

## CHAPTER ONE

# GENERAL TIPS & TECHNIQUES



A-1H Skyraider manufactured by Monogram, Inc. (1/48 scale kit built by Major Billy Crisler, USAF.)

Over the years I have discovered and rediscovered techniques for working with plastics that have greatly advanced my modeling skills. I have condensed and refined them so that anyone can use them with success. The topics in this chapter are cataloged and grouped so you can find a specific technique easily. All the procedures and methods presented have been tested and proven in building the models pictured in this book.

### REQUIRED TOOLS & EQUIPMENT

Listed below are the tools and equipment you will need to detail your model. All the items listed are mentioned throughout the book; where appropriate I have included suppliers or recommended manufacturers.

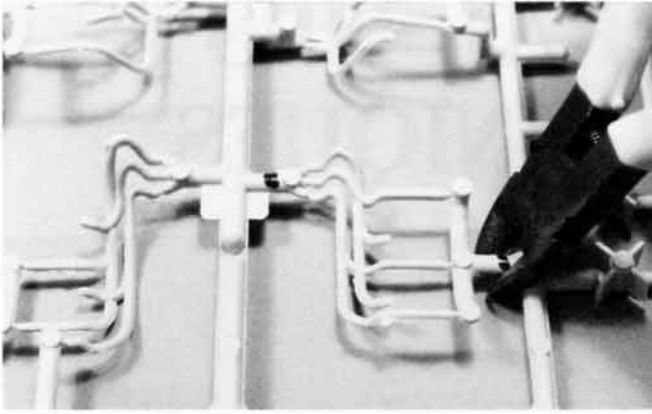
The fillers and glues I use include Testor's modeling putty, Squadron Shop's Green Stuff, the white and blue tube super glues marketed by the Duro Corporation, Two Part epoxy adhesive, marketed by the Devcon Corporation, and Elmer's or Kristal Kleer's white glue. Duro's super glue and Devcon's two-part epoxy can be found in just about any hardware store. To apply Duro's white tube super glue I use a .5mm mechanical pencil or thin wires for precise application. You also need a super glue accelerator; I have found that a two-ounce bottle will last a long time. Duro's blue tube super glue is called quick gel and is an excellent filler.

For sanding I use sandpaper from the Testor Corporation or K & S Engineering Company. It comes on a

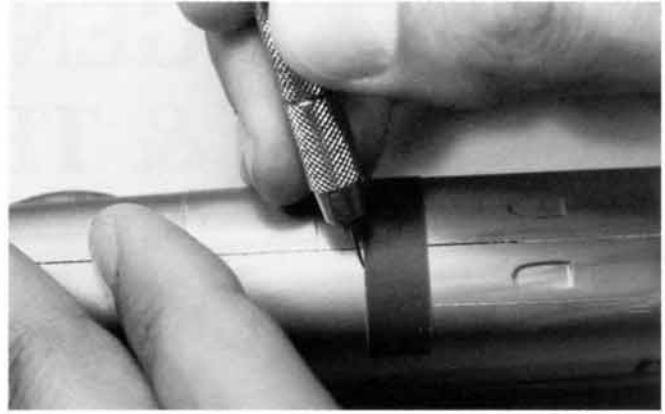
waterproof backing and can be used wet or dry. It can be cleaned with soap, water, and a brush and be reused. The grades range from 150 to 600 grit. They come in 3 x 4-inch sheets and are color-coded for easy identification. Flex-I-Files and Flex-Pad files are also handy sanding implements. The Flex-I-File works great to form and shape curves.

For sanding blocks I use small pieces of pine, balsa wood, plastic stock, or even the handles of my files. Balsa wood is especially useful because it conforms to compound areas such as wing and fuselage connection points.

For polishing I use plastic polish from the Bare Metal Foil Company or Brasso metal polish. To polish the areas that are sanded, use a cotton



Use a pair of wire cutters to cut the trees that are connected to the parts. It sometimes helps to mark the locations.



Scribing panel lines and connecting them to raised lines is easy to do with labeling tape as a guide and a sharp sewing needle.

cloth and either of the two recommended polishes. You can't do without an X-Acto knife and numerous blades. I always keep a supply of #11 and #16 X-Acto blades, as I use them more than any other size. You will also need a small pair of wire cutters to remove parts from their trees.

For masking I recommend Scotch 3M painter's masking tape. This is the best product I have found for masking. It also makes great seat belts.

Plan on using several boxes of facial tissue per model. Tissue makes an excellent stuffer in areas that are deep and need to be masked, like cockpits and wheel wells.

You will need a glass plate for cutting decals, photoetched parts, and placards. Tape the edges with duct tape to keep from getting cut. The tape also acts as a cushion between the glass and your workbench.

For scribing I recommend plastic scribers from the Bare Metal Foil Company or Micro Mark. Both remove the plastic instead of pushing it aside, as needles do. You can also use a sewing needle in a pin vise (called a scribing needle), which works well around sharp corners. Both these tools are also used to remove control surfaces and other parts.

You will need templates to scribe circles and other small shapes. For long lines, use labeling tape for Dymo label machines.

To clean out sanding dust from scribed lines use a soft toothbrush.

To detect flaws on plastic surfaces, joints, and seam lines, use silver paint applied with a soft brush.

To clean plastic prior to applying a primer coat use Polly-S plastic prep. It can also be used between coats to remove dust and skin oils. Polly-S also makes an excellent decal and paint remover for painting disasters.

Waldron Products sells a standard-size punch set for their instruments. You will find a thousand and one uses for it besides making instrument consoles. It is a valuable tool for scratchbuilding and simplifies many projects. Waldron also markets fine console instruments and placards.

Model Technologies and others produce photoetched seat belt hardware and mesh screening with many uses. Recently, manufacturers have been supplying photoetched seatbelts complete with buckles and adjusting hardware as part of the belt. While these are easier and quicker to use, you will never be able to achieve the effect of a multiple-part seat belt, and it is difficult to paint the metal hardware. I recommend getting separate hardware for seat belts.

Evergreen Scale Model Products markets the widest selection of plastic sheet stock, strips, and rod sizes. Their plastic is easy to use, soft, responds well to sanding and shaping, and accepts paint well.

You will need a good selection of drafting templates. At a minimum you should have circles, squares, rectangles, and ellipses, and a set of small clear drafting triangles.

Round toothpicks and cotton swabs are valuable items to have on hand. Toothpicks make good applicators for white glue and for picking up

Waldron's instruments. Use cotton swabs to smooth out white glue and to clean and shape two-part epoxy.

For proper decal application you will need clear gloss and flat finishes. Testor's and Polly-S clear finish products will give you excellent results.

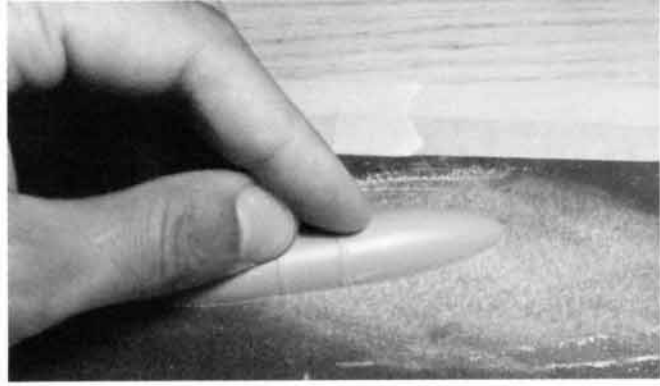
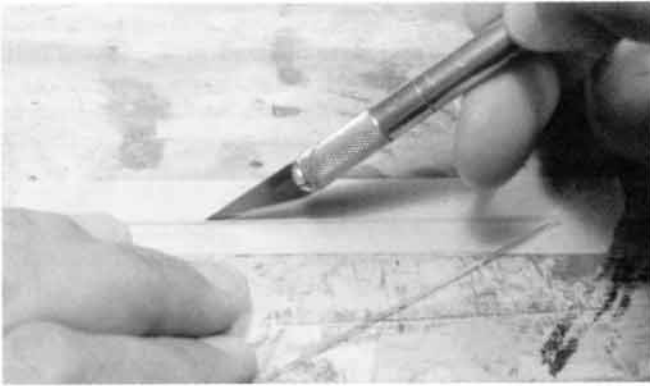
You will need a good supply of tweezers and micro files in various sizes. Micro Mark carries a full line of files and tweezer sets.

For airbrushing I use Badger airbrushes. I like single-action brushes because my hands are not that steady, and I find it difficult to keep the button in place as I airbrush. Clean your brush after each session and let the parts soak in a jar of mineral spirits. I also recommend investing in a compressor, even if it is a small one. Having a reliable air source is important in airbrushing. Buy a spray booth or use a large cardboard box with the top and front cut out. Moving boxes are sturdy, come in various sizes, and are readily available.

For great-looking decals you will need a decal-setting solution, but be sure the solution is compatible with your decals. I use the Microscale system, and it has never failed me.

For weathering use Polly-S weathering paints. Another good tool for weathering is pastel pencils. I run them across a piece of sandpaper and apply the residue with a soft, flat brush. I also recommend a good supply of quality flat and round brushes, especially small detail brushes.

You will need a variable-speed motor tool, a motor tool drill press, and a motor tool vise. Cutters in vari-



To cut straight strips of masking tape use a straight edge and a sharp blade. The sharp blade will insure that the masking tape will not have any feathered edges.

Sanding the gluing surfaces of small parts on a flat surface greatly improves the fit and it reduces the amount of seam work you have to do.

ous sizes, drill bits from  $\frac{1}{4}$  inch down to a number 80 bit, and circular saw blades are also a must. Larger size drill bit sets can be found in hardware stores, and micro bits from number 60 to 80 can be purchased from Micro Mark in sets. You will also need a drill bit gauge and a pin vise for small jobs. I also recommend a motor tool chuck, which can also be purchased from Micro Mark. Last but not least, you should have a pair of safety glasses to protect your eyes whenever you do any cutting or drilling.

You will need razor saws of various sizes, a jeweler's saw, and an X-Acto miter box for cutting plastic stock. Blades for jeweler's saws come in various sizes.

A good supply of wood dowels in various sizes for sanding and shaping plastic is a must. A bag can be found at any crafts store. You can also get modeling clay from these stores, which is great for adding weight to the nose area of a model.

To flatten tires I use an old iron. To protect the surface and the plastic I place a small piece of waxed paper on the iron's surface when I am ready to work.

For measuring interior areas and to transfer measurements, get a good pair of drafting dividers. You will also need a contour gauge for making interior fuselage and wing bulkheads. Contour gauges can be purchased from Micro Mark along with scale rulers for 1/32, 1/48, and 1/72 scale scratchbuilding.

For mixing thinner with paint, invest in eyedroppers. They reduce

the mess associated with mixing paint and save cleanup time.

For removing control surfaces and adding interior strength to wings, I use two-part resin. This stuff is great for casting parts and adding strength to control surfaces that have been cut out. It also adds a good weight to these parts and makes them easier to work with.

You will need stiff piano wire, thin spool wire, thin electronics solder, and stranded electronics wire for rigging biplanes and adding wiring and control cable detail. As you build models you should save lengths of plastic sprue in different colors, including clear. When stretched, colored plastic makes excellent rigging and colored wiring for cockpits and engines. To stretch the plastic you will need a candle and some stick matches. Small Parts Inc. of Miami Lakes, Florida, carries countless items you will find many uses for, including stiff stainless steel wire.

To transfer shapes from a cross-section of a wing or fuselage to sheet stock, you will need a grease pencil. Finally, for any detail work you will need good lighting. I use two adjustable arm desk lamps.

### **USING PUTTY & SANDPAPER & DETECTING FLAWS**

Squeeze a small amount of putty onto a piece of paper. Allow it to flow from the tube while retaining its round shape, and squeeze out a line  $\frac{1}{4}$  to  $\frac{1}{2}$  inch (6.4 to 12.7mm) long. For most putty applications use either a #18 flat

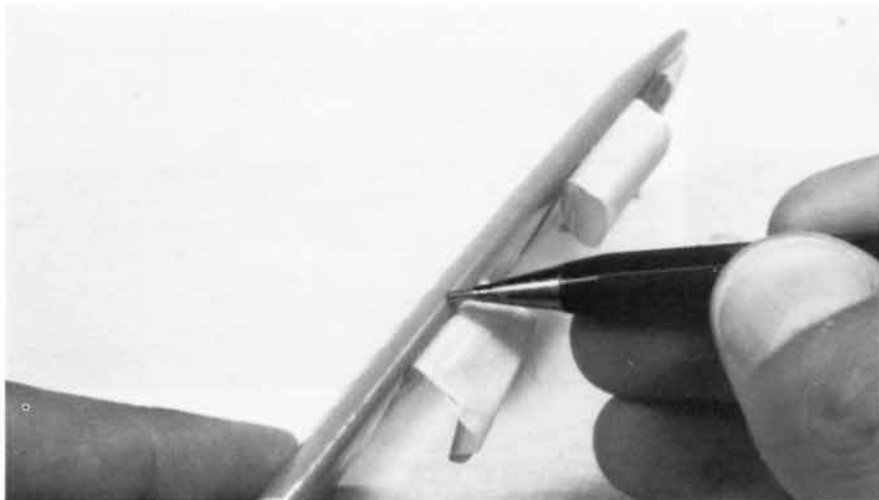
ended X-Acto blade or a #16 angled X-Acto blade, and slice off small amounts with the edge of the blade. This will give you greater control.

Use the minimum amount of putty to do the job. Too much increases your sanding work and your chances of marring surrounding detail. When applying putty, be sure the plastic halves are well secured with glue. Any flexing of the halves during curing or sanding and scraping will cause the filler (putty) to crack and detach from the plastic.

Mask around the area to be putty before applying it so that when the tape is removed the only putty that remains is along the seam line. This guarantees that the putty will only touch the plastic where you want it. Tape along both sides as close to the seam as possible. This will give you a thin putty line and reduce your work and the amount of detail removed during sanding.

Work in sections no more than two to three inches long and don't worry about getting putty on the masking tape. Quickly apply putty and remove the tape by pulling it back over itself and away from the putty. It is important to remove the tape while the putty is still moist, although you will need to let it dry before you sand. While this is a slow process, the thin putty line is well worth the effort and time. Before sanding, mask those areas around the putty line again to save surrounding detail.

When using sandpaper, be very careful of surrounding detail. On wings this is usually not a problem



Applying super glue along seam areas that were covered with masking tape completes the gluing and filling process. After the glue has dried, you are ready to shape and sand the seam.

areas that were repaired. If you did a good job smoothing and cleaning you will not be able to detect where you repaired.

### REMOVING SEAMS

For gluing and for most seam work use Duro's white and blue tube super glues. Super glue doubles as seam filler and can be sanded and scraped like plastic. After painting, you can't detect the difference between the glue and real plastic.

Never snap a part off the tree—this may leave an indentation where the part was connected. It will almost always occur along a gluing surface, so be careful. Cut the tabs that connect the parts to the tree with small wire cutters, being sure to leave a small amount of the tab on the part. It's easier to remove the excess tab after the part has been removed from the tree.

After removing all the necessary parts, lay them flat. Carefully cut remaining tabs and clean the parts of excess plastic or flash. A #11 or #16 X-Acto blade works best for this. Be careful not to mar the plastic parts or remove any raised detail when removing flash.

Now check the fit of the two halves. Tape the halves together to ensure that corresponding aligning

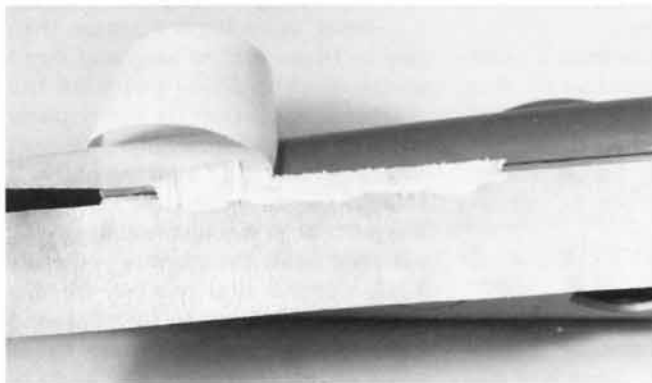
because they are normally mated along the curved edges, making them easy to scrape and sand. Locations that are flat, have large circumferences, or are rounded, such as fuselages, require additional care. Mask as close as possible to the seam. The sandpaper will have a tendency to abrade the tape, so you might have to replace the masking tape more than once.

When you plan your sanding, be aware that the rougher the grade you use, the more work will be required to smooth the surface. To detect flaws in seam work or surface repairs, paint the area with Testor's silver paint. The silver highlights fine seam lines, scratches, bumps, and tiny bubble holes in putty. You will have to remove the silver paint before you apply any more putty, because putty will not stick to the paint.

When all the areas you sanded are flawless, remove the silver paint. The primer coat will not adhere well to the silver. In addition, the areas that are silver will have a deeper color when painted, and the finished appearance will be uneven.

The primer coat will also detect flaws. This is your last chance to repair problems before the finish coats. If you try to repair flaws after you finish painting, your chances of blending in the surface paint are not good, so do the hard work up front.

After you have finished repairing problems detected by the primer, sand the primer coat surrounding the problem areas with 600 grit sandpaper, so that it will blend into the plastic surface. Next, clean the entire model with Polly-S plastic prep. This step will remove plastic residue and skin oils. Finally, spray the primer on



Working small sections at a time lets you remove masking tape while the putty is still wet, but be sure to pull the tape back over itself and away from the putty.



The finished putty line is very small and will decrease the sanding you'll have to do. This also limits detail loss.

Masking tape placed close to the leading edges of a wing surface isolates the loss of detail.

pins and holes line up correctly. Check the fit in the same way on fuselages as well as on wings and tail surfaces before working on these parts.

Check the mating surfaces of both halves for flatness. Sometimes there are mold lines or bumps on these surfaces. If they are not removed, the halves will not sit flush against each other. The easiest way to remove these ridges is to scrape them flat with a #11 X-Acto blade.

As you tape, identify areas that need work and check contours and details that are formed when the parts are glued. Panel lines and hatches that cross seam lines must be lined up correctly. Take care to align corners and edges properly, or you will be doing a lot of scraping and sanding.

When you are ready to begin gluing, tape the parts together with masking tape. Use as much tape as necessary to hold them the way you want. Use super glue and a .5mm lead pencil as an applicator.

Make a small puddle of super glue on a piece of paper. When you put the glue on the paper for the first time, the paper will absorb most of it. Let the puddle dry and put more glue on top. Dip the tip of the lead pencil into the glue and run it along the seam line and between the masking tape



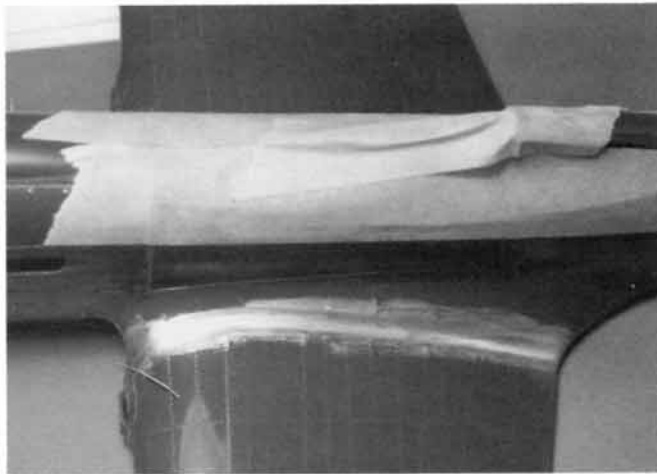
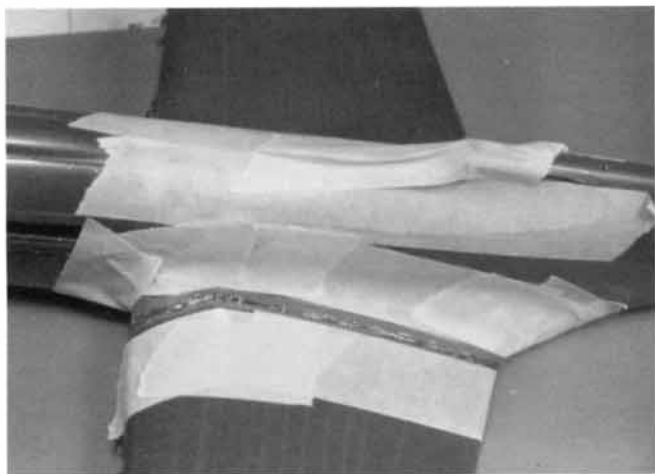
locations. Do not let the tip of the pencil get any closer to the tape than about  $\frac{1}{16}$  to  $\frac{1}{8}$  inch (1.6 to 3.2 mm). This will prevent gluing the tape to the plastic. The pencil will carry enough super glue to go about  $\frac{1}{4}$  to  $\frac{1}{2}$  inch (6.4 to 12.7 mm) along a seam line.

Capillary action will pull the super glue between the parts along their gluing surfaces. The glue will also act as a filler. You may need to apply several layers to cover the surface of the seam. After it has dried—about five minutes—remove the tape and glue those areas where the tape was located. Small amounts of glue work better than large amounts.

To remove excess glue and to contour and smooth the glued surfaces, scrape with a #11 X-Acto blade. Mask along the edges of the seam and sand along the seam line. Super glue is clear and, because the amount of glue is so small and narrow, it will almost appear as if there is none at all.

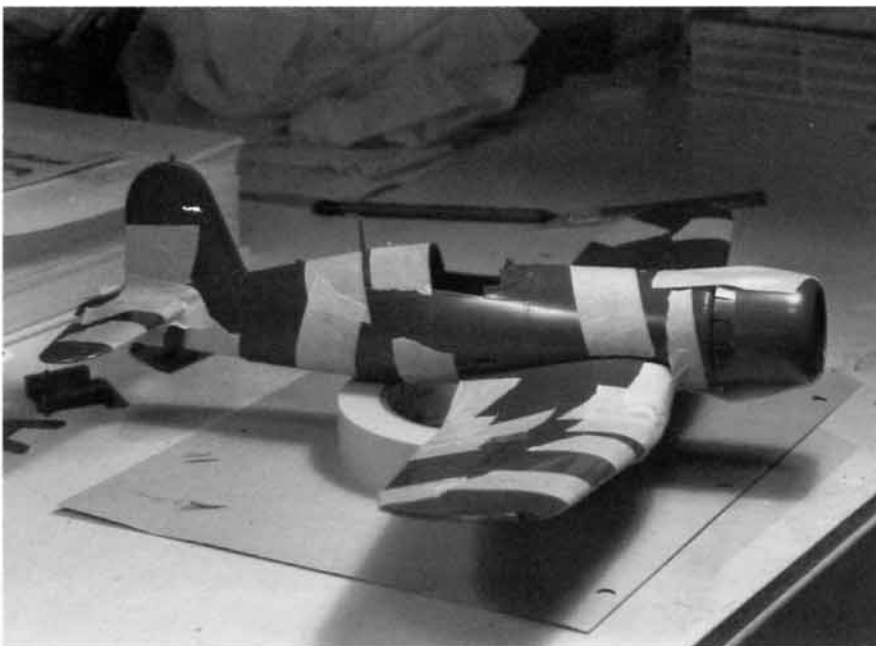
### EJECTION MARKS

Ejection marks can either be indented or raised. They are almost always round, and are usually located in places that are hard to get at. Hasegawa's 1/32 scale F6F Hellcat is a good example. The kit has both raised and indented ejection marks on the



I saved much of the surface detail while filling and sanding the  $\frac{1}{8}$  inch wing-to-fuselage gap on Revell's 1/32 scale P-40 by using masking tape.

No seam correction job of this magnitude would be complete without applying silver paint to detect cracks or areas where additional gap filler is needed.



Revell's 1/32 scale Corsair got a trial fit using masking tape. This helped identify fit problems long before assembly of the major components.

insides of the landing gear wheel well covers, and along the sides of the rockets. Worst of all, each landing gear has three distinct indented ejection marks.

The first step in dealing with these marks is to see if they will be noticeable when the part is assembled. Although this takes a little time and some creativity with masking tape, the effort is well worth the time invested. If the marks are not noticeable, don't waste your time with them.

Fill ejection mark holes with quick gel super glue or putty and sand smooth. If you use putty, apply it with a flat-tipped X-Acto blade and run the blade across the ejection mark to smooth it out as if it were super glue. Another method is to use Waldron's punch set to punch out a piece of plastic filler in the correct diameter. To install the disk, place a small drop of super glue at the center of the indentation, insert the disk, and sand smooth.

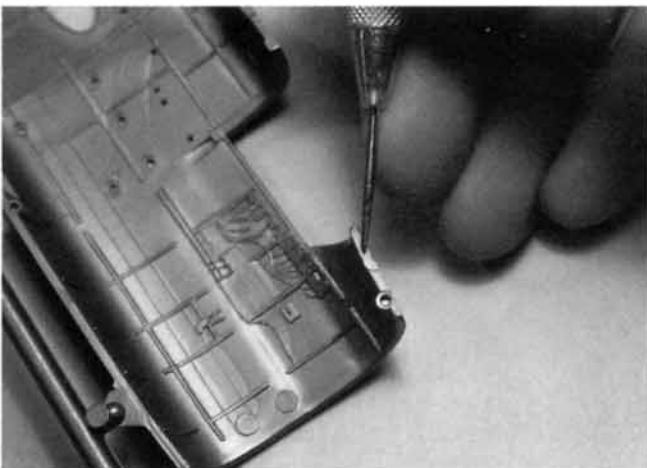
Raised ejection marks are easier

to deal with because you are removing plastic instead of filling in. The easiest method is to scrape it flat with a #11 or #16 X-Acto blade and sand the surface smooth, or just use the sandpaper. For dimples, apply a drop of Duro's quick gel super glue (blue tube) and sand smooth after it dries.

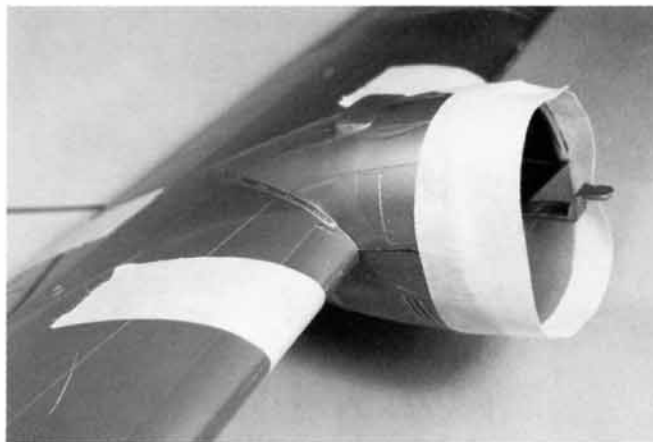
### RESTORING PANEL LINES

Every model builder is faced with the dilemma of what to do about panel lines lost during sanding. To minimize the length of line you are going to lose, mask as much of the surrounding area as possible. If the surface has indented panel lines, you can replace them by simply rescribing them. Be sure to scribe the new line to the same depth and thickness as those you are going to connect to.

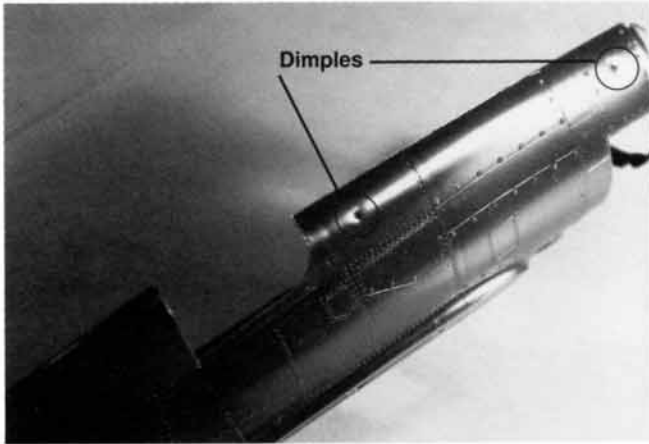
**Replacing raised lines.** If the surface has raised panel lines, you can either replace the raised line or scribe the area that was lost. If you choose to replace the raised line, use a piece of stretched plastic sprue of the same thickness as the raised detail. This is tough to judge, but if you use a thin section of stretched sprue you will get pretty close. Use an oversized length, so that you can hold both ends without getting your fingers in the way, and run the sprue through a puddle of super glue. The sprue should have a thin coating of it, characterized by very tiny balls of glue. Be sure to get rid of any large globs of glue before attaching sprue, because they will mar the surface.



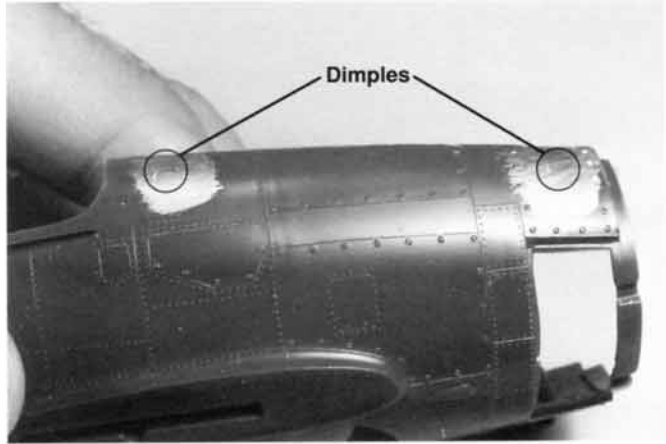
Some models have mold lines on the gluing surfaces that can easily be removed with an X-Acto blade.



The leading edges of the wings of Monogram's 1/48 scale B-29 are a tough contour area to glue: add fillers and sand. Tight masking helps align corners to reduce filling and sanding.

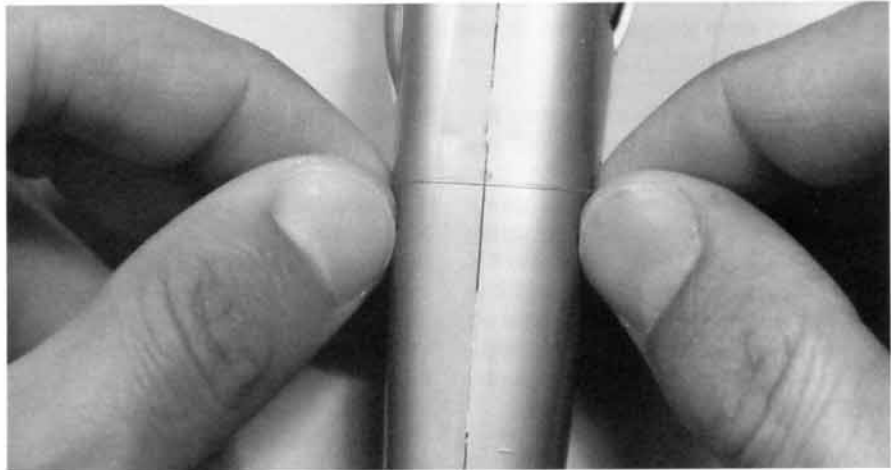


The dimples on a model can be found mostly in obvious locations, but sometimes they are subtle. Check the surface of the model carefully and fill them with super glue.



Here the first coat of silver paint has detected areas that need additional glue. Leave the paint on—it will act as an indicator of surface smoothness while you sand.

Position the sprue over the area to be replaced, holding it taut at both ends, and then lay it down. Be sure to get the ends to overlap exactly where the raised panel lines end. Do not adjust it once it comes in contact with the plastic. If you position your eyes directly over the area to be replaced you will increase your chances of doing it right the first time. If you miss, let the glue dry, sand off the sprue, and start again. The glue will begin to dry immediately once you run the sprue through it, so you have to work quickly. Once it has dried, cut the ends of the sprue so they butt up against the end of the raised line and run some 600 grit sandpaper over the repaired area to blend.



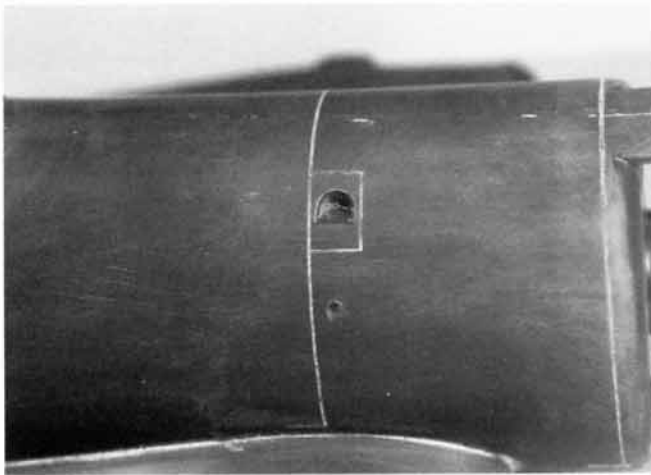
Replacing raised panel lines on Monogram's 1/48 scale B-25 with stretched sprue isn't hard, but it takes a steady hand. Be sure the entire length of the sprue has super glue on it, so that it will blend into the surface when you sand the new panel line.

**Scribing raised lines.** The second approach works well on models that will have a flat paint finish. What you are really doing is playing a trick on your eyes. A scribed line will look raised because the scribe actually pushes the plastic out of the groove and up slightly on each side.

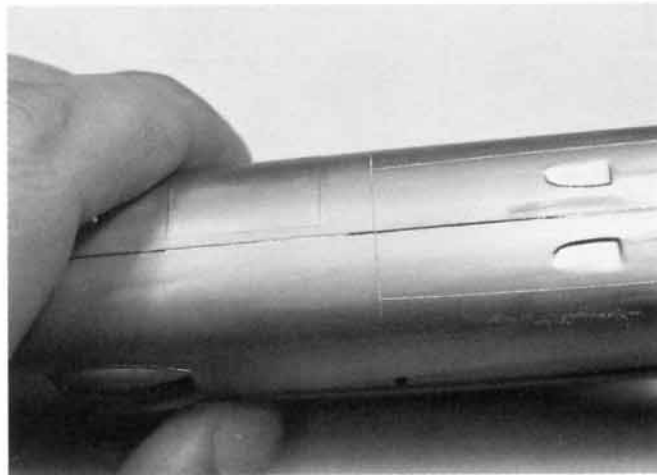
To scribe a line you will need to attach a guide to keep it straight. Use labeling tape (such as the type used in Dymo Label Machines) because it has a sticky backing and is flexible. Peel the backing off and place the edge of the sticky surface along the raised



The scribing technique was used on upper panel lines that cross over the fuselage on Monogram's 1/48 scale B-24J. (Model by Richard Boutin, Sr.)



If you decide to scribe all new panel lines, sand the lines, but leave the sanding dust in the lines. This allows you to get a visual impression of the entire model's new panel lines and helps to identify mistakes. When you are ready to remove the dust, simply run a toothpick in the scribed lines.



The finished indented panel line will be difficult to detect unless your eye is almost right up to the model surface. This method is much faster than replacing the raised line with stretched sprue.

panel line. This will ensure that the scribed line will butt up against the raised line.

Don't scribe the line too deep. Two or three passes with a scribing needle will do the trick. After you finish, remove the tape and sand the area flat, but be careful not to sand off any more raised detail. Use a toothbrush with soft bristles to remove sanding dust from the scribed line.

### MASKING, PAINTING & ATTACHING CLEAR PARTS

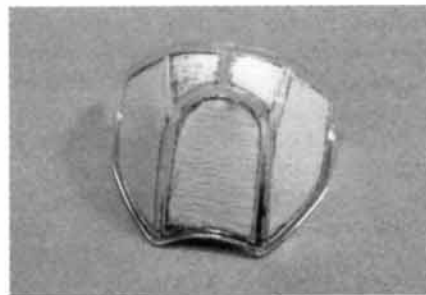
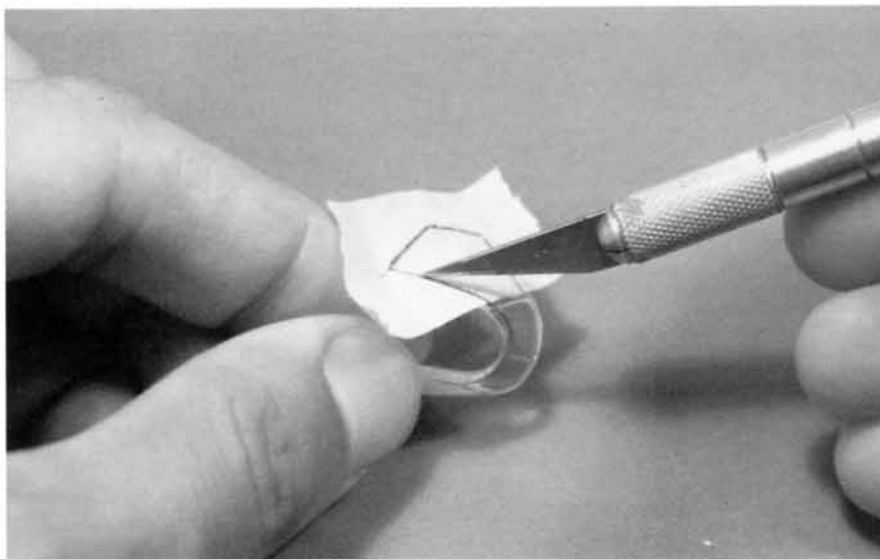
The best way to get a realistic finish is to mask the clear panels

between the framing and airbrush the parts. There are two basic techniques for masking. Which one you choose depends on the framing on the part. Most framing on clear parts is raised, but some manufacturers design theirs with a high relief between the clear panels and the framing. While this sometimes appears unrealistic, when the framing is painted the high relief is hard to notice.

**High-relief framing.** This type of framing detail offers a quick and easy approach to masking, as long as you have a steady hand. Mask an area of the clear part so that the tape covers a

clear panel and overlaps the framing. Burnish the tape down. Then take a .5mm lead pencil and follow the edge of the framing with the tip. This outlines the location where the framing meets the clear panel and provides a line for you to follow when you cut the tape. As the pencil tip pushes the tape up against the edge of the framing, the tape stretches slightly.

After outlining a section, run a #11 X-Acto blade along the edge of the framing by following the pencil line. Because of the high relief of the framing, the edge of the knife will follow the framing easily. Cut through the



(Above) The exterior of Revell's 1/32 scale P-40 windshield is finished and ready for the last step, which is to mask the inside area.

(Left) Use the pronounced edge of the framing as a guide for cutting, and be sure to use a sharp blade.

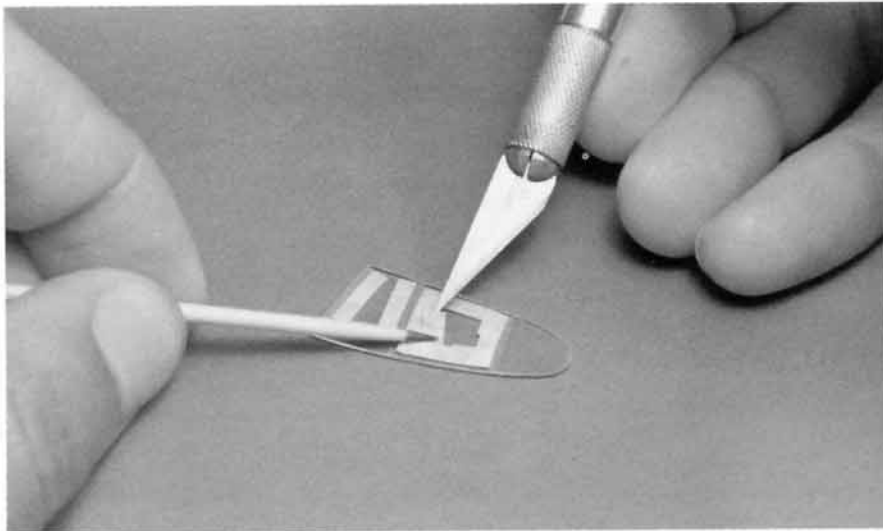


entire section of tape, so that when you remove the excess you will not peel off the tape covering the clear panel. You will notice that the tape sits up against the base of the framing where it meets the clear panel. This allows you to paint the sides of the framing, which would be impossible to do if you were painting it by hand. Once you have outlined the entire clear part, run the pencil along the edges of the tape one last time, ensuring that all edges are seated properly.

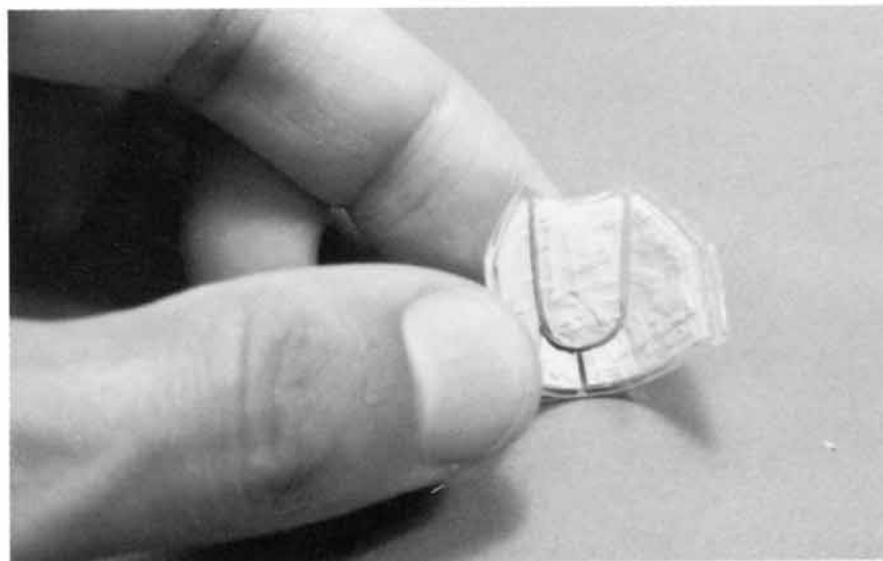
**Low-relief framing.** The second technique is used for clear parts without high-relief framing detail, or for clear parts that have already been installed. Cover the clear panels with small pieces of pre-cut masking tape. Lay one strip of tape on your workbench and another right over the first one. This top layer will be used as masking for the clear parts. Next, cut long thin strips, using a small triangle as a cutting guide to ensure that the lengths of tape have straight edges. For covering small areas or when running the masking around curved framing, cut the strips approximately  $\frac{1}{16}$  inch (1.6mm) wide. Next, use your triangle to cut the tape perpendicular to the long cuts, making each cut about  $\frac{1}{16}$  to  $\frac{1}{8}$  inch (1.6 to 3.2mm) apart. Cut various lengths, so you can use the small ones to run along framing and the larger ones to cover the large areas outlined by the tape located along the framing.

When you are ready to start masking, peel up a piece, using the tip of a #11 X-Acto blade. Be sure you are not lifting both layers of tape. Start anywhere along the framing edge and work your way around the entire clear panel. As you work along a framing edge, overlap the sections of tape. Press it down with a round toothpick. Once you have completed outlining a frame, you can mask the center area of the clear panel with the larger strips of tape. When you are finished, go back over the areas where the tape meets the framing and be sure it's pressed down by using a pencil eraser on it. When you have finished, check to be sure you do not have even a sliver of clear plastic showing.

For a fighter aircraft windshield, mask the interior of the clear part and match the framing locations. While you can get away with not painting the



The best way to mask clear parts that don't have pronounced framing is to use small sections of masking tape with square edges.



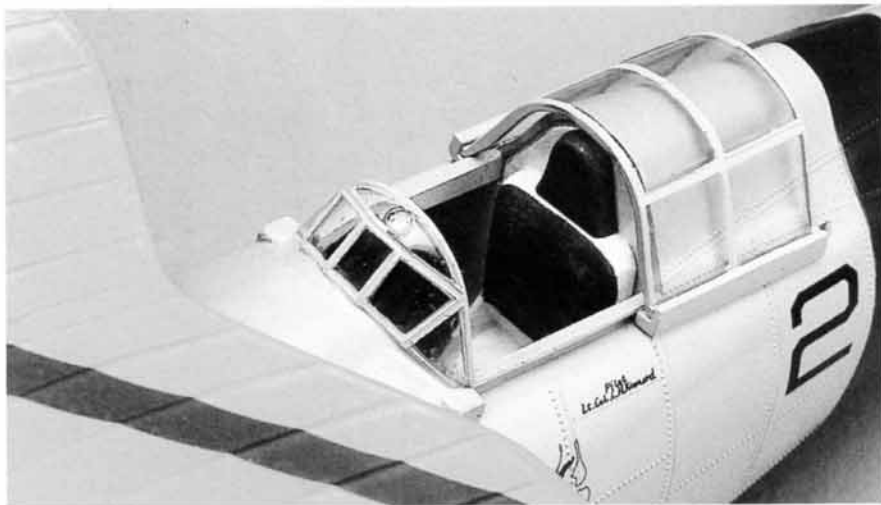
Here the inside of Revell's P-40 windshield has been masked with tiny strips of masking tape.

entire interior framing of a canopy, you can easily see the interior of a windshield, so you need to paint it. This is difficult because you don't have any raised framing to guide you as you install the tape, but you do have the outline of the tape to follow.

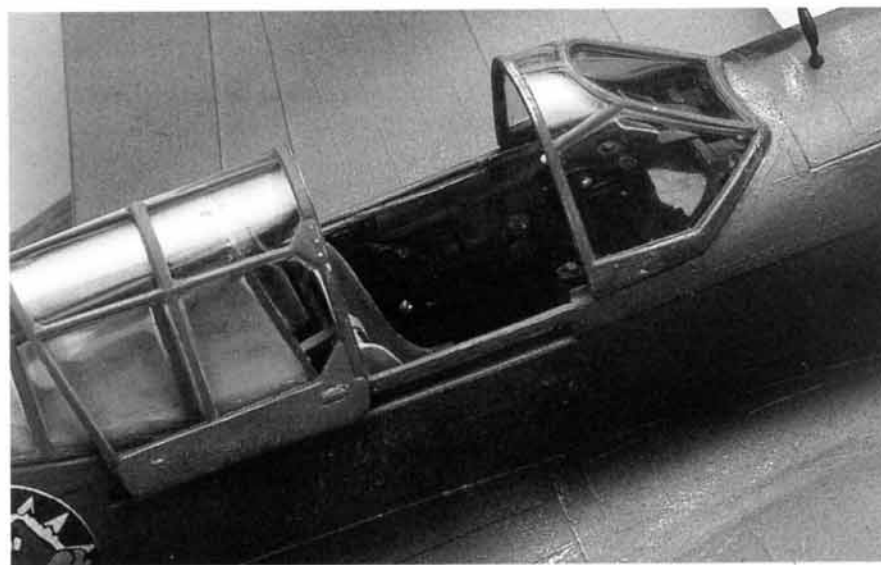
If you are painting the canopy, you can get away with just painting the interior framing located on the front and back of the canopy. If you decide to mask and paint the interior framing, you can cut long thin strips of tape, follow the outline of the exterior

canopy, and mask the framing that goes in the same direction. Paint these areas and remove the masking tape. When the paint is dry, mask the framing that goes in the opposite direction and paint it. This method works well on surfaces with no raised detail and seldom removes paint you masked over.

**Attaching clear parts.** The type of aircraft and location of the clear part will dictate whether you mask the clear panels, airbrush the part and then install it, or install it, mask it, and



Another good example of Elmer's white glue being used as a filler. Monogram's old F3F has large gaps between the windshield and the fuselage that were easily filled with Elmer's glue before painting.



The fit on the windshield of Revell's P-40 is not very good, but Elmer's white glue renders it undetectable.

then airbrush it. As a general rule you should attach clear parts with Elmer's white glue because it dries clear and is water soluble. You can wipe it off the panel areas without marring the plastic. When the model has a row of clear windows that are attached, such as on Monogram's 1/48 scale DC-3, you can use Testor's glue for those sections of the clear plastic strip that can't be seen. Except for these rare instances, always use Elmer's.

To attach a clear part, squeeze a small puddle of Elmer's onto a piece of

paper and use a toothpick to apply the glue. Position the part and wipe off excess glue with a damp Q-Tip. For the installation of interior clear parts such as windows, apply glue to the perimeter of the opening on the fuselage, install the window, and wipe off excess glue.

Elmer's glue also doubles as a filler; after it dries you can apply more to fill in any voids between the clear part and the fuselage. It can also be used to contour the base of the clear part to the fuselage.

## GENERAL PAINTING TIPS

For a quality paint finish on models, invest in an airbrush and compressor. This will allow you to produce the effects necessary for realism and a perception of depth. With an airbrush you can create thin coats of paint that will not cover up minute detail. You can mix paint colors, produce different tones and shades of the same color, and achieve superb weathering and streaking impossible with spray cans or a paintbrush.

For the best results, use the paint manufacturer's thinner or the thinner they suggest. The same holds true for waterbase paints. If you can't find the manufacturer's waterbase thinner, I recommend Polly-S thinner.

Since paint pigments tend to settle to the bottom of the container, it's important to mix paint thoroughly before each use. Drop a few copper BBs into the paint and shake for a few minutes. I recommend copper BBs because steel will rust in waterbase paints, changing the color.

Another good practice is to clean the neck and top of the paint bottle and the inside of the bottle cover immediately after opening the paint. This will ensure a good cap seal and longer shelf life for your paints.

The easiest way to mix proportions of thinner and paint is to start off with equal volumes of each in separate jars and use an eyedropper to add small amounts of thinner to the paint. I use standard 3/4-ounce airbrush jars for all my paint mixing. If I start with equal volumes of both paint and thinner, the most the paint can be thinned is 50 percent. I also mark each bottle of thinner with the color of paint that I am mixing. That way I keep track of individual paint-to-thinner ratios. Be sure the paint in the mixing jar does not fill more than half the jar, or you will not be able to get the maximum 50/50 mixture.

Add about three-quarters of the thinner and shake the contents. Test the paint with the airbrush and add additional thinner if necessary. If you are using enamel paint, warm it before use. Warm paint will flow, spray, and adhere better than cold paint. To warm it, use a coffee cup warmer plate. It warms paint up in a few minutes and is easy and safe.

(Right) Copper BBs make excellent paint mixers, and I recommend that you add them to all your paints.

(Center) Masking tape works well in large areas such as landing gear bays.

When you place the paint jar on the warmer plate, be sure to loosen the cap, so that the air in the jar will not pressurize. After warming, shake it again to ensure that the hotter paint at the bottom mixes with the cooler paint at the top.

When you're finished with the paint, leave it in the airbrush jar and label it with the manufacturer's name, the paint's color name, a federal stock reference (FS) number, if applicable, and the approximate proportions of paint and thinner. I usually end up with about ten jars of thinned paint when I am finished with a model. Since these thinned paints do not have a long shelf life, I usually pour them into a large container and clean the jars and caps. When the container is full I take it to the local recycling center for disposal.

### **SURFACE PREPARATION**

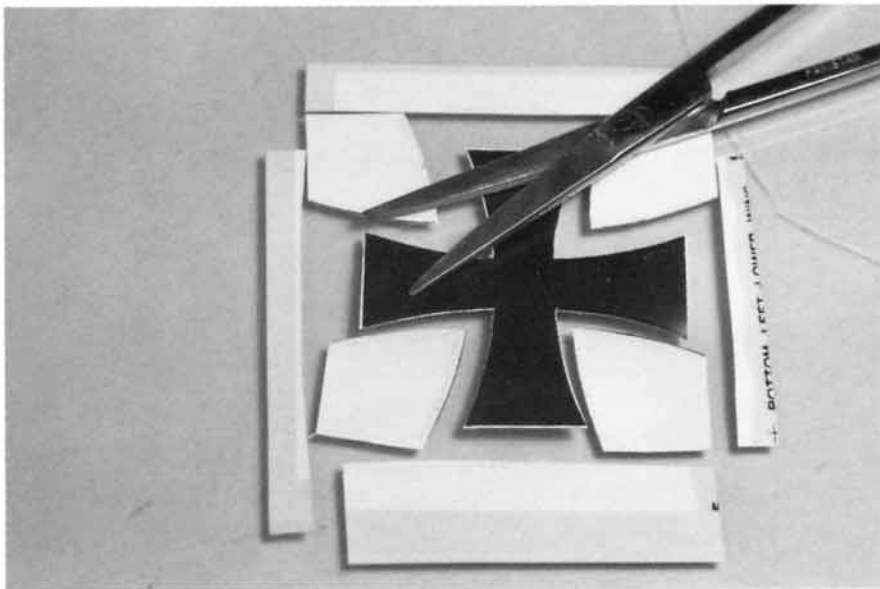
Surface preparation is important for proper adhesion between the paint's bonding agents and the surface, and for a good finish. Prior to any painting, including priming, clean the surface of manufacturer's mold release lubricants, dirt, polishing residue, and oil from your fingers.

I recommend Polly-S Plastic Prep for surface preparation. It cleans plastic, leaves no residue, and makes the plastic static-free so dust won't be attracted to it. If you follow the manufacturer's directions you will get excellent results. Before painting, mask those areas that have been pre-painted or need a different color. All plastic surfaces should get a primer coat of paint prior to any finish coats (except buffable metallics).

Again, if you use a primer or some other color to check the plastic, give it an even coat before applying

**For those hard-to-get-at places use tissue paper stuffed into place with a toothpick. Cover it with small pieces of masking tape for added protection.**





Trim as much excess clear film as possible from the decal. This reduces the chance of silvering and enhances realism.



Thanks to a good coat of clear gloss, the clear film in the center section of the Flying Tigers emblem is invisible.

finish paints. Without a uniform surface color, the paint finish may have a slightly different color on areas with no undercoat. Another important point in surface preparation is to make sure the plastic is the proper temperature. If the surface is cold, the paint will not adhere properly.

Use a hair dryer to warm the plastic and to get rid of any remaining dust that became attached to it while

the model was in the spray booth. Hair dryers can also be used to accelerate the drying of waterbase paints, but they do not work well on oil/petroleum base paints. In any case, do not let a hair dryer get too close to the plastic; it may warp or melt it.

One final note on painting tips—clean your airbrush after each use. If you are doing a lot of painting with different colors, you can save airbrush

cleaning time between color changes if you clean the jar and siphon and run thinner through the airbrush. Then disconnect the jar and spray to clean out the remaining thinner. Wipe the tip of the airbrush to remove paint.

After you have finished painting, take the airbrush apart and clean all the parts. I have used the same Badger 200 airbrush for over six years and it has needed repairs only once. They were free because the airbrush has a lifetime guarantee. Take care of your airbrush and it will give you excellent results.

## DECALING

**Cutting decals.** The secret to preventing decals from getting a silvered appearance on the clear sections is to apply them to a gloss finish. If you have a flat finish, airbrush a coat of clear gloss, apply the decals, and then airbrush a coat of clear flat to restore the dull appearance of the paint. Apply the clear coats to the entire model so you won't be able to detect any differences. Just about every paint manufacturer markets clear gloss and flat finishes, and all of them work well. Another advantage to having a gloss finish is that the decals will slide easily, which is helpful when you are positioning them or if a decal folds under itself.

In most cases you can use scissors to cut out decals, but if they are close together and you have to bend the sheet to cut around a decal, use a #11 X-Acto blade and do all your knife cutting on a glass plate. Bending the sheet while the decals are dry may crack the inks.

I leave a border of approximately  $\frac{3}{16}$  to  $\frac{1}{8}$  inch (4.8 to 3.2 mm) around decals and cut them as I apply them. In other words, cut one decal, trim the excess clear film, apply it, and repeat the process for the next one. Nothing is more frustrating than cutting out several decals and then losing or misplacing one. This can easily happen when applying decals because the process is a bit messy. As you cut out and trim the decals, your workbench will be littered with small pieces of the decal sheet.

After rough-cutting a decal, remove as much clear film along the outer edges as possible. If the decal is a series such as "115B6" and is a small

One of the secrets to successful decal application is to be able to hold the backing while you slide the decal into place.

decal, remove the clear film from the outer perimeter. If the series is large and the numbers or letters are spaced far enough apart, consider cutting them out separately and applying them to the model. You do not have to remove the film from central areas of numbers or letters. If you applied the clear gloss paint correctly, they will blend in.

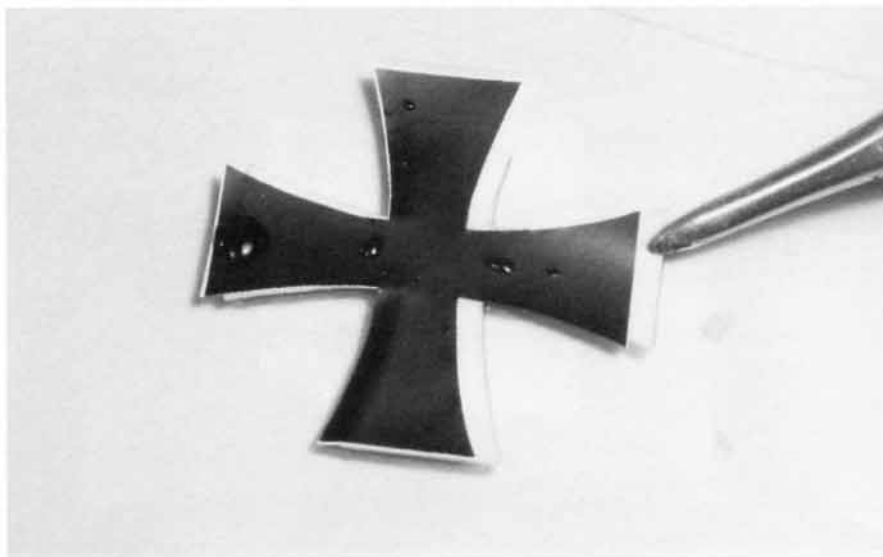
Scissors work best for cutting long straight lines. If you are cutting along jagged edges, use a #11 X-Acto blade. When cutting small areas with the X-Acto knife you can get away with doing it freehand, but for long cuts use a straightedge to guide the blade. Sometimes when you are cutting into tight corners along a decal's edge, the cutting lines may not connect, leaving a tiny area uncut. If this happens, don't tear the carrier film from the decal—this may tear some of the inked area as you pull it.

If you are cutting large round shapes and feel confident with your scissors you can easily cut the excess carrier film by rotating the decal as you cut. Practice cutting out shapes before you actually start on the decal. Draw some shapes with a fine-point pen on thick stock paper, such as heavy bond typing paper, and practice cutting with both the scissors and the X-Acto blade. While this may sound rudimentary, I find it to be good practice, especially if I have not done any decal cutting in a while. Another approach is to make a photocopy of the decal sheet and practice on that.

The decals I find most difficult to work with are the stencils found on aircraft surfaces. They are usually small, and I recommend that you leave the carrier film on for a little extra contact surface to work with.

Small round decals are also a problem, especially those applied to fuel caps. For some reason they do not respond to setting solutions well, perhaps because their surface areas

Multiple coats of setting solution applied with a Q-Tip will draw the decal down around the smallest detail.



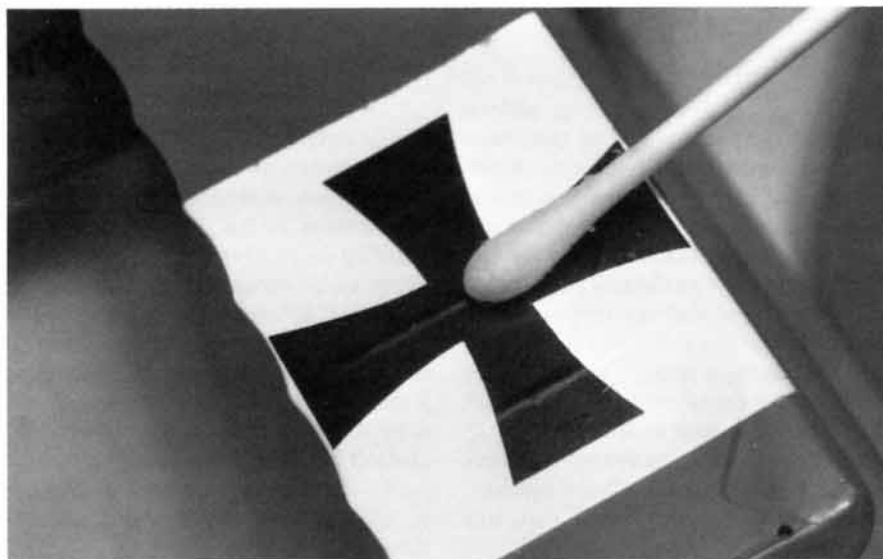
are so small. If you punch out the clear carrier film from the center of the decal it will lie down well and mold itself onto raised detail.

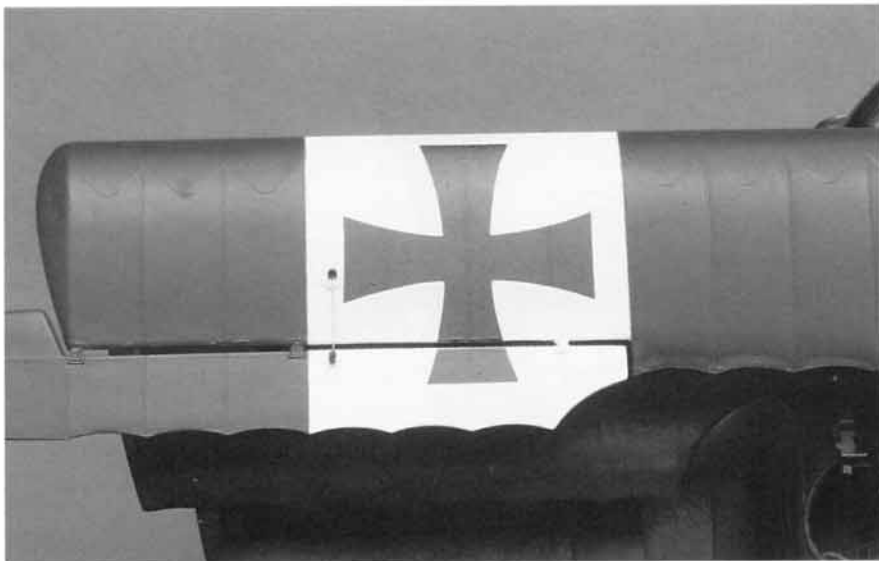
**Application.** To apply decals, first fill a shallow tray with lukewarm water, add a few drops of Elmer's White glue, and stir the mixture until it is milky. Before picking up a decal with your tweezers, wrap the tips with small strips of masking tape to prevent damage to the decal. Keep the rest of the decal sheet away from the water to keep it dry. Dip the decal into the solution. If it is small, dip it for no more than 5 or 6 seconds. If it is large, let it sit for about 10 seconds.

When you dip, make sure the entire decal is submerged; when you

are ready to take it out, let the excess solution drip onto a tissue. Do not let the decal float in the solution, because the glue which holds it to the backing paper may dissolve quickly, resulting in the decal lifting off the paper.

After you have removed the decal from the solution, let it sit until it slides freely across its backing. While you are waiting, apply your setting solution to the model's surface. Use Q-Tips because they absorb just enough solution and won't damage decals. If you use a two-step process like the Microscale system, separate the bottles by putting them on either side of the workbench. This way you will not mix up the Q-Tips you are using as applicators.





Once the decal is dry it will appear as though it was painted onto the model surface.

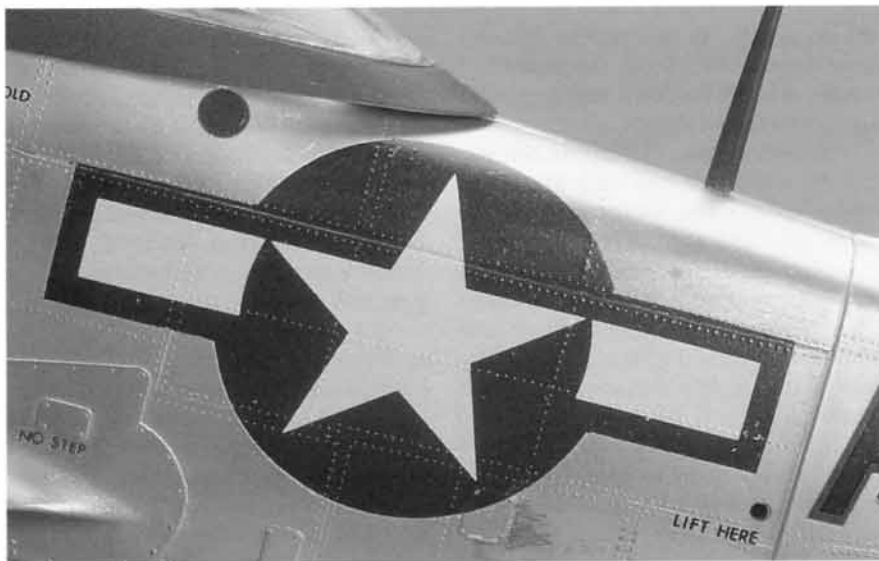
When you position a decal, check that it is straight, not upside down, and not reversed. Also, be careful with insignia containing a star. On fuselages, the center point of the star is always pointing up, and on wings it points toward the leading edge.

After you have applied a decal and are satisfied with it, soak up excess water and setting solution before it dries. If you let the water dry on the model, it will usually leave a stain, which can be removed by washing with a damp Q-Tip and drying with tissue paper.

To get the decal to really snuggle down around detail, apply several coats of setting solution. If it is lying against a surface with no raised detail, don't waste time applying setting solution because there is nothing for the decal to conform to. I usually apply at least three or four coats of setting solution and let each dry completely. Apply the setting solution with a Q-Tip; only wet the surface of the decal. As it dries it will pull the decal down around the detail, and it should flatten out. If tiny air bubbles appear, pop them with a pin, apply some more setting solution, and press down where the bubbles were. Each successive coat will pull the decal down around surface detail until it appears painted on. Even details like small rivets and locking screws will show, so take your time and don't skimp on coats of setting solution.

**Weathering.** When you have finished applying decals and the water and setting solution stains have been removed, you can apply a protective coating to them. You also need to decide if you want to weather them. If you painted the model with faded colors or if you plan to weather it, you will also need to weather the decals. Nothing looks more out of place than a weathered aircraft with bright decals. Since all military colors and painted insignia and markings lighten in the sun, use a light color to lighten the decals and blend them into the surface of the model.

The first step is to apply a coat of clear flat paint. It will provide a pro-



Setting solution did an excellent job of pulling the decal down around every rivet detail on this P-51 Mustang.

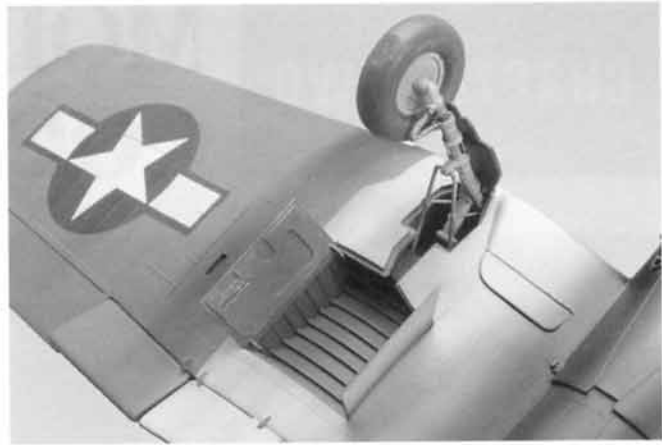
When the decal is ready, slide it partly off the backing so you can grasp the backing with the tweezers. Holding the backing with tweezers in one hand and a damp Q-Tip dipped in setting solution in the other, place the decal next to the surface of the model.

Lay the decal on the surface, place the Q-Tip onto the decal and pull the backing away. You can now position the decal with the Q-Tip, but don't put too much pressure on it. Once the decal is positioned, press with a damp tissue or foam sponge. Keep the decal wet while you are working with it.

If the decal is large and is a number or letter such as a "7" or an "F," be careful how you slide the backing off. These types tend to fold over or under themselves or rip. Try to move the backing away along the surface least likely to be damaged. In the case of the letter "F," move the backing to the left, and in the case of the number "7," to the right and upward. It also helps if the decal's glue is fluid and the decal is kept wet. If it does fold under itself, slide it around. Sometimes this will move the folded portion just enough to grab it with a Q-Tip and correct the problem.



Fading insignia and other markings on the fuselage sides is tricky because they don't fade as much as those on the upper wing surfaces.



A heavy dusting of dilute Polly-S dirt in combination with exhaust and gun powder stains add a dramatic effect to the underside of Revell's 1/32 scale Corsair.

protective coating and a good adhesion surface for additional paint. For weathering or fading on the upper wings or the fuselage, use Polly-S dust-colored paint from their weather colored paint series. If you do not have the Polly-S dust color, use Polly-S flat white mixed with a little Polly-S gray so the final color is an off-white.

For weathering decals on the underside of the wings and the extreme lower half of the fuselage, use the dust or flat white in combination with the dirt color if the plane operated from an airfield, and a flat gray mixed with some black for carrier-

based planes. The reason for using waterbase paints is that you will be applying a large volume of thinner to the model's surface because of the paint-to-thinner ratio. The waterbase thinner will not react with paint already applied, even if it is also waterbase paint.

The fading effect on decals is subtle, so mix a dilute solution of flat white/gray or dust. Use a paint-to-thinner ratio of no more than 1 part paint to 3 parts thinner. Before you spray, test to ensure that it will not coat the model with paint. The result you want is a subtle dusting of paint

particles on the surface of the model, especially on the decals. Don't get the airbrush too close to the surface while spraying. The paint should be just about dry as it touches the model.

As I said earlier, use the dust or flat white in combination with a mud color for underside weathering on planes that operated from airfields. The underside of an aircraft does not get much direct sunlight, so the fading effect will be a lot less. Insignia and markings on the lower fuselage or lower wings are usually dirt- and dust-covered instead of just faded.