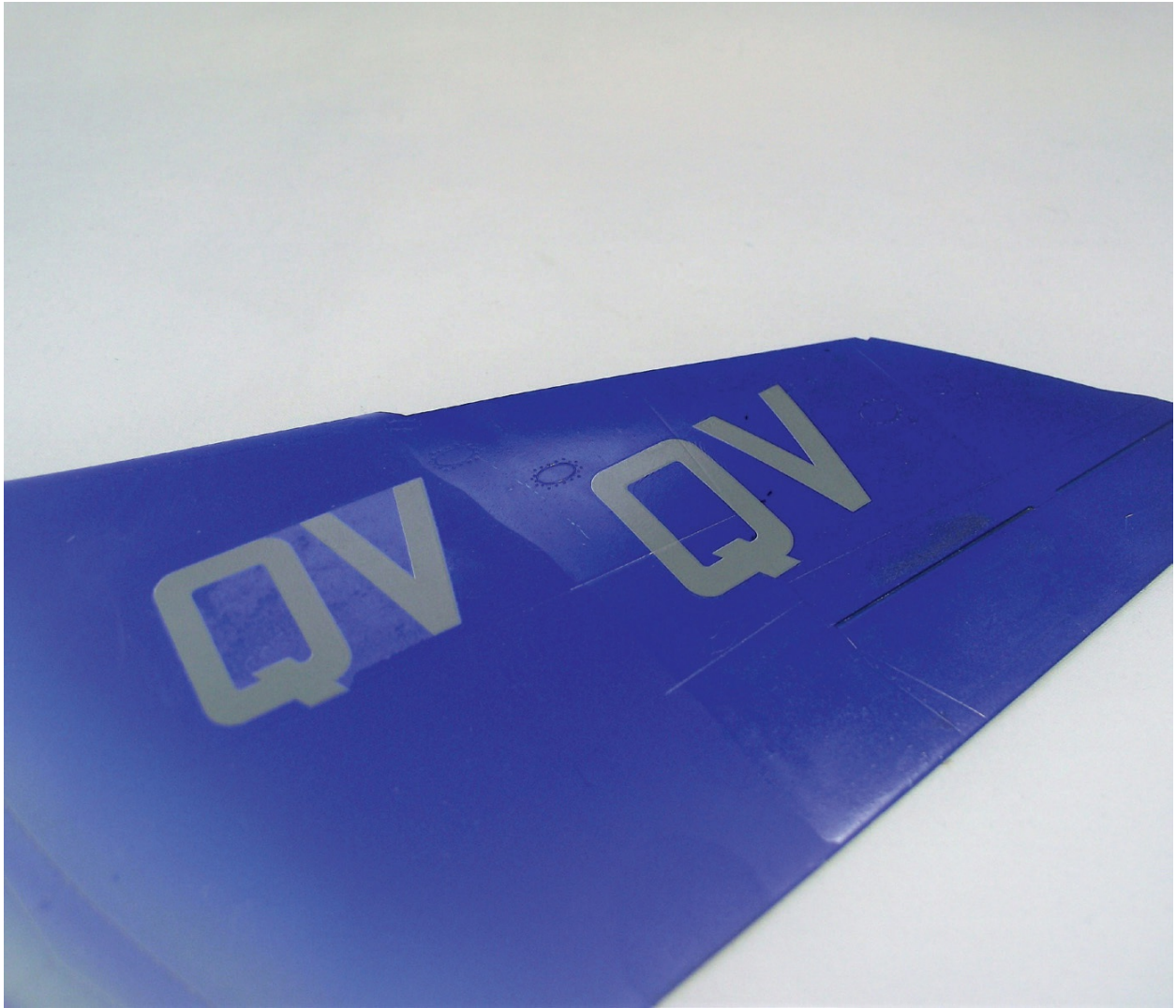
Waterslide transfers, more commonly known as decals, will be part of any mainstream manufactured kit. To get them looking as if they were painted on to the model requires the application of a gloss clear coat over the finish coats, especially if you are using a matt finish. Without this, a decal applied to a matt finish will develop 'silvering' under the clear carrier film. Silvering is just air trapped under the decal, which causes the matt finish to be uneven. It appears as a slightly rough finish when magnified. If you apply a gloss clear coat, it will even out the surface and will feel smooth to the touch.



A typical range of waterslide decals. For scratch builders there are also decals for rivets, weld lines and access panels available from companies such as HGW or Archer (seen at the bottom of the picture).

There are some essential tools needed for applying decals: tweezers, sharp knife, setting and softening solutions, a short, stiff haired brush, medium-sized paint brush and cotton buds or soft tissue. When starting to apply decals, do not attempt to do too many in one

session. For example, the national markings on a British World War II fighter usually consist of six roundels of which four are applied to the wings, two to the fuselage plus two fin flashes.



In this picture, the wing was painted matt blue and the right-half was given two coats of gloss clear coat. Two decals were then positioned, using the same method on both and left to dry. Silvering can be clearly seen on the left hand decal.

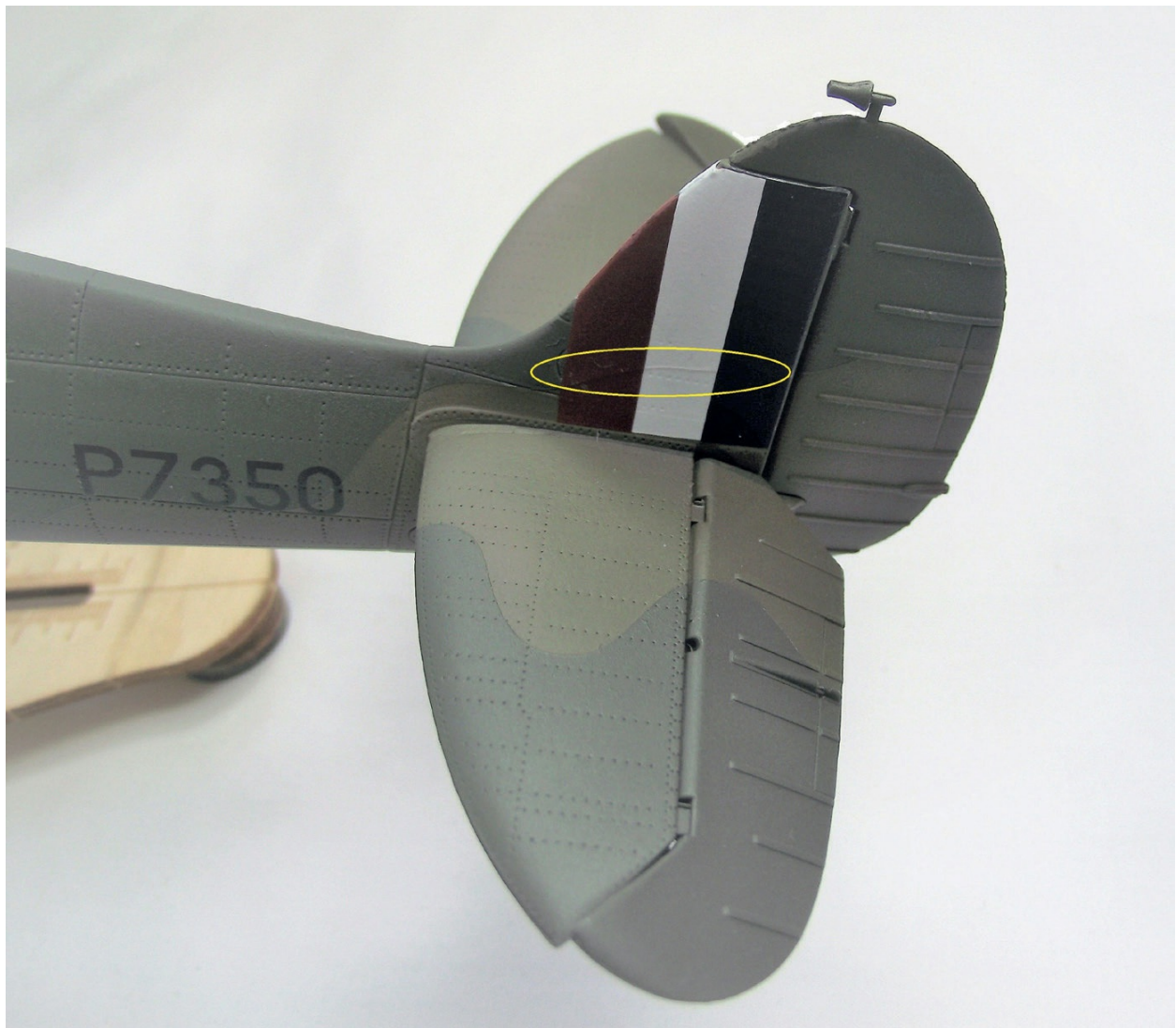


For applying decals, some basic tools are required; the tweezers are used mostly when applying small stencilling.

1. Start with two roundels and dip them in warm water. Do not leave them in the water. Put them on a cutting matt and wait for them to loosen.
2. When the decal is ready, brush some setting solution on to the area on which the decal is to be placed, then slide the decal into place from the backing paper. Brush more setting solution on to the decal to soften it. Wait a few minutes, then, with the soft tissue or cotton bud, gently press down the decal to squeeze out the excess solution. Make sure the decals you are working with are all in the right place and aligned correctly.

3. If the decal has not shrunk back into details like hatches or panel lines as you would wish, then apply some decal softener, which is a stronger solution.
4. Sometimes the use of a short, stiff haired brush can assist in pushing the decal into detail. Be careful not to break the decal up. Some decals are very thin and fragile.

Be aware that if the border between camouflage colours lies under the decal, there may be prominent lines where the camouflage colour meets with masking material during painting. Make sure you flat down any prominent lines or they will show through the decal.



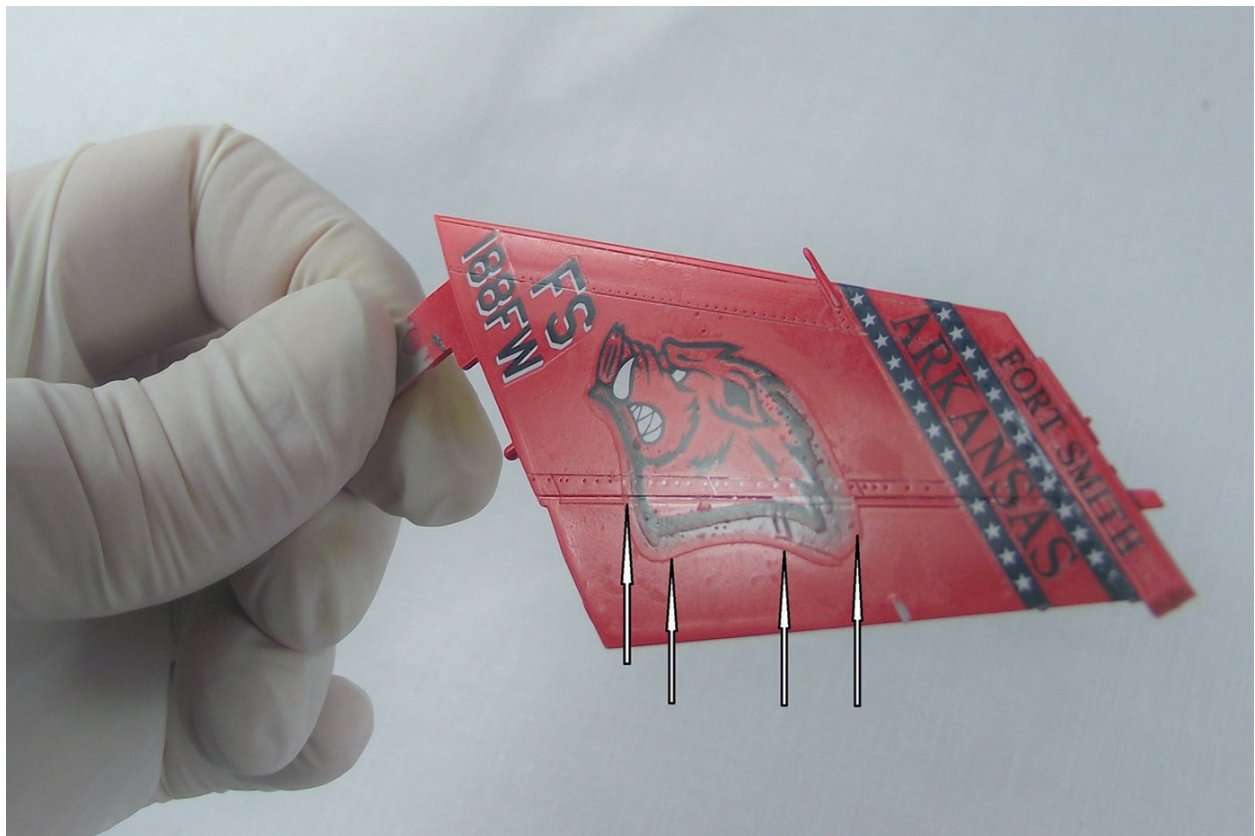
In this picture, you can see the demarcation line of the camouflage on

the white of the fin flash. It is possible to avoid a demarcation by gently flattening down the area with 1,200-grit wet and dry, before applying the decal.

Some decals have a thicker carrier film and when placed on to the model this leaves the decal noticeably raised on the surface. The way to reduce the prominence of the decal is to apply several coats of clear coat, flattening down between the coats. Be careful not to break through the decal when flattening down; only use very fine grades of rubbing down paper, preferably 1,500-grit wet or dry, or finer, and used with water.

Before putting on several coats of clear coat, apply any weathering washes you require in the engraved detail, as the clear coats will eventually start to cover over them.

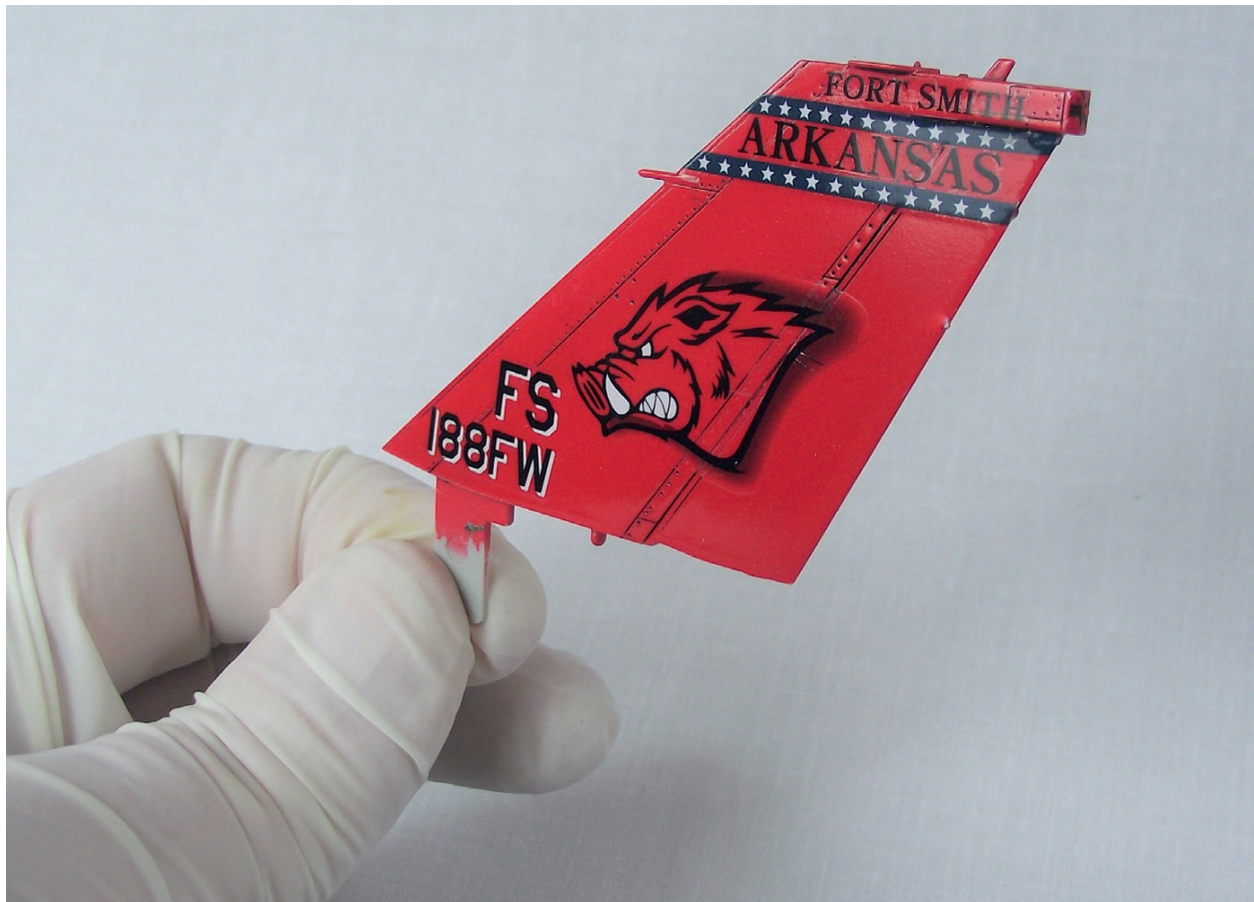
If the stencil markings have a thick carrier film, another method to possibly use is the following:



Some decal carrier film can be very thick, as indicated here with

arrows. Gloss clear coat has been applied over the decal and flatted down, using 1,500-grit wet and dry. Be careful not to break through to the colour or to the decal. Panel wash has highlighted hinge points and seams before more gloss clear coat is applied.

1. Prepare the decal in warm water as normal.

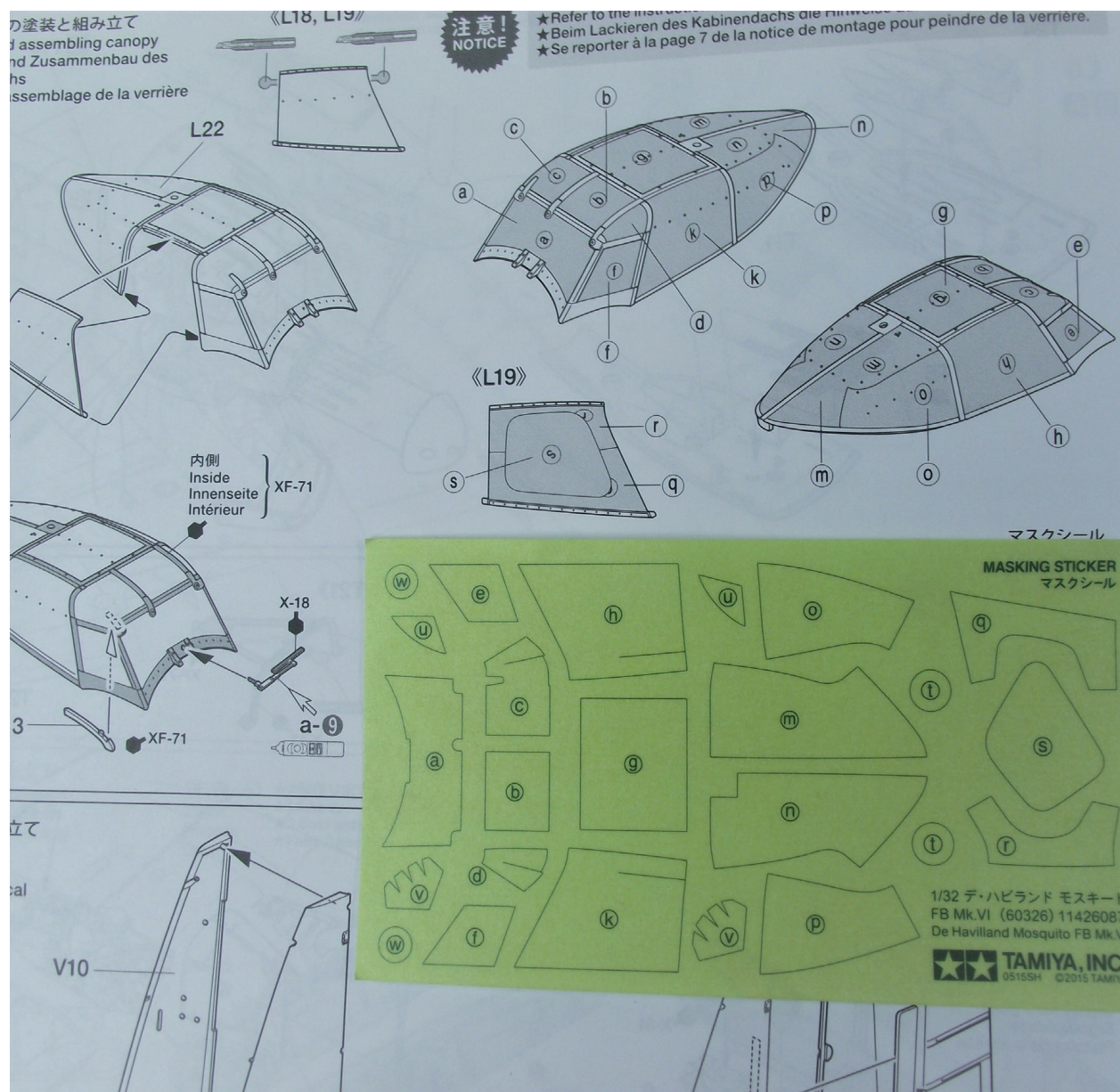


After some effort, the decal edge has almost disappeared and the look is much cleaner.

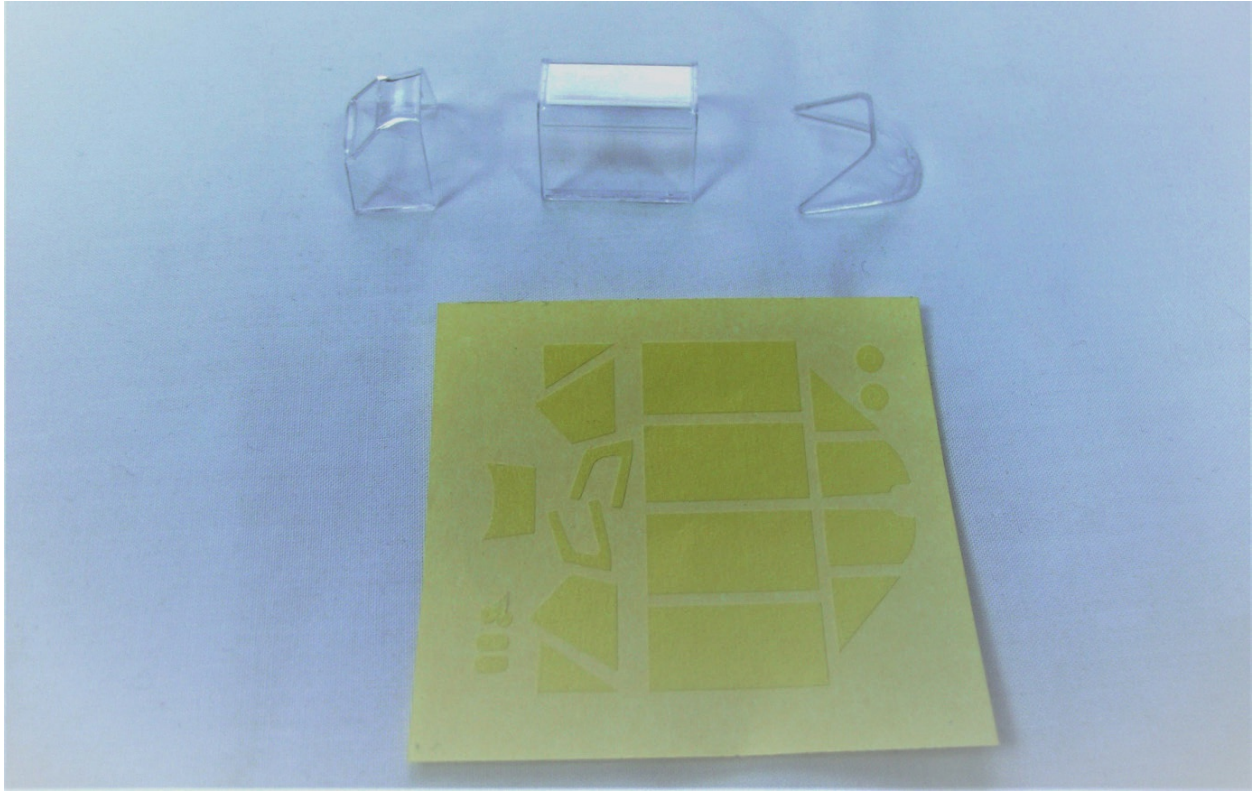
2. Brush a small amount of acrylic clear coat where the decal is to be placed.
3. Slide the decal on to the wet clear coat and brush a little clear coat on to the decal. This will sandwich the decal in clear coat, eliminating any chance of it silvering, and the clear coat will help it to blend on to the surface.

MASKING AND PAINTING CANOPIES

The idea of applying masking material to aircraft canopies can seem daunting, but there are a few ways this can be achieved painlessly. Some kits come with masks printed on to self-adhesive masking tape. If your kit is like this, you will need to cut around the shape and place the appropriate piece on to the canopy. Others come pre-cut, in which case all you need to do is peel off the required part and place it on to the corresponding part of the canopy.

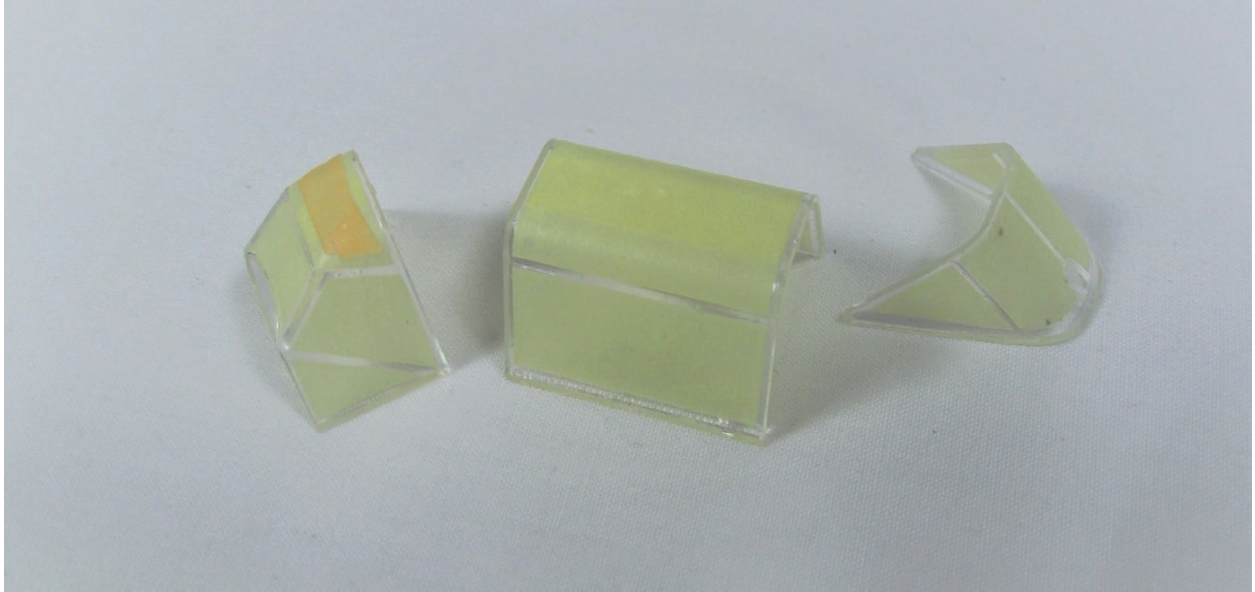


Tamiya kits commonly include sections of the canopy printed on to self-adhesive masking tape. These need to be carefully cut out, using a sharp knife, and applied to the model as directed in the instructions.

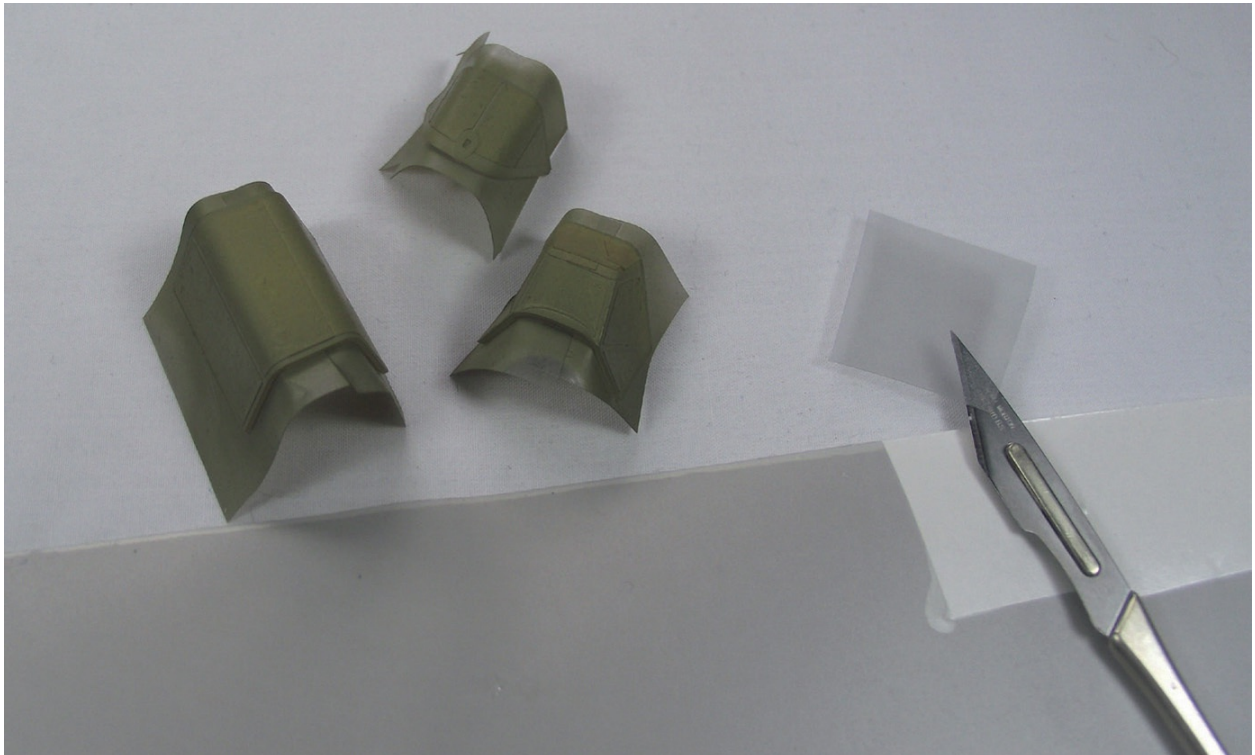


This is a typical precut canopy mask. The waste material has been taken away to reveal the required parts. They can come as either vinyl masks or masking-tape masks.

Masking canopies can also be achieved by using masking tape or vinyl masking material, as you would with the main structure of the kit. With this method, each section of the canopy is covered with paper masking tape. The next step is to press the tape down using a cocktail stick into the raised edges of the moulded framework, then with a sharp knife carefully cut off the excess. Follow by pressing down the tape edge with a cocktail stick to seal the tape.



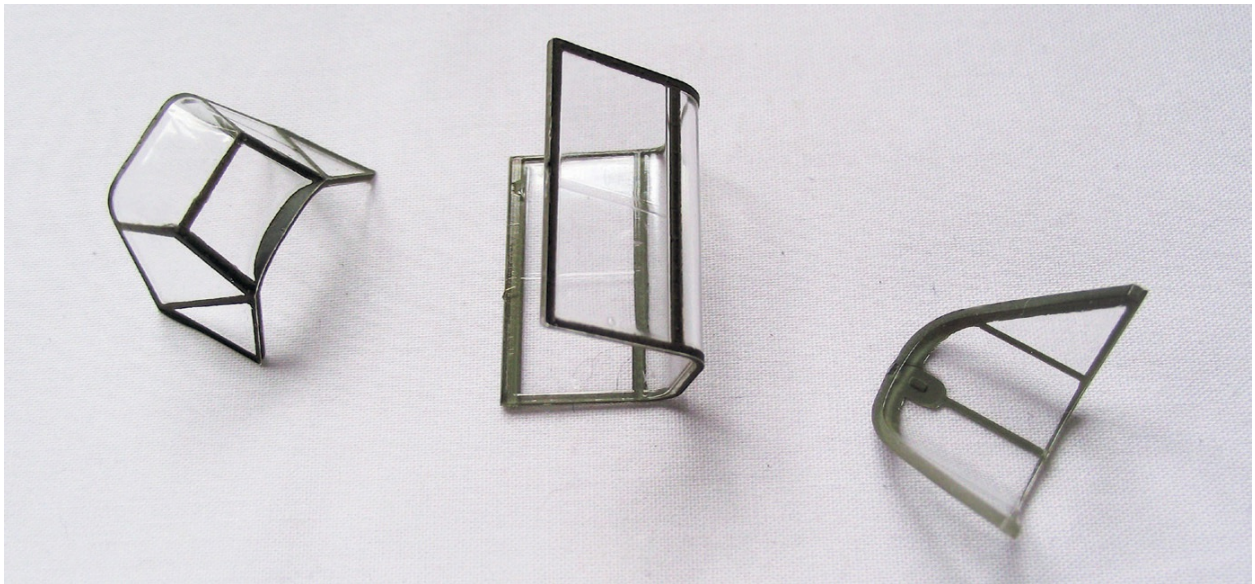
With all paint masks, it pays to make sure they are correctly positioned and the tape edges pressed down to ensure no paint will creep under the mask.



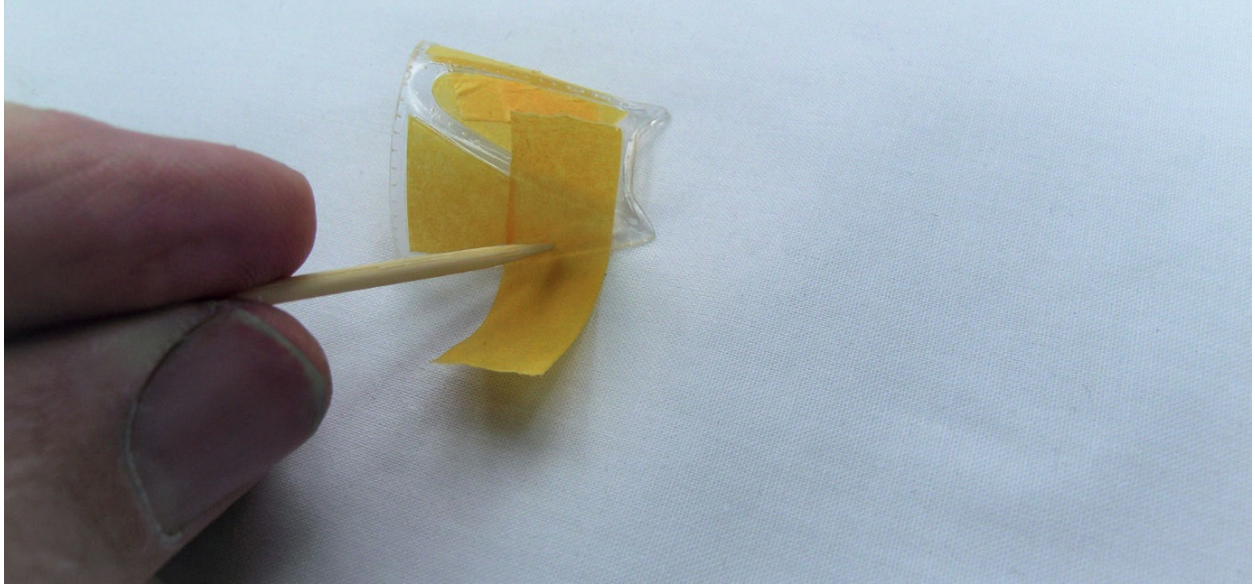
Use spare mask material, such as Ultra Mask, to mask off the interior of the canopy. From the outside of the canopy, the first colour you should apply is the interior colour, over which you should apply the

exterior colour.

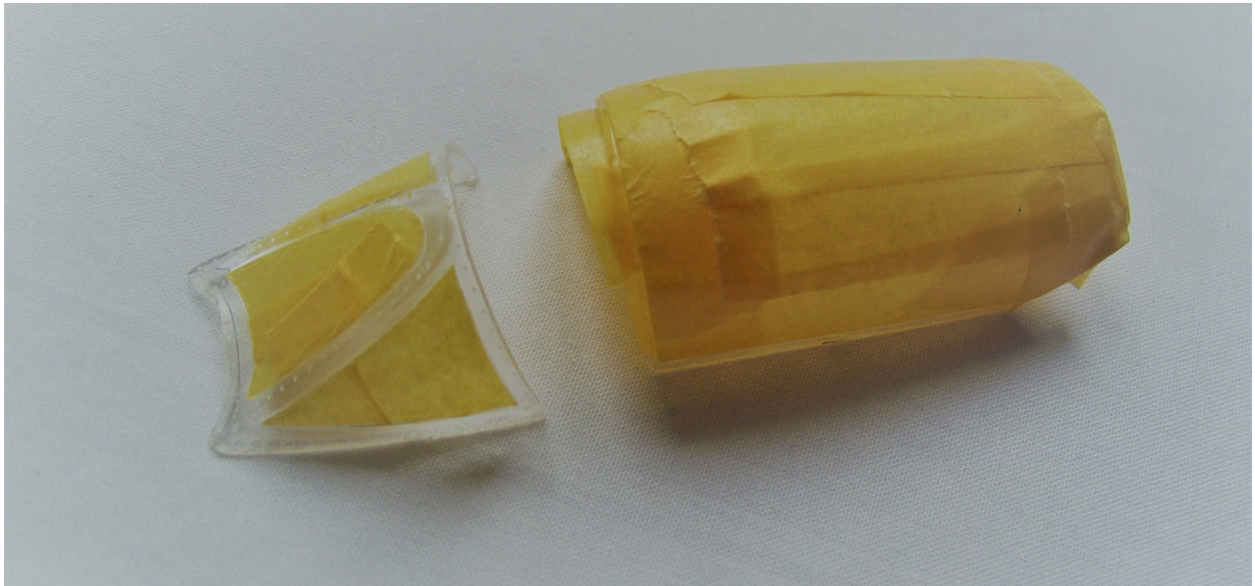
Canopies or other clear parts in a kit can easily get damaged in transit or accidentally scratched. To repair such damage is not difficult. There are two main methods of conducting repairs. The first is to use a sanding and polishing method. If the scratch is deep, then you may need to start with 800 or 1,000-grit wet and dry. Follow this up using finer and subsequently finer wet and dry each time you sand the surface. The Alclad II Polishing Pack is ideal for this purpose, starting as it does at 3,600 grit to 12,000 grit. An alternative is the Ultimate sanding stick range. A fine polishing compound can be used with these if required.



When fully de-masked, the interior colour will show on the inside and the exterior colour on the outside.



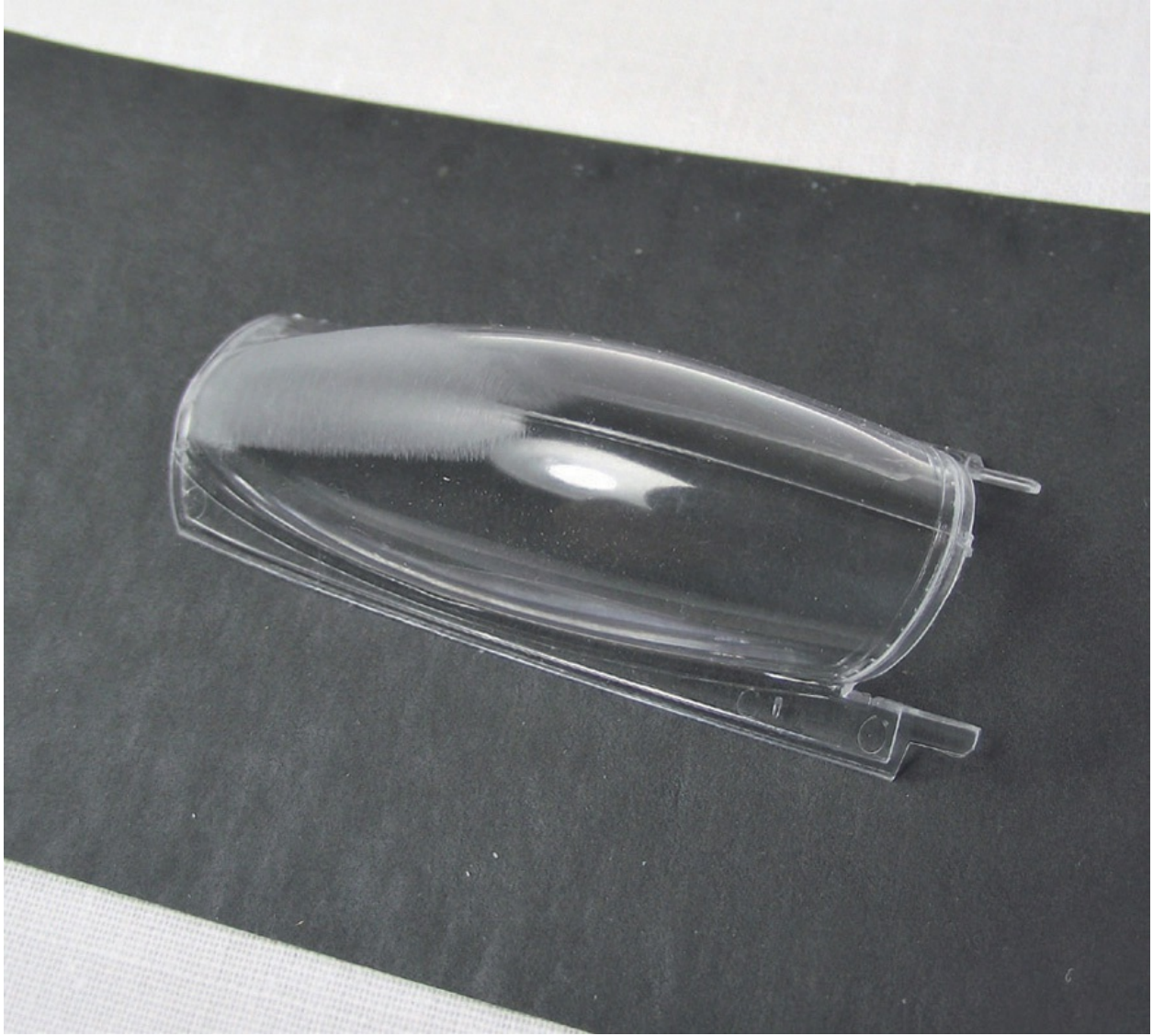
Using standard Tamiya masking tape to mask a canopy works well, but make sure you use a cocktail stick to press the tape into the corners, and then cut off the excess with a sharp knife.



Remember to mask off the inside surface of the canopies, and press down the tape edge again before applying any paint.



*Hand-polishing and buffing requires the finest grades you can find.
The finest should feel smoother than paper.*



This canopy had a moulding seam down the centre line. It is part of the moulding process and should not remain visible on the finished model. For demonstration purposes, half of the seam has been sanded with 240/1200 Ultimate sponge sander.



Following the 240/1200 sanding, the Ultimate buffing stick was used; the green or blue side of the stick was used first, followed by the white smooth side, to achieve a polished finish.

The second method is to dip the canopy into a clear coat compound – a quick-drying one is preferable. The following steps will show how this is done using Gauzy agent glass coat.

Dipping Canopies for Better Clarity



These items will be required to achieve the best results: tweezers for dipping the canopy, a sheet of paper towel, a glass tumbler or equivalent, the canopy and Gauzy Agent.



Do not shake the Gauzy Agent just before use, as this will create air bubbles that will attract to the canopy. Using the tweezers, dip the canopy and hold it above the pot while the excess drops off.



There will be a build-up of the Gauzy Agent, which can be taken off by touching the canopy on to the paper towel.



Once all the excess has been removed, place the canopy on to a hard surface and cover it with a tumbler. This will stop any dust from settling on to the wet surface on the canopy.



Drying time does vary, but once the canopy is crystal clear, it can be put in place.

CLEAR COATS

The prospect of applying clear coats can be fearsome for some modellers, as they can be difficult to see when applying them. If you look for the wet edge and use good light, then you should limit the difficulty. Model paint manufacturers produce their own clear coats, which are available as matt, satin or gloss finishes. At some point you are likely to use a clear coat, even if it is just for application of the decals. Clear coats come as either oil- or acrylic-based and can be purchased pre-thinned or the modeller can mix them with an appropriate thinner to achieve the right consistency.



This is a typical range of clear coats from some of the mainstream manufacturers, both oil-based and water-based.

If mixing a clear coat, the principle is the same as with paint. The problem is likely to be encountered when mixing oil- or solvent-based material, as swilling oil- or solvent-based clear coat around a glass jar to judge consistency is not going to be easy. The mix will be transparent and so it will be difficult to see if it is the consistency of milk. As a default method, start with 20 per cent thinner and add more if required. Acrylic clear coat, however, usually has a transparent white tone to it, so can be treated the same as paint or milk in the swill test.

The effect obtained when applying clear coats can vary, depending

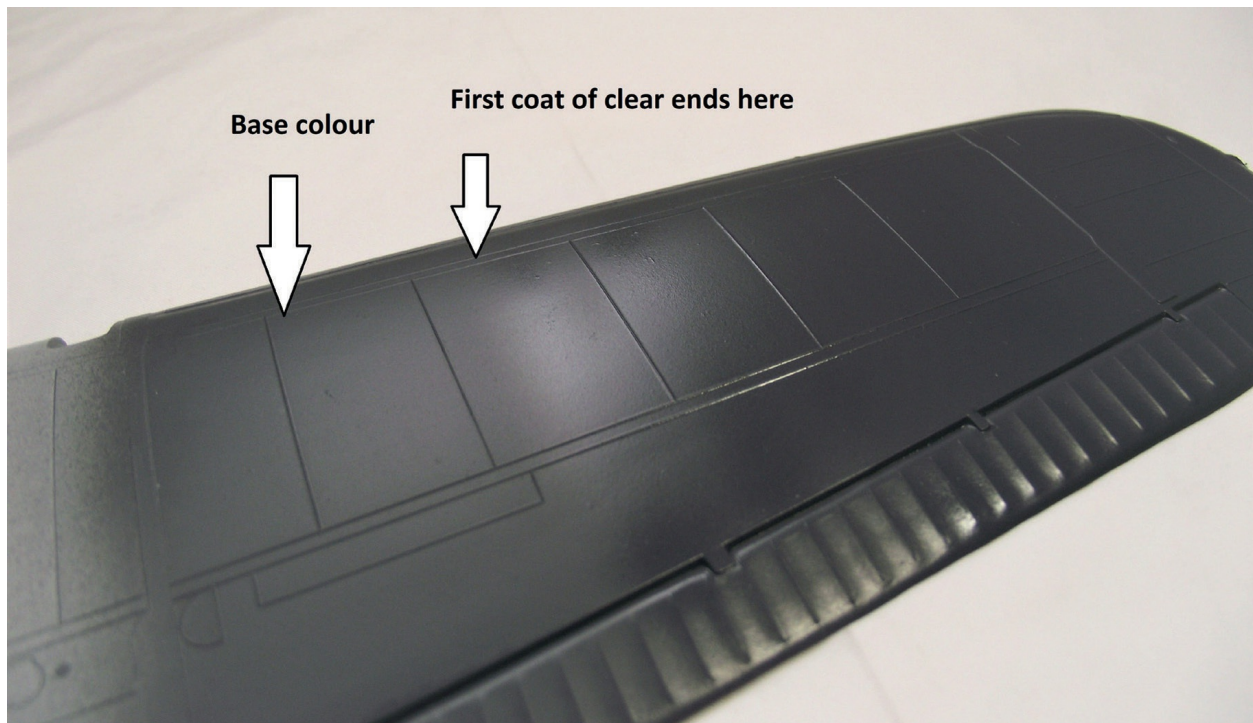
on whether the base is oil or acrylic. Trial whichever you choose to use on an old model, and bear in mind that some clear coats, usually the oil-based ones, will darken the appearance of the tone of the colour beneath. Painting instructions in kits often give mixes of paint colours and then ask you to add a clear coat to achieve the required colour.



Water-based clear coats have a tendency to pool if too much is applied on the first coat.

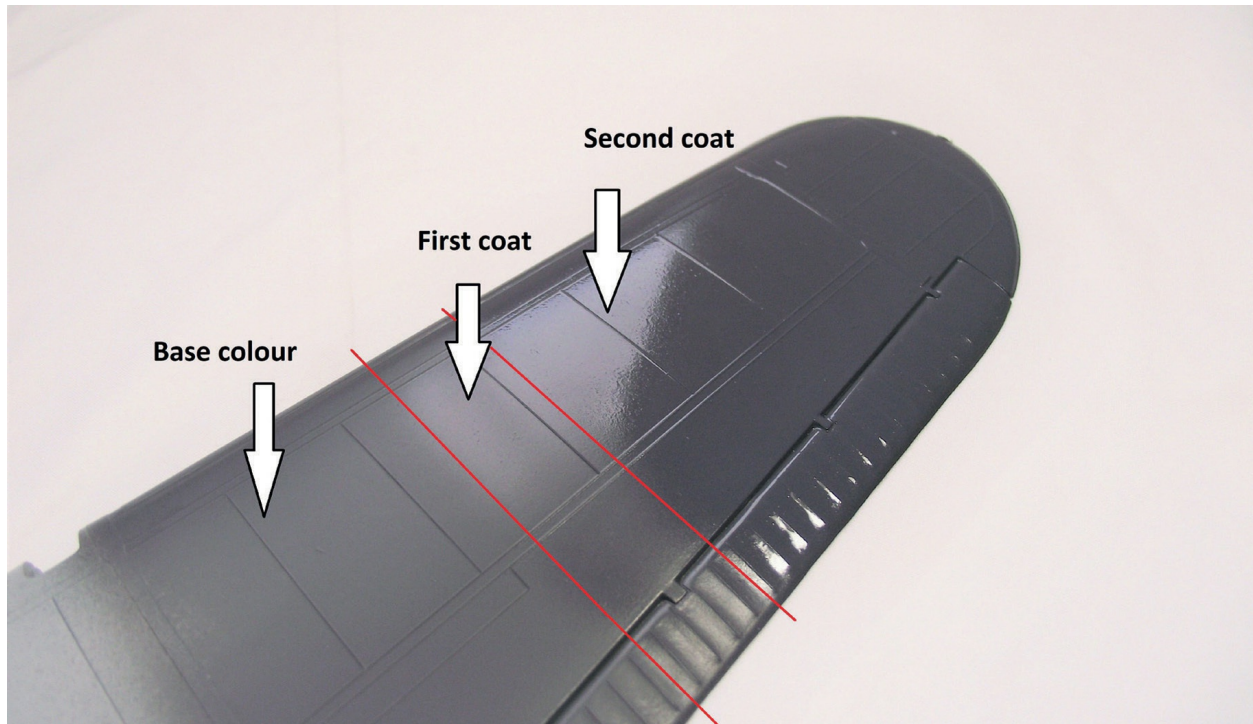
Water-based clear coats are more easily applied as a light coat first followed by a wet coat, because, in common with all water-based materials and due to surface tension, they will puddle if applied too wet at the start of application. Other clear coats may be more easily applied wet. Clear coats are like primers to spray, in that they tend to be easier to use with larger nozzles and more air pressure, especially

if you are painting a large area. There is a difference between brands and on whether the product is ready mixed or not.



Demonstrated here is the correct amount of water-based clear coat applied to the surface. It should just appear as a light sheen to the surface.

As you work on the piece and the amount of fluid inevitably diminishes, the quantity of air in the bottle increases, so that ready-mixed clear coats will thicken up. If this should happen, you should add an appropriate thinner to the amount you are going to use. For high-gloss finishes it sometimes pays to apply a matt or satin paint finish and then apply a clear coat in order to get the gloss appearance. Some gloss paints can take a long time to dry and cure, allowing dust particles to settle on the surface, whereas matt finishes generally dry quickly and, once they have been clear-coated, any dust particles can be flatted out of the clear coat and polished without disturbing the colour underneath.



Finally, this picture shows the second coat applied. The red lines indicate where the first and second coats end. The second coat is still wet, so it will flow out more and lose the slight orange-peel effect. The first coat has a slight sheen to it.



In an effort to demonstrate the kind of reaction that happened on the Mustang, this test piece was deliberately created. The reaction is much coarser on the test piece but shows up better on colour than on metal finishes.

During the painting of the P-51 Mustang, an error occurred when repairing an area of polished aluminium after clear coat had been applied. A reaction between the newly applied aluminium and the clear coat appeared in a very small area, so fine that it was not possible to pick out the fault in a photograph. The fault appeared as a very fine crazing. This may have happened because the clear coat was not fully cured, or because the coating in that area was too thin

for a solvent-based material. After having made sure the clear coat was fully cured, the process was repeated without any further problems.

Chapter Eight

Weathering

INTRODUCTION

As would be expected in peacetime, aircraft are well looked after by crew chiefs, but in war situations cosmetics are not a priority, so aircraft can look very grubby. Making a model look realistic is an art form in itself and much of the realism depends upon the application of weathering techniques. How much and whether to apply weathering is a matter of the model-maker's personal preference. Aircraft will get fluid leaks from spillages and vibration, their flying controls have hinges that will need lubricating, so there are likely to be oil spillages. This means that when the aircraft is in normal flight, these fluids and greases will be drawn out with the airflow. When on the ground, liquids will always run downwards. This may sound obvious, but when comparing a tail-wheeled aircraft to a nose-wheeled aircraft, any fluid spillages will run at different angles. There are other factors to consider, like exhausts, walkways and the climate in which the aircraft is operating. All can affect the overall paint finish.

To use just one or two colours when weathering may be rather limiting and not reflect all the possibilities. Oils and greases vary in colours from yellow ochre through browns and burnt umber. There may be traces of other highly coloured liquids, e.g. DTD 585 was a red hydraulic fluid, and some modern fuels have red or blue dyes in them. Two aluminium panels, such as cowlings, fretting against each other will produce black stains. When aluminium corrodes it usually appears white in colour and sometimes black pitting can be seen. Paintwork will oxidize and fade, especially in tropical climates, whereas aircraft

that operate in European theatres will bear the marks of rain and snow, which will gradually erode any temporary finishes or leave streaking stains.

A freshly painted model can look nice and crisp, but does lack that realistic look, and has a more toy-like appearance. By just adding a few minor touches, you can make the model look far more realistic. Something that really helps with weathering is having a picture to follow and a little knowledge of the aircraft you are portraying. If you are new to these techniques, the best advice with weathering is to practise on something else first until you are confident of the effect, leaving your newly completed masterpiece intact.

MATERIALS

There is an abundance of different materials you can use to weather an aircraft. Some techniques need application after priming your model, like preshading and chipping effects, but most are done after the finish coats. Listed here are some materials you may come across, with a brief explanation of what they are and how they work. Some of them you can use with an airbrush, others are for use with a paint brush and cotton bud.

Washes

Washes are generally easy to use and especially suitable for beginners. They can be made up from any model paint and there are also some ready-made washes available. Washes are used to highlight detail, increase shadow areas and for staining (such as fuel and oil spills).

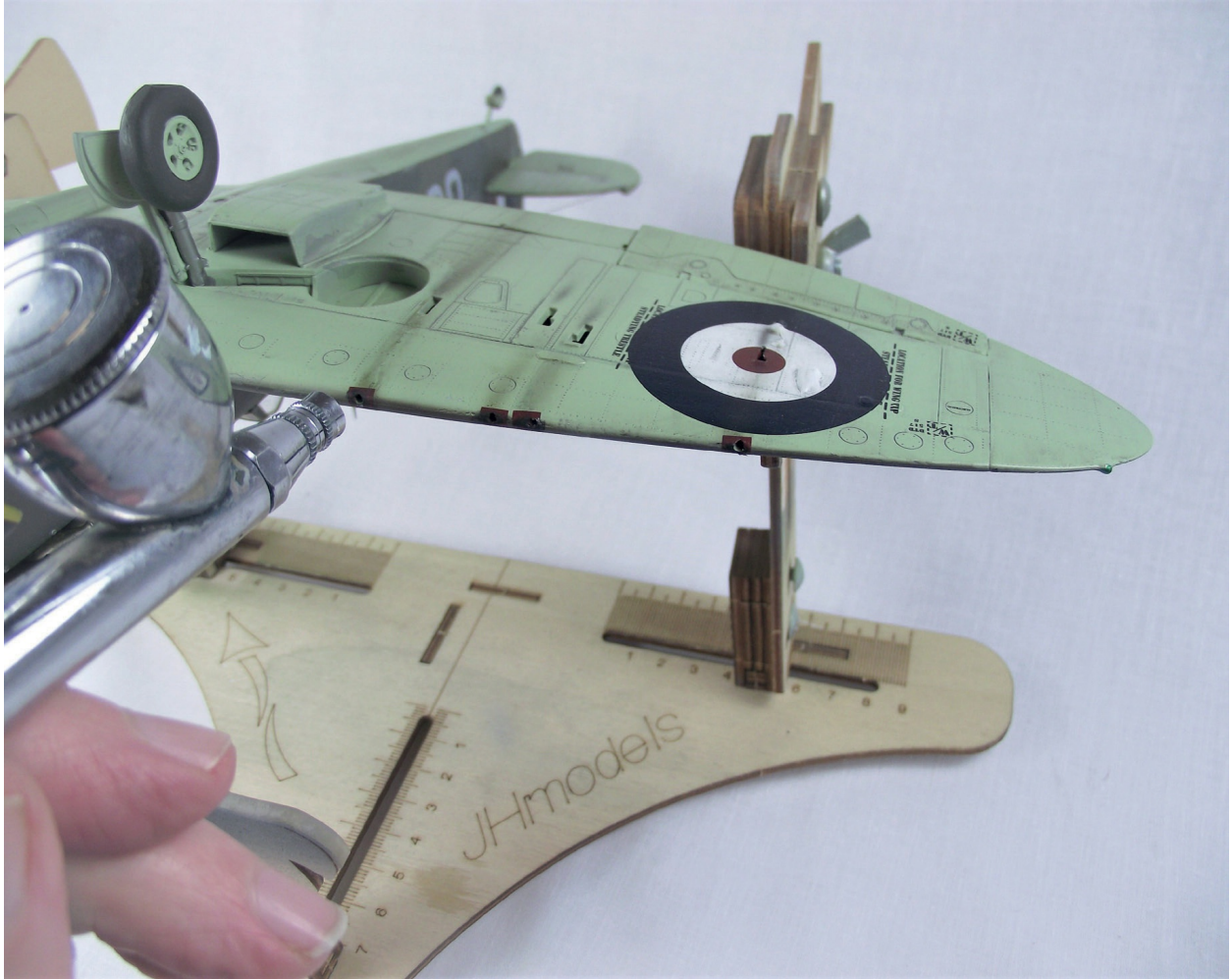


A selection of ready-to-use washes. These types of material can be used for shadow areas and for highlighting detail. Flory models produce eight colours in their clay wash range. The colours can be mixed to produce your own colour and are very easy to use, so they are especially suitable for the beginner. Lifecolor produce liquid pigment sets for particular areas of modelling, but the colours can be used for many other purposes and they can be purchased individually. The beauty of these pigments is that they can be removed with a remover supplied in the set. Another product from Lifecolor is Tensocrom Weathering Agent. There are eleven colours and one medium, so using Lifecolor paint you can make whatever colour you wish.

For those modellers who are attempting weathering for the first

time, the following commercial products are worth noting. Flory models water-based clay wash, which is brushed or airbrushed directly on to the model and, once dry, a damp towel is used to wipe off the excess, leaving the wash around raised detail or in recessed panel lines. This product is really easy to use. Lifecolor produce some water-based pigment wash sets. These are based around particular areas of modelling (e.g. armour, railways or ships) but the colours can be used on other subjects, too.

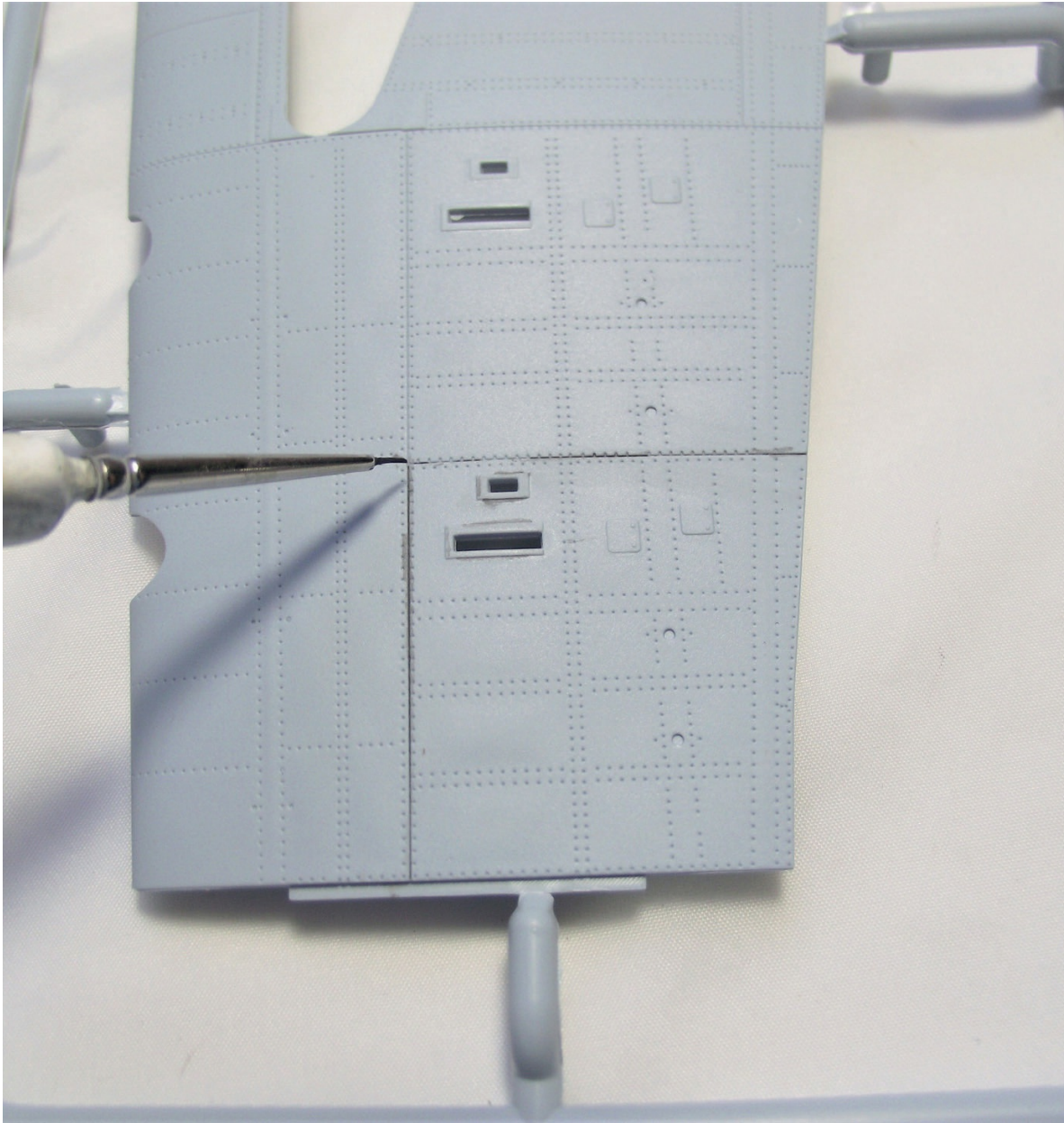
These products are applied with an airbrush or by brush; the excess is removed with the removing product supplied in the set. This technique enables weathering to be built up gradually. Further colours can be added on top, but a sealing clear coat has to be put on between them. As with all weathering, it is best to apply on to a clear coat that protects the main colour scheme. Some of the washes are aggressive with very strong pigments – ink and dye-based washes, in particular. It is advisable not to put these types of washes directly on to paintwork that has no clear coat applied, as it can stain it by leaving a tide mark, sufficiently noticeable as to require a repair.



Tensocrom smoke was used to make gun-smoke stains, applied with an airbrush from the position shown. To perfect the technique, it is helpful to practise first on a piece of card. With the trigger, push down for air, pull back one-third and release in one swift movement. Try to keep the pattern restrained. It takes a little practice, but is worth the effort.

Another way to use a wash is with capillary action, which is far more controllable but takes a little patience. This method is very useful around raised detail and on recessed panel lines. In the illustration, the area to which the effect was applied was dampened first with water (white spirit might be appropriate, depending on the base material of the product chosen for application). It is best to work in small areas, completing one at a time. Next, a fine brush was loaded

with the chosen wash; the tip of the brush was then just lightly touched on to the dampened area. The wash crept around the detail and along the recess. Excess wash was absorbed with a tissue or a dry brush.



Capillary action is being carried out on a test piece. Water is dampened into the recessed panel lines and the raised wing panels. Then, with a fine brush, a small amount of wash is painted on to the panel line and capillary action will do its work. This method is time-consuming but very controllable.



The capillary action method has also been used on these wheels. One has had a heavier application than the other. The Dunlop raised lettering on the tyre side walls has been lightly dry brushed with dark grey. It is small details like these that bring a subject to life.

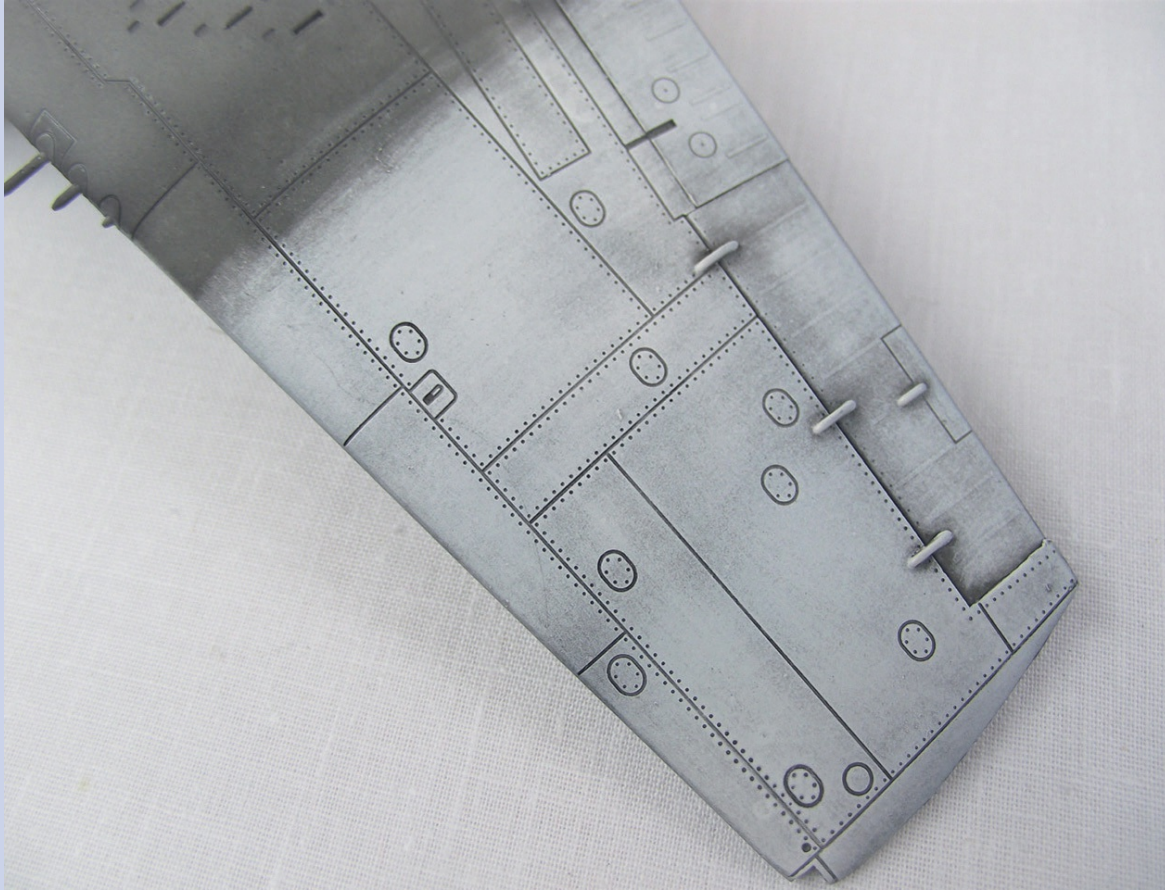


Oil paints can be purchased in small sets, like this one, at a reasonable cost. A set like this will last for years, as only small quantities are used. The disadvantage with oil paint is the drying time, which can take over 24h.

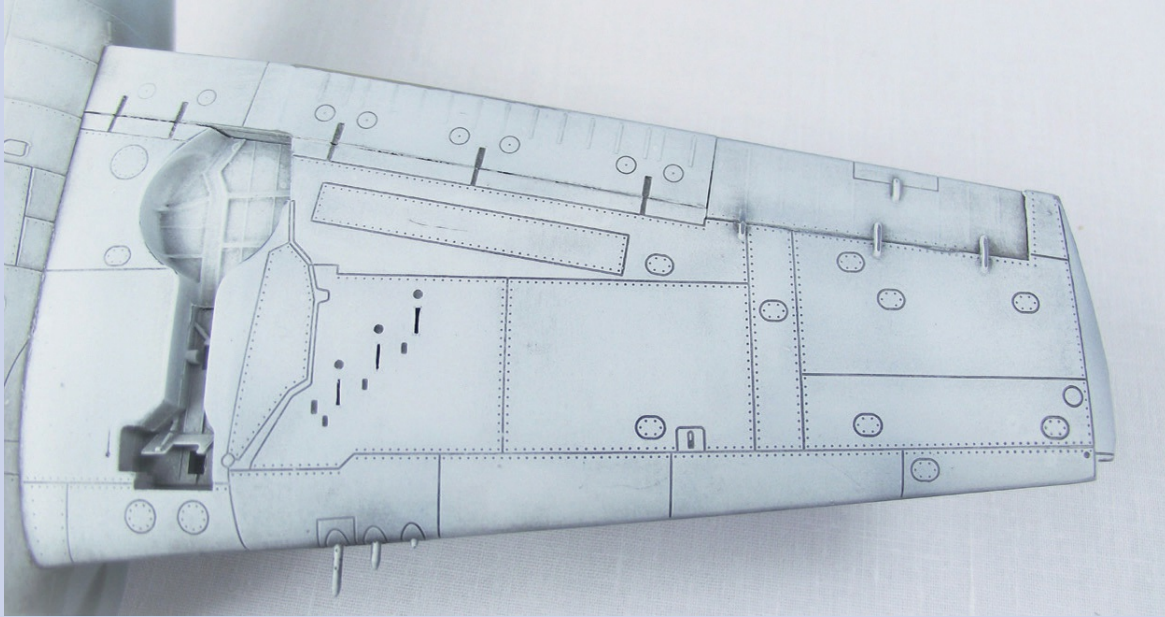
Application of Clay Washes



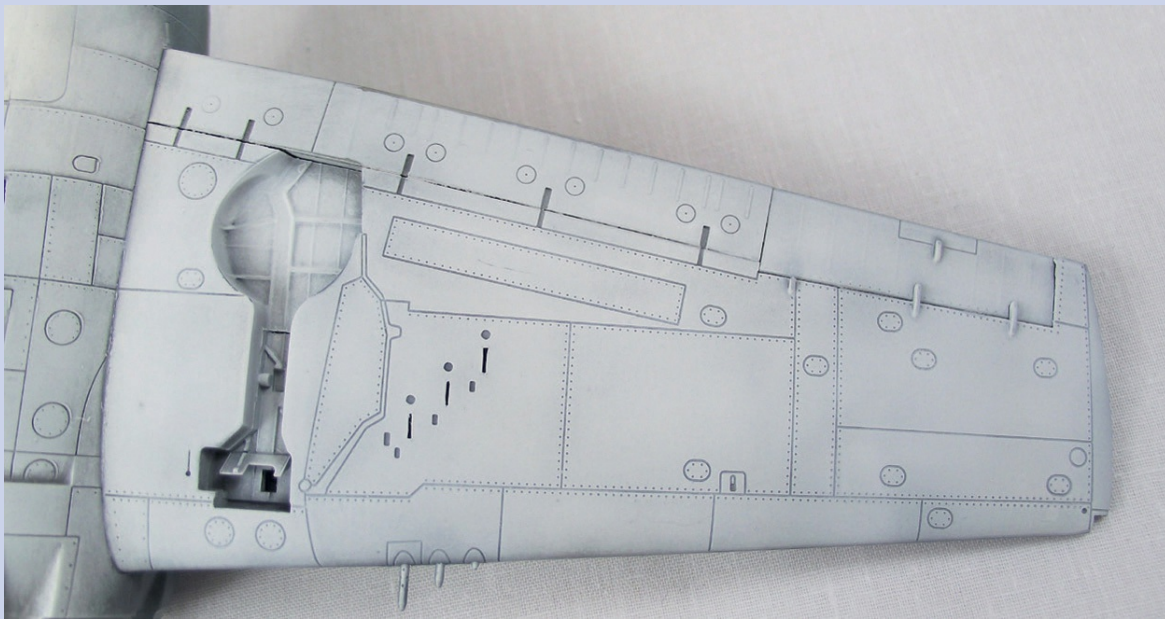
This step-by-step has been carried out on a test piece. The under surface was pre-shaded and then painted white. When the white was dry, the black Flory Models wash was applied with an airbrush. Using black on a white base colour was deliberate, as it demonstrates how easy it is to apply and how easy it is to make it look wrong. (Note: no clear coat has been applied.)



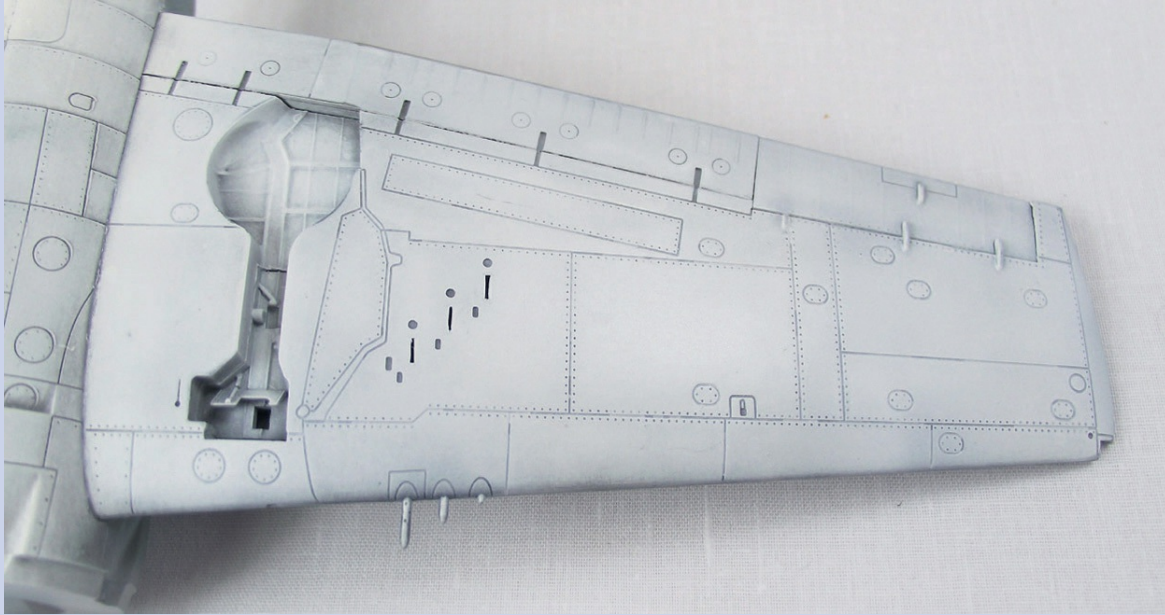
In this picture, the wash has been partly removed, and you can see how even a clay wash will still mar the white base colour. This is not a problem in this demonstration, and can work to your advantage, if you want the wing panels to have a look of greater wear.



After some tidying up, the majority of the black wash has been removed, but all the panel lines and panels stand out far too much. A lighter wash would have been more appropriate.



The next step was to apply a thin wash of white (mixed 75 per cent thinner and 25 per cent white), with an airbrush. This was applied randomly, to break down the starkness of the black. This procedure can also be done with other colours, and can be considered part of a post-shading or colour modulation (filters) process.

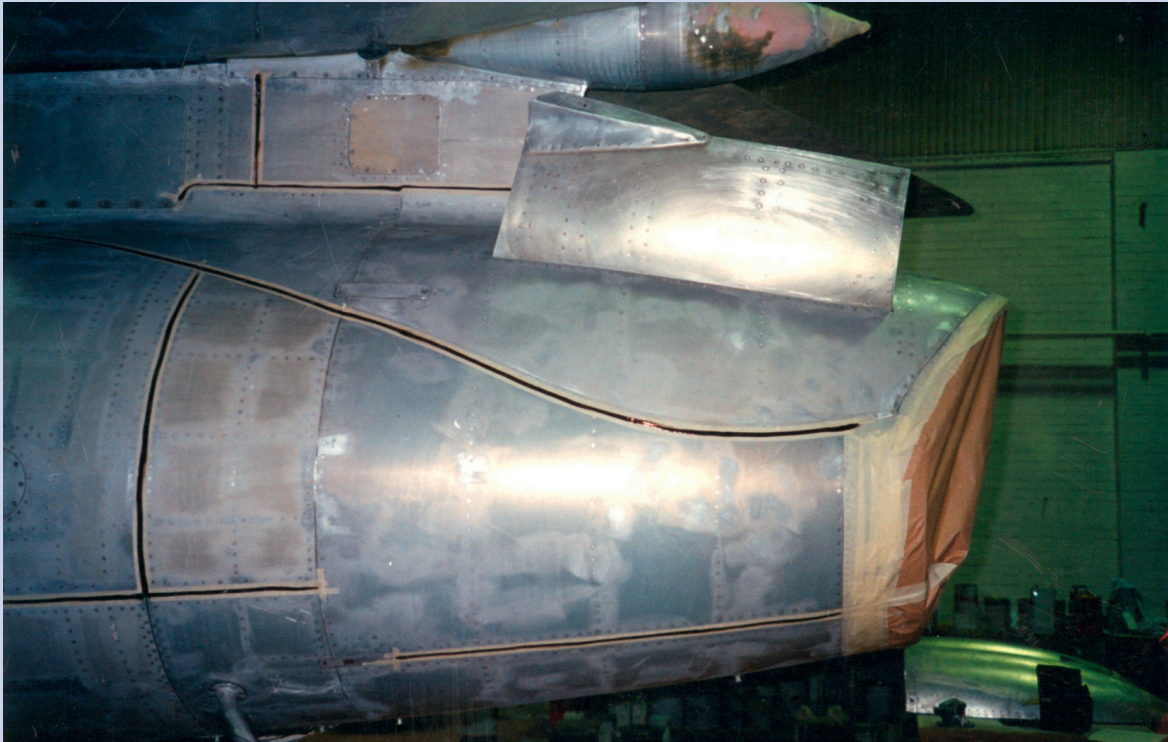


Finally, using a fine brush and a white wash, some panel lines and panels were softened in random areas, to break them up a little more. This process is down to individual taste.

PRACTICAL ADVICE ON WEATHERING

Having worked on refurbishing real aircraft, both military and civil, for twenty-two years, I have seen aircraft in all states and conditions. In modelling circles, there are many fads and fashions as to what is 'the in thing to do' with finishing model aircraft, and this is especially true around weathering. The subject is very controversial and can often provoke heated arguments. Take, for example, panel lines. Modern kit production includes accurately engraved panels and skin joints, and modellers are keen to show them off. The temptation for modellers is to emphasize every panel and skin joint, and often in a

black wash. If every seam appears in a constant colour, the weathering will stand out like a sore thumb and look very unnatural.

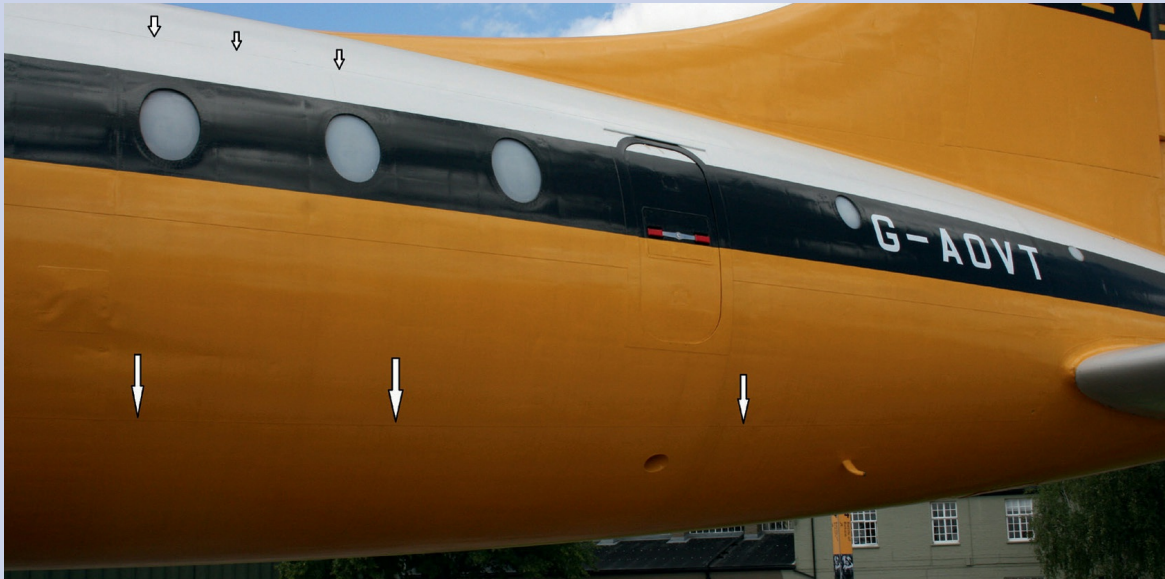


On most military and civil aircraft, overlap and butt joint seams are filled using PR-1422 sealant. This is a corrosion prevention process, as well as aiding airflow and providing less drag.

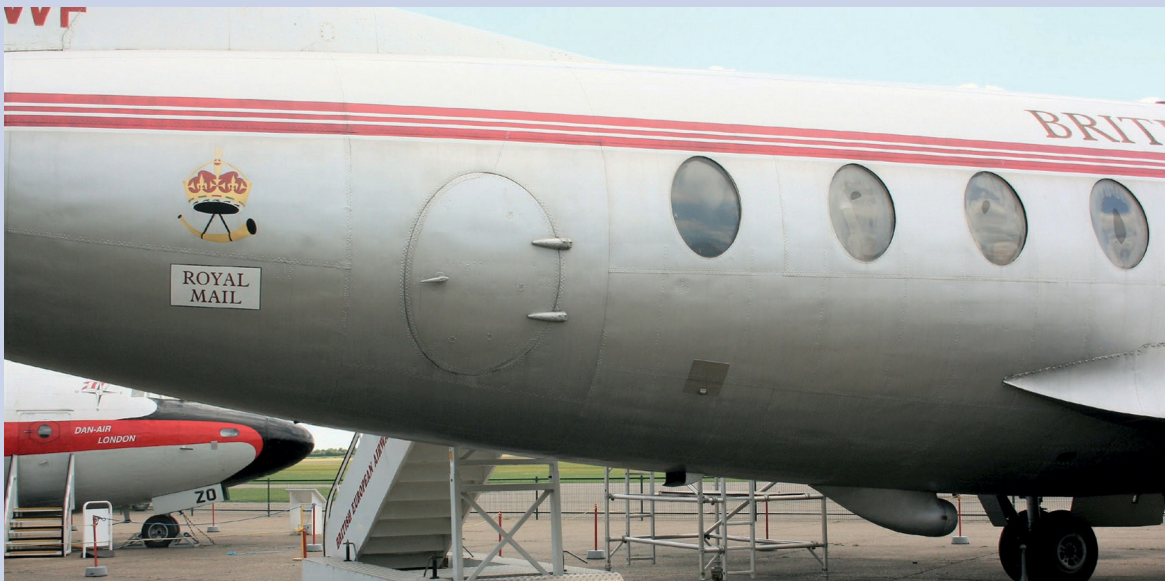
Advice is offered earlier in this book, with the comments 'go and look at the real thing' or 'find a picture to act as a reference'. Not all skin joints have a constant colour along them and not all panels have gaps around them. An explanation of what happens to real aircraft may be helpful here. With the exception of some small private aircraft, most modern aircraft skin joints are sealed with a special sealant, which is there for prevention of corrosion and to stop fuel leaks, especially where the wing structure is a fuel tank. If the joint is sealed, it is less likely to become grimy or soiled.

There is no right and wrong, with weathering, but

if you want a realistic effect, once you have done your research, be experimental. Start with easy-to-use materials and build your skills. With a little practice you will achieve good and realistic results.

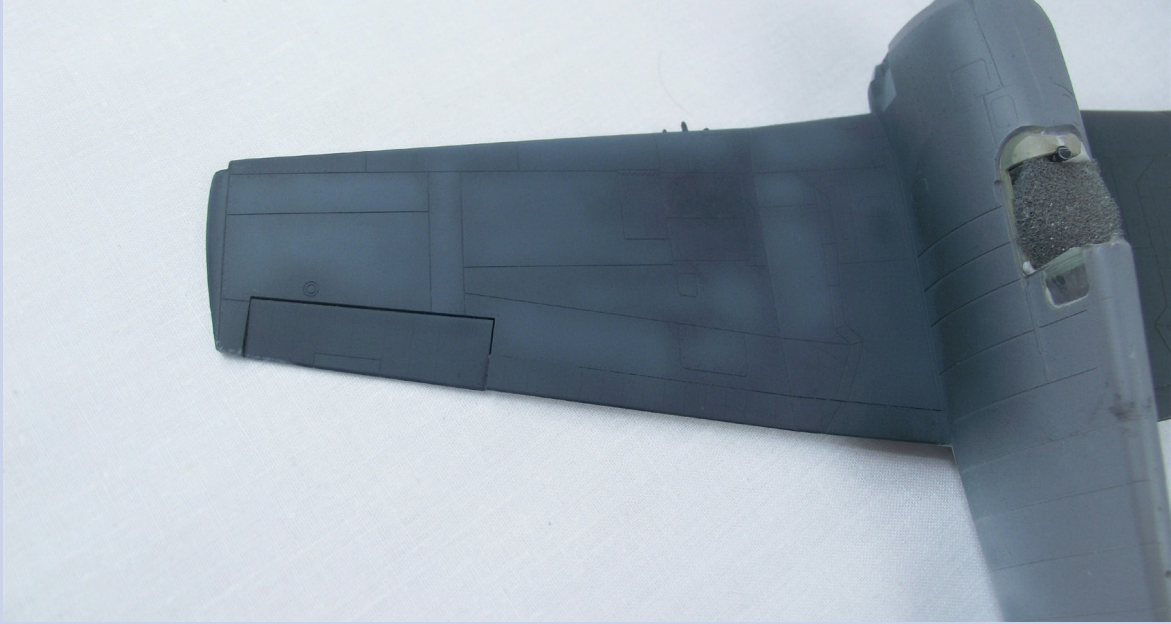


Note the indicated seams are neither a constant colour nor black. Bear this in mind when deciding to weather an aircraft.



The gap around the door is dark, so it would be correct to use a dark weathering effect. Careful examination of this picture shows there are various streaks caused by rain. The streaks are very subtle but more noticeable around the door and just below some of the seams.

Application of Washes and Filters



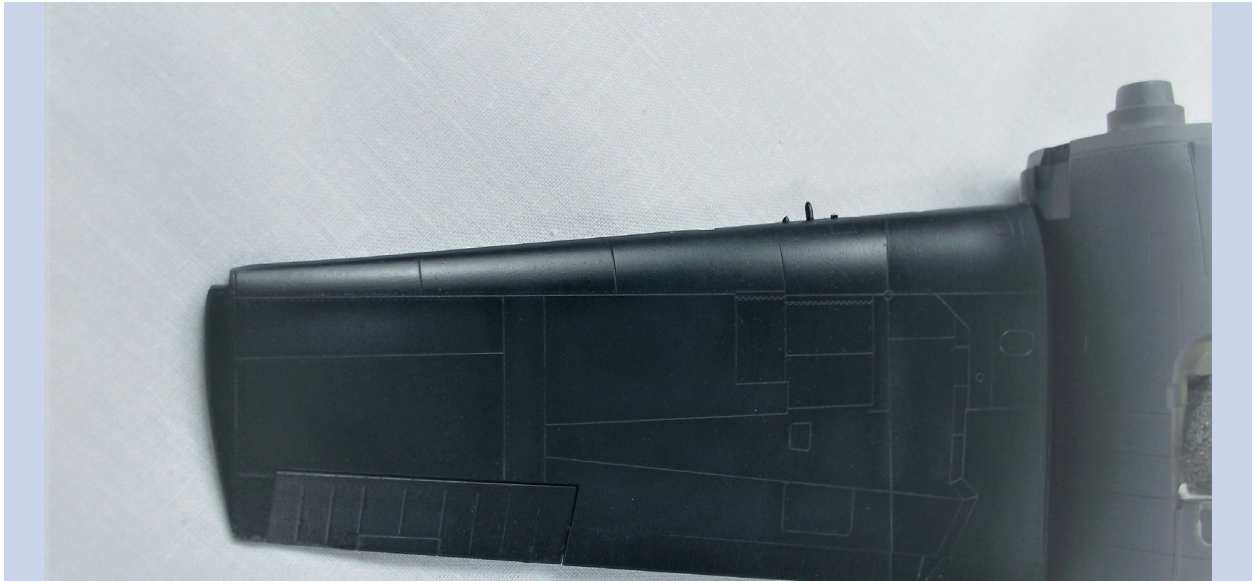
There are different ways to use filters. In this case, the wing top was painted Non Specula Sea Blue. This colour was then lightened with a small amount of white, and then individual panels were filled in, keeping away from the panel edges.



As this is a dark-coloured wing, if you wish to enhance the panel lines, a light-coloured wash should be applied.



When the wash excess was removed, the panel lines were exposed. The wash has also acted as a filter and toned down the lighter blue areas.



Finally, a filter of the original colour was mixed up. The colour has a weak pigment, so the mix used was 80 per cent thinner and 20 per cent paint. Apply as many thin coats as you wish to achieve the colour saturation required. Give each coat time to dry before putting on the next coat. The filter also helps to break up the light wash in the seams, making it look more natural.

Filters

Often called colour modulation, filters work in a similar way to coloured camera filters, controlling tone and intensity instead of colour. With paint filters, a similar effect is achieved. Filters typically consist of 95 per cent thinner to 5 per cent paint and their purpose is to change the tone and contrast, but not to change the basic colour. Once the camouflage paint is applied, a lighter shade of the camouflage colour can be applied to the centre of selected panels, leaving the panel lines alone. This will give you a similar effect to pre-shading. Post-shading is similar to using a filter, but uses a stronger solution.

Artists' oil paints can be used as filters or mixed with white spirit and made into washes. Small dots of oil paint are placed on to the area required, using a flat brush, dampened with white spirit. Brush and blend the mix into the paintwork. Use colours in the same spectrum as the base colour, applying lighter colours to lighten and darker colours

to darken.

Pigment Powders

Pigment powders enable you to produce your own washes or filters using various carriers such as white spirit. These powders can be mixed with groundwork plaster for making mud on airfield diorama bases, or just used as they are to replicate, for example, the dust in tyre treads. There is a wide range of colours to choose from and the products are available from several manufacturers.

Artists' Soft Pastels

Artists' soft pastels are essentially chalk sticks. You can grind them down on a piece of fine sandpaper, and then apply the dust with cotton buds or brushes to the model. This method is useful for exhaust stains, if you are not comfortable with using your airbrush to reproduce them. Make sure you apply a matt clear coat afterwards to avoid disturbing the dust while handling the model.



There is a vast variety of pigment powders available from various manufacturers. They can be mixed and used for filters or washes when mixed with a suitable carrier.



Artist soft pastels are available from most good art shops. You can get sets in small or large stick sizes, with a good range of colours.



This Bf 110 upper-wing exhaust stain was produced with soft pastel sticks. The colours can be applied with a cotton bud and easily put on top of one another. Remember to seal it with a matt coat afterwards, so that you do not disturb the stain while handling the model.

Inktense Pencils and Pastel Pencils

These types of pencils are applied initially in the same way as a standard pencil, but they can also be ground down and mixed with water, used like a pencil and then a wetted cotton bud or brush is applied to the colour to spread it around. This is a useful technique for small stains from hinges or small leaks from panels.



Inktense pencils are water-soluble and permanent when dry. They can be used in restricted access areas or for making small, controlled stains.



These pencils have strong pigments, so a small dot just placed in the area you want to work is likely to be sufficient. Only work on a small area at a time.



Then with a damp brush, wipe over the dot in the direction you want the stain, while it is still fresh. You can work it further with a damp cotton bud.

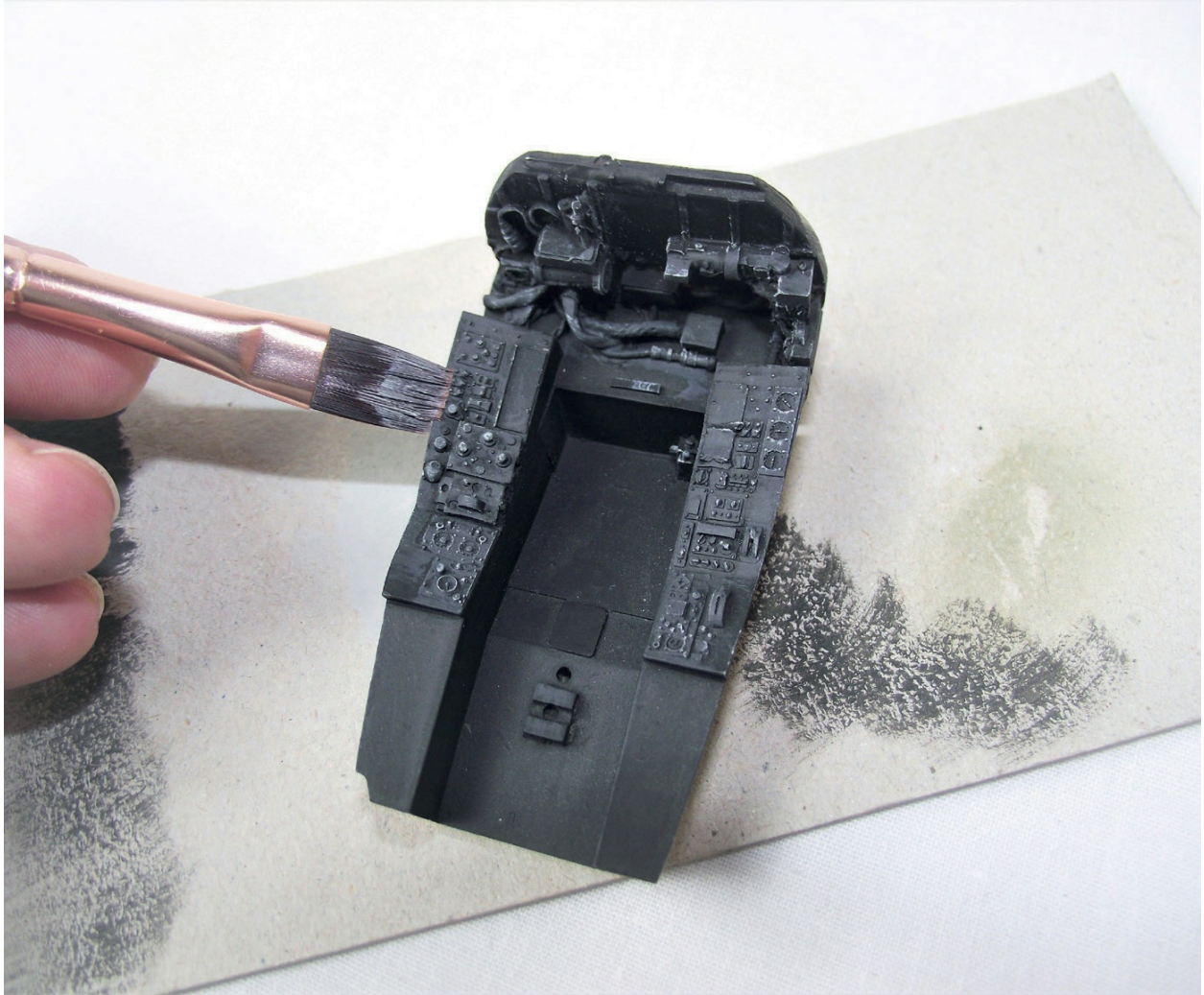
DRY BRUSHING

Dry brushing is a method of applying very small amounts of paint to areas of raised detail. Load a small amount of paint on to a flat brush, and then wipe the brush with a tissue to remove most of the colour. Test on a piece of cardboard or an old model. If too much is coming off the brush, then repeat the process. Start applying the paint to

areas required, using a very light pressure on the brush. This will leave residue on corners and on raised detail.



Preparing a brush for dry brushing. Test how much is left on the brush by wiping the bristles over a piece of cardboard. The top of the brush stroke applied in the picture is too much; the bottom of the stroke is about right.



The end result should look something like this. Notice how the paint picks out the raised detail and is left on the corners. Further enhancements can be made with other colours or by adding decal placards and instruments.

ENGINES AND EXHAUST STAINS

Engines and engine bays are areas where dirt, oils and greases accumulate, giving the modeller the opportunity to use imagination and create a realistic look. Mechanics from all nations take care of their aircraft to the best of their ability, depending on the conditions in which they are working. Try not to overdo the grease and oil effects.



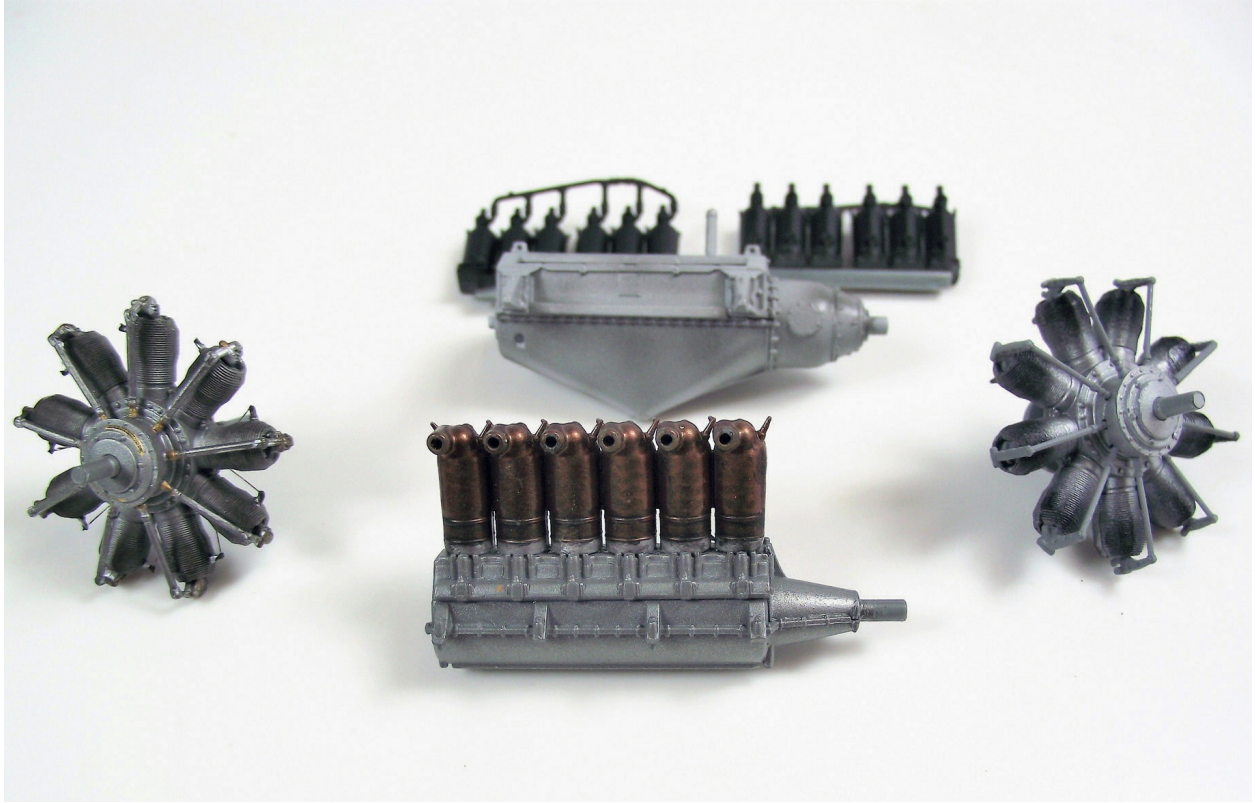
A large radial engine with this amount of detail requires painting and weathering with each part as sub-assemblies.

On larger scale models, aircraft engines are sometimes supplied or can be purchased separately. It is possible to adopt a variety of ways to paint your model's engine and engine bay area. The method of construction of each model engine will vary according to the manufacturer and engine type, but by building sub-assemblies and painting them before adding them to complete the model, you can access areas that might otherwise be difficult to reach.



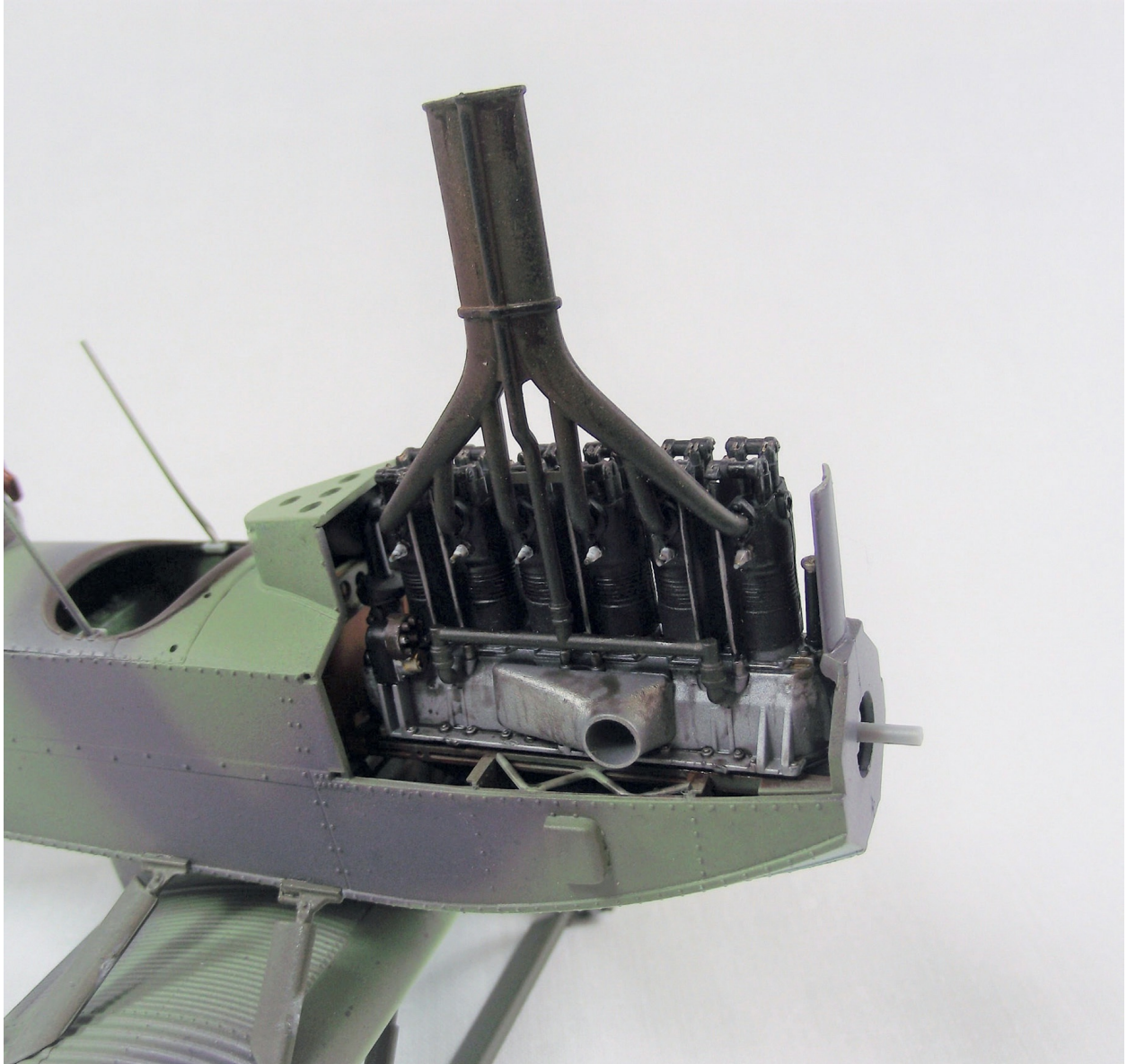
The same engine from the previous picture has been dry assembled and there are more components yet to add. The more details you pick out, the better the finished engine will look.

Start by using a dark base coat on the engine block and accessories, but be aware that using only black or a natural metal colour can make an engine block look monotone. The recessed areas are where dirt and oils are most likely to accumulate, so as you work out from these recessed areas, apply different, lighter tones using colours such as tyre black or dark aluminium.



A typical set of World War I engines with work in progress. Engines benefit from the cylinders being painted and weathered separately; it saves a lot of masking. The copper-painted cooling jackets on the engine in the foreground have been weathered. If they were just left in a copper colour straight from the paint pot, the look would be too stark and unnatural.

Check your references, as some pipes may have been made from copper or aluminium and need corresponding metallic tones in order to look realistic. Some pipes will have clamps where joins are made. These can be carefully painted and a wash applied. Bolt heads or nuts on crank cases and cylinder heads are taken on and off during maintenance processes, so to reflect the wear, these will need to be a metal colour. By using two blended metal colours together they will look less stark and applying a wash will tone them down a little further.



Temporarily fitted to the airframe is this Benz Bz.IV engine. It was painted and weathered as a separate assembly and not added to the airframe until after both wing centre sections had been fitted.

There are large variations in types of exhaust stains, e.g. piston engines can be 'normally aspirated', supercharged and turbo-charged. Each individual aero-engine will give different exhaust stains, but there are patterns discernible with different engine types as well.

Supercharged engines will normally give a greyish deposit on the surface, and some radial engines will discharge a lot of burnt oil. The

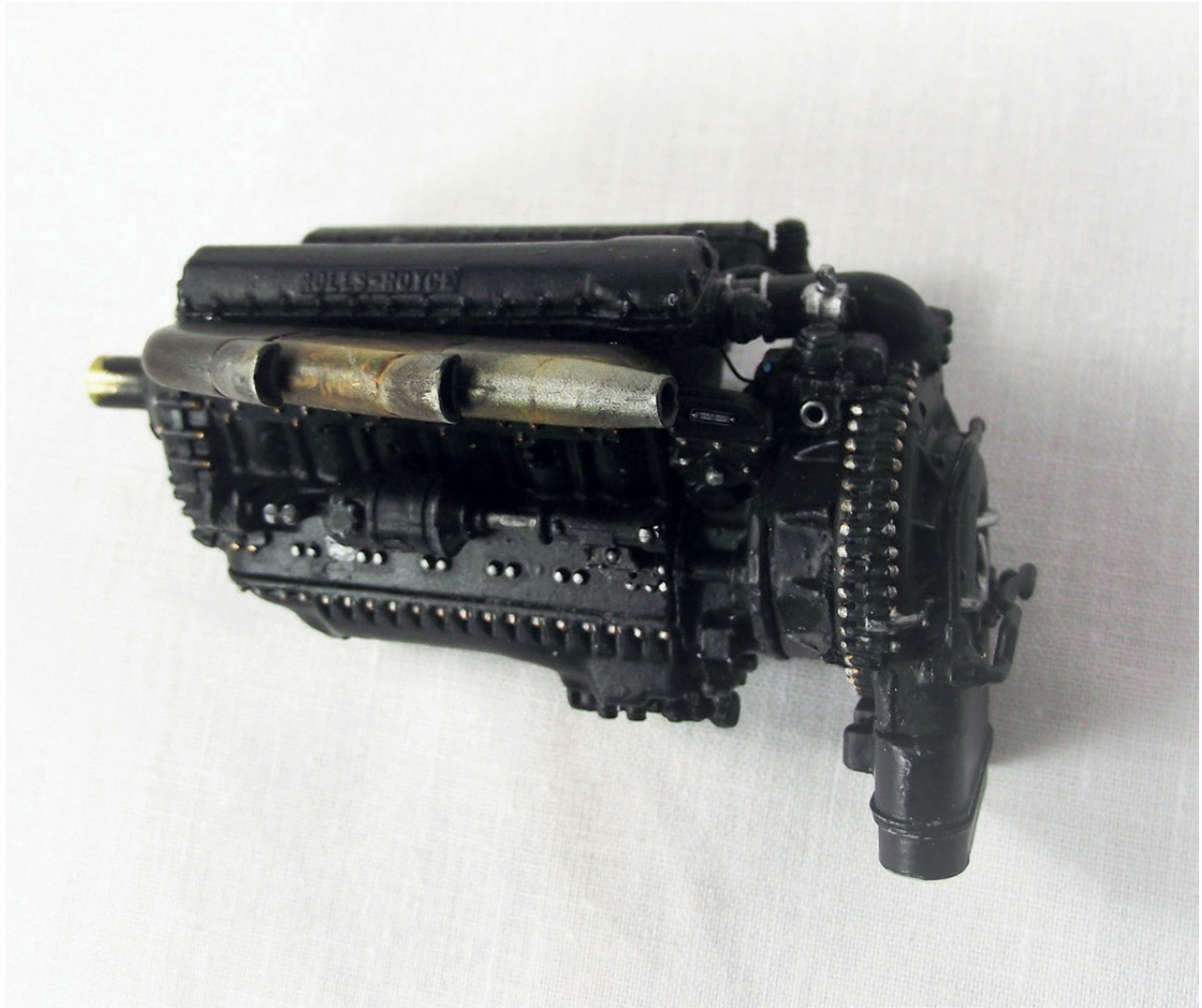
AD Skyraider was notorious for producing heavy exhaust stains. The operating conditions and the level of maintenance can also have a significant effect, so please check your references if you wish to give an accurate representation. For example, on a single-piston engine fighter, the airflow over the wing has an influence on the shape of the exhaust stain. This is entirely down to the aerofoil section of the wing and the boundary layer of air.



When doing exhaust stains, bear in mind other parts of the airframe, which may get affected. These undercarriage doors and the landing gear on this Wildcat have been stained by the exhaust, and in wartime would likely be more significantly marked.



Stainless steel plates do not stay stainless for very long. Note the variety of colours.



This 1/24 scale Merlin engine exhaust has been painted to simulate the exhaust in the top picture on the opposite page.



The contrast has been altered in this picture to highlight the exhaust stain. Blue/grey and brown staining can clearly be seen.



Of interest in this picture are the different tones on the panels on the rear fuselage, behind the exhaust. The colours of the tail hook and exhaust tube are also of note.

Appendix I

Paint Application Troubleshooter

Below is a list of the symptoms, likely problems and corresponding solutions that are most commonly encountered by the budding airbrush artist. There will, undoubtedly, be others that can manifest themselves, but by using this guide and by simple deduction, you should be able to find the cause of the difficulties and rectify them. An airbrush is a simple tool that requires good cleaning and maintenance, and many of the common problems will stem from a lack of thoroughness with these tasks.

Symptom	Likely problem	Solution
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Dry, rough to touch finish.	Air pressure too high, spraying too far away from the surface.	Reduce the air pressure or get closer to the surface.
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Paint runs or leaves sags.	Too much paint is being applied. The modeller is not letting the proceeding coat flash off before applying the next coat. Paint is being applied too close to the surface.	Each coat should be taken to the 'just wet' stage. Let each coat flash off before applying another coat. Keep the distance to approximately 4in from the subject.
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Orange-peel effect in the finish coat.	Air pressure is too low; paint mix too thick.	Increase the air pressure first. If the problem persists, then the paint is too thick and requires more thinner. Make sure you empty the airbrush of all the thick paint and run some thinner through the airbrush to clear the nozzle before using the thinned paint.
Paint seems too transparent and runs.	Over-thinned paint.	Do not try to thicken up the paint if you have more than 9ml or 1/3oz mixed up. It takes three times the amount of paint to thicken up paint, and you will end up with too much mixed paint. Start a fresh mix by adding 20 per cent thinner and gradually add more, if necessary.
Paint crazes or cracks.	Incompatible finishes.	Every paint is a recipe of pigments, binders and solvent. Every manufacturer uses different combinations, so even though both products you are using may be water-based, it does not mean they will mix together or will not react to each other. Do a test piece, if you have not used them before or if you are not sure you can put a barrier coat (usually a clear coat) between them.
A white, milky appearance or bloom on the surface of the finished colour or	Moisture trapped between the layers. This might be caused by draughts while painting.	In some cases it can be cured by applying a clear coat over the top of the problem area. In others you may need to repair the paint coat. With solvent-based colours you may be able to use a few drops of anti-chill thinner, which slows down the rate of evaporation.

clear coat.

AIRBRUSH TROUBLESHOOTING

Symptom	Likely problem	Solution
Paint is spitting or skipping, rather than spraying in a continuous steady stream.	Nozzle blocked; build-up of paint on the needle. Breather hole in the paint reservoir is blocked (in those with lids).	Remove the nozzle and needle. Clean both thoroughly with the appropriate airbrush cleaner. Make sure the breather hole is clear; use an old needle or pin to clear it. It is possible, while painting, to block the breather hole with your fingers on suction-feed bottles.
	Reservoir is nearly empty.	Add more paint.
	Nozzle damaged or worn.	Replace the nozzle.
	Paint is drying on the needle or drying on the nozzle	Try adjusting the air pressures first. If the problem persists, try adding flow enhancer or retarder.

tip (this problem is more likely when using acrylics).

Bubbles appearing in the fluid/paint cup.	Nozzle cap or head assembly is not sealed to the airbrush.	Check the seal for damage and tighten up the head assembly.
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Split nozzle.	Check the nozzle for damage or splits and replace if necessary.
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Nozzle cap or tip blocked.	Clean the head assembly and needle cap.
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Nothing happens when the trigger is pressed down or pulled back for air.	Air supply is blocked or restricted.	Make sure the regulator is set to the required pressure and air valves are all open.
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Compressor is not operating.	Check all electrical connections and switches on the compressor.
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The trigger is not installed	Make sure the bottom part of the trigger is engaged into the air valve. The airbrush instructions should show how the airbrush is
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correctly. properly assembled.

The needle will not pass through the airbrush after cleaning.	Trigger is not installed the correct way around.	Make sure the slot in the trigger has the correct orientation.
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No fluid will exit the airbrush when operating the airbrush.	The needle lock-nut is not tightened up.	Check the needle lock-nut in the handle. Make sure that, as you pull the trigger back, the needle is moving rearwards.
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	Blocked nozzle.	Remove the nozzle and thoroughly clean and make sure the orifice is clear.
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When you press down for air you also get paint flow.	The needle is not seated in the nozzle correctly.	Loosen the needle lock-nut, partially withdraw the needle and push the needle forward until the needle contacts the nozzle. Do not force the needle into the nozzle or you may split the nozzle.
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Needle cannot be removed from the airbrush.	Paint has dried on the needle, forward of the needle bearing,	Feed some cleaner into the airbrush and let it soak for a few minutes, then try again. If the problem persists, remove the head assembly and fluid nozzle, then withdraw the needle from the front of the airbrush. Clean the needle and lubricate it before replacing it.
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stopping the needle
being pulled rearwards.
Getting some airbrush oil into and around the needle bearing will help stop this from happening again.

Paint is getting back into the handle or trigger area.	The needle bearing is damaged or worn.	Replace the needle bearing if it is damaged. Some needle bearings are adjustable and can be tightened up (a special tool may be required to do this). Alternatively, send your airbrush to an airbrush service centre.
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Appendix II

Airbrush Cleaning Quick Reference

ACRYLIC PAINTS

1. Empty excess paint from the cup, immerse the airbrush into water and clean the inside of the cup with a brush.
2. Scoop up water into the cup and flush through.
3. Fill the cup with clean water and flush through normally.
4. As number 3 above, but place your finger over the jet end to back-flush through airbrush.
5. Repeat 3 and 4 as often as necessary until no trace of paint is seen on a tissue.
6. Repeat 3 and 4 with airbrush cleaner.
7. Unscrew the rear end of the airbrush, loosen the needle lock-nut, remove the needle and clean with water or airbrush cleaner.
8. Fill the cup with airbrush cleaner and flush through without the needle.
9. Spray foaming airbrush cleaner into the cup, flush through.
10. Lubricate the needle with Vaseline or Super Lube. Replace the needle very carefully and tighten the needle lock-nut.
11. Reassemble the rear-end of the airbrush.
12. Unscrew the front cap to nozzle, clean with water and airbrush cleaner and replace.
13. Fill the cup with Liquid Reamer and flush through.
14. Clean all outside surfaces of the airbrush with Liquid Reamer.

ENAMELS

All stages of cleaning are as described for acrylic paints, but use good-quality white spirit or thinner, as recommended by the paint manufacturer, in the place of water. Make sure all traces of solvent are removed by flushing water through afterwards. Ensure that cleaning is carried out immediately after the conclusion of airbrushing.

Glossary

Atomize Using air pressure to create a mist.

Barbelling Painting a line with an accumulation at either end, resembling a barbell, where the paint flow remained stationary at inception and completion.

Blooming Where solvent-based paint appears to have a milky film on the top surface, caused by moisture within the solvent-based paint film.

Boundary layer A thin layer of air flowing over the surface of a wing.

CFM Cubic feet per minute.

Crazing Surface covered with a fine network of spider-web pattern 'cracks' caused by two incompatible materials.

Double-tracking Applying a light coat of paint and then immediately returning to the painted area to apply a second coat, a technique commonly used in priming.

Fish eye Dent-like gaps appearing randomly on the paint surface, caused by contamination prior to painting.

Flash off Allowing a solvent or other liquid in paint to evaporate to allow a second coat to be applied. Paint will not adhere to a finger if lightly touched but if pressed would leave an indentation as the paint remains wet under the top surface.

Flatting Taking off the shine, or rubbing down.

Hydulignum Densified wood laminate.

Jablo A manufacturer of laminate propeller blades.

‘Just wet’ Where paint is applied at a rate that produces a damp surface but does not pool or run.

Opacity Depth of colour pigment.

Orange-peel Painted surface that has small blisters, giving the impression of the skin of an orange, where the outer paint skin has dried before the solvent base evaporated, resulting from thick paint or low air pressure.

‘O’ ring A mechanical gasket or seal compressed into place during component assembly.

Pitot tube A critical piece of an aircraft for measuring airspeed.

psi Pounds of pressure per square inch of area.

Scale effect A technique of lightening the colour of paint to achieve a perspective of distance.

Self-levelling primer Dries to a smooth, hard finish.

Spray pattern A variation in the surface of a painted coating, depending upon the distribution of different sized droplets.

Vortex A whirling mass of air.

Useful Addresses

The Airbrush Company Ltd

Suppliers of airbrushes and compressors: Iwata, Badger, Paasche, neo for Iwata, Premi-air Sparmax, airbrush spares, tools and accessories and provider of airbrush training. Airbrush and compressor servicing.

79 Marlborough Road,
Lancing Business Park,
Lancing

West Sussex BN15 8UF

Tel: 01903 767800

www.airbrushes.com

Crafty Products Gyro-Cut

Suppliers of hand-held rotating cutter.

Crafty Products Ltd,
Inglenook Cottage,
Hanby,
Grantham,

Lincolnshire NG33 4HJ

Tel: (0)7908 935578

<http://www.craftyproducts.co.uk/gyro-cut>

Flory Models

Suppliers of washes, pigments and sanders.

2 Brow Hill,
Heathfield,
Newton Abbot,
Devon TQ12 6SW

www.florymodels.co.uk

Hannants Ltd

Suppliers of model kits, model paint ranges, modelling tools and accessories.

Unit 35 Harbour Road,
Oulton Broad,
Lowestoft NR32 3LZ

Tel: 01502 517444

Also: Unit 2 Hurricane Industrial Estate,
Grahame Park Way,
Collindale

London NW9 5QW

Tel: 0208 205 6697

www.hannants.co.uk

Little Cars

Suppliers of airbrushes and compressors: Harder and Steenbeck, Sparmax, spares and accessories, model-making tools and accessories.

Uncle Jacks,
Lavendon Road,
Olney MK46 4HH

Tel: 01234 711980

www.modellingtools.co.uk

RB Productions

Suppliers of wood grain stencils, modelling tools.

7 The Mall,
Main Street,

Leixlip,

Co. Kildare, W23 X725, Ireland

www.radubstore.com

Scalewarship Ltd

Makers of custom paint masks, photo-etch and 3D printing.

5 Beechwood Avenue,
New Milton,
Hampshire BH25 5NB
www.scalewarship.com

Ultimate Modelling Products

Suppliers of Ultimate primer and finishing products
Tel: 02392 000955
www.umpretail.com

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