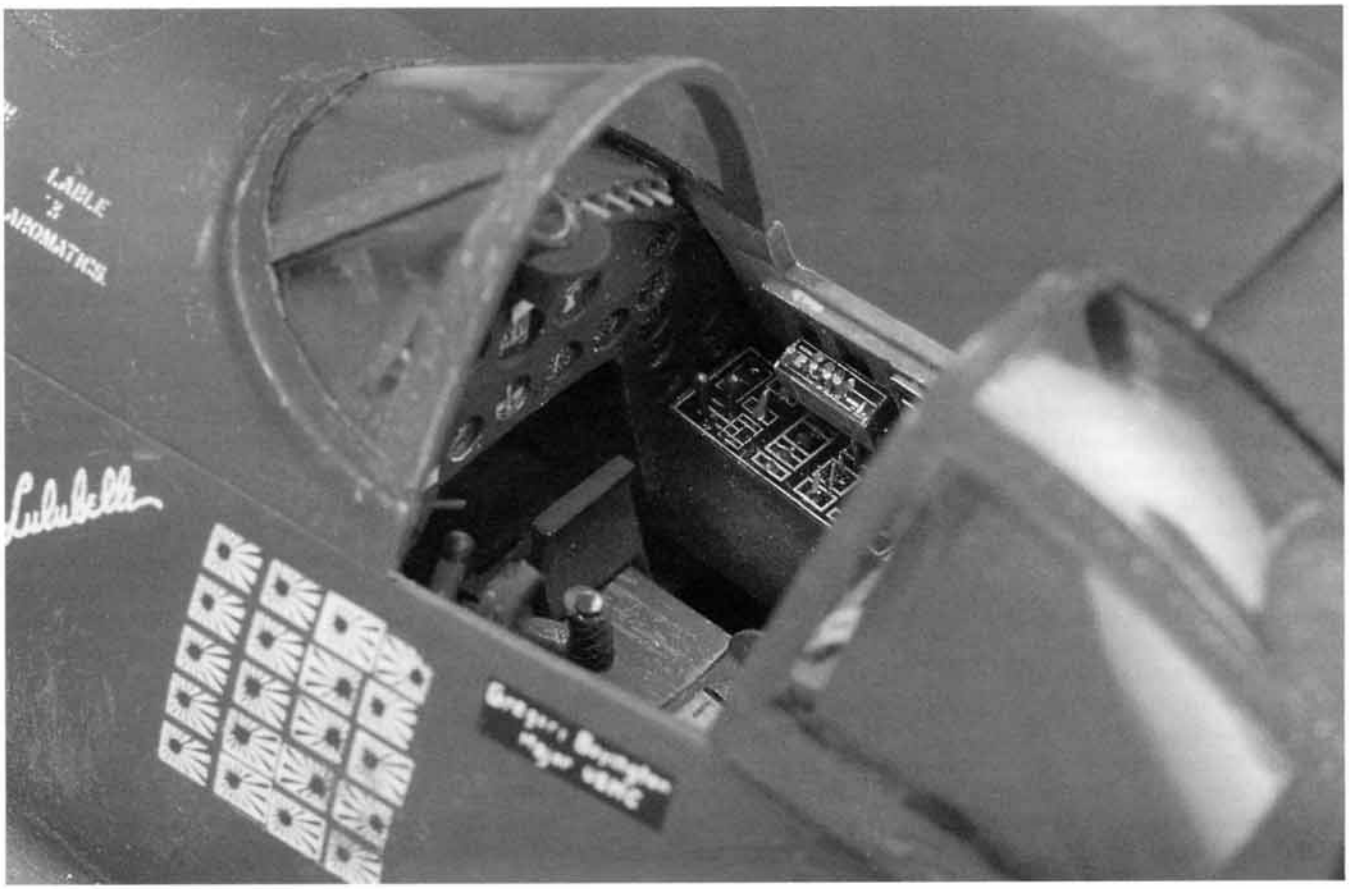
CHAPTER TWO MODIFYING COCKPITS



There are over one hundred extra parts incorporated into Revell's 1/32 scale Corsair. The combination of decals, Waldron instruments and placards, and weathering create a realistic effect.

Over the past decade the quality and quantity of detail that model manufacturers have incorporated into their kits has been impressive. Within the past few years manufacturers have been marketing high-tech kits that include photoetched parts, which add wonderful detail to cockpits, landing gear, and engines. The plastic modeling cottage industries offer a wide range of detailing accessories such as photoetched parts, metal and decal-type placards, highly detailed resin and white metal accessories, as well as superb decals. All these allow you to build models so detailed you can count the toggle switches inside the cockpit. But while they will enhance your model, they will not take the place of scratchbuilding techniques, creativity, and imagination.

COCKPIT PAINTING & WEATHERING

Detailing cockpits means many hours of tedious work, especially in anything smaller than 1/32 scale. The number of parts and accessories you use to detail a cockpit may well exceed 100. The addition of these parts, coupled with some basic techniques for painting and weathering, will result in an accurate presentation of the real aircraft.

Adding detail, no matter how much, is a waste of time if you can't see it. One of the tricks of master modelers is to use different shades of the same color to highlight detail and create a perception of depth. Artists use this technique when painting a picture that appears to have depth.

For example, if the interior of a cockpit is flat black and you use this color throughout, you will end up with a black hole. Creating the perception of depth is easy, but will add extra steps to your modeling approach. The end results, however, are worth the effort.

A note here on paints: although I use enamel paints for all exterior work, I use water-base paints for most interior painting. I usually end up air-

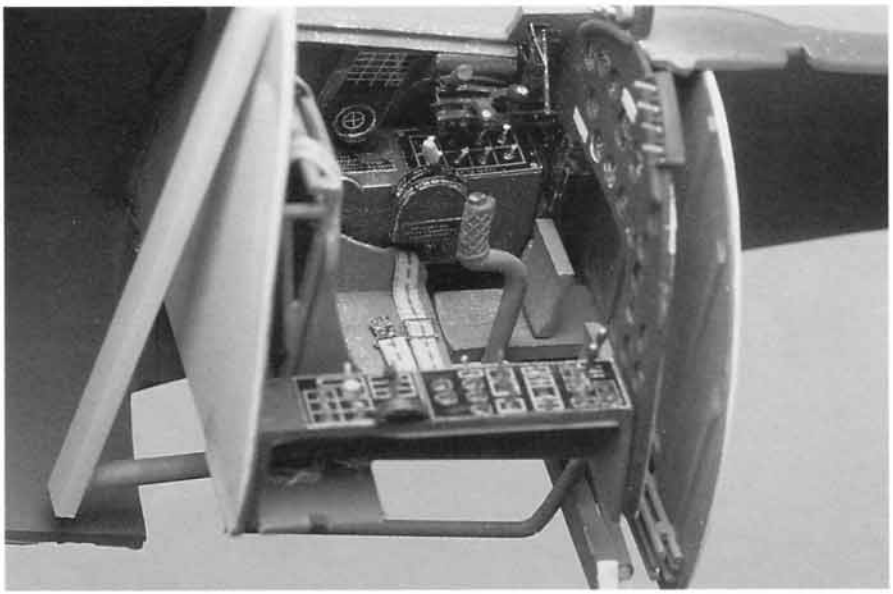
brushing several shades of a color, and when using an airbrush it is much easier to clean up water-base paints than enamels. You can also accelerate the drying time of water-base paints with a hair dryer—a great advantage when time is limited.

If you are using flat black for your console, mix a few drops of flat white with it so the resulting color is a dark gray. If the radio boxes, switch banks, and flight control and engine control quadrant boxes on the sides of the cockpit are also flat black, paint a few of them the same color as the console and others a slightly lighter color made by adding more drops of flat white to the gray. If the cockpit walls and seat are interior green, make the walls a slightly darker shade of green. The sides of the seat could be one shade and the seat bottom and back and frame another. When mixing shades, keep these color differences subtle. The different shades of flat black and green will still be visible, allowing the eye to focus on detail you have added like wires, piping, seat belts, switches, and instruments.

The parts of the cockpit that are exposed to the sun should be lighter in color. In 1985, working for the Department of the Navy, I spent two months at China Lake Naval Air Station in the Mojave Desert. An aircraft boneyard at this air station had several B-29 bombers that had been there since the early '50s. I crawled through them, and among the many things I noted was that the interior green paint that was exposed to the sun was faded almost to light gray. In other areas of the plane, where the sun never touched, the same color looked almost as good as new. With this example in mind, don't be afraid to apply different shades of paint even to a single part, such as a seat.

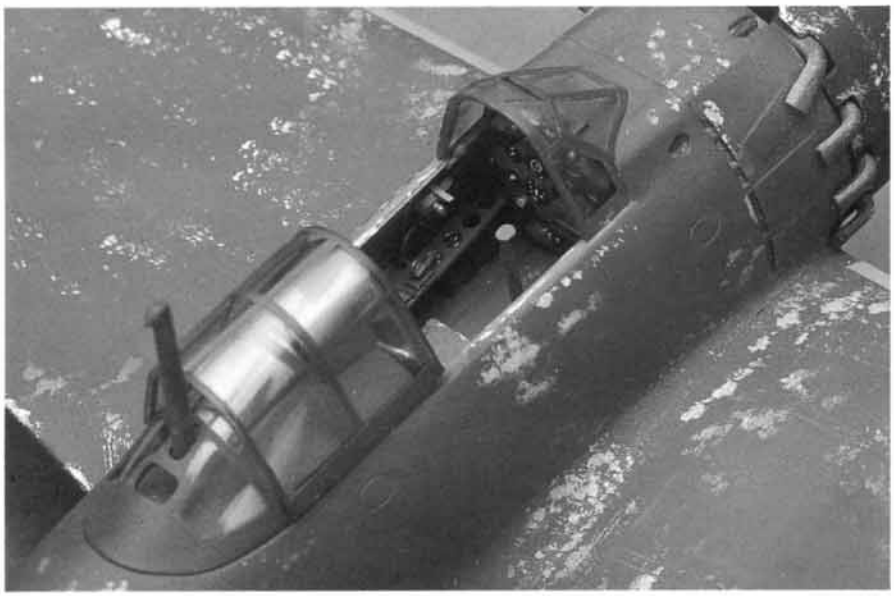
Number the bottles containing shade mixtures and make a list of which shades you use on what parts. This way you will know which shade to use on a part if you ever need to do some touch-up. I always use light gray or white to lighten colors and never mix flat paint with gloss paint.

We have already addressed the weathering effects of sunlight, but what about wear and tear, dirt, and fluid leaks? Wear and tear on the cockpit area consists mostly of paint that has been worn off by rubbing, chipping, or constant contact. Seat bottoms and backs should have areas that show metal because they get worn by the pilot's back and parachute. Places where his arms rest and the area of the floorboards directly in front of the rudder pedals also get constant rubbing.



The cockpit of Revell's 1/32 scale Corsair was painted several shades of interior green and flat black to create a perception of depth.

It is not always possible to highlight detail by painting parts different colors. Some examples are rivet detail, worn paint that shows bare metal, and weathering. Drybrushing can create these details. This technique uses small, flat brushes nearly void of paint. Shake a paint bottle well, then dip the tip of a dry brush into the paint left in the cap. Brush the paint onto a piece of paper, wiping each side of the brush alternately until only a hint of paint is seen.

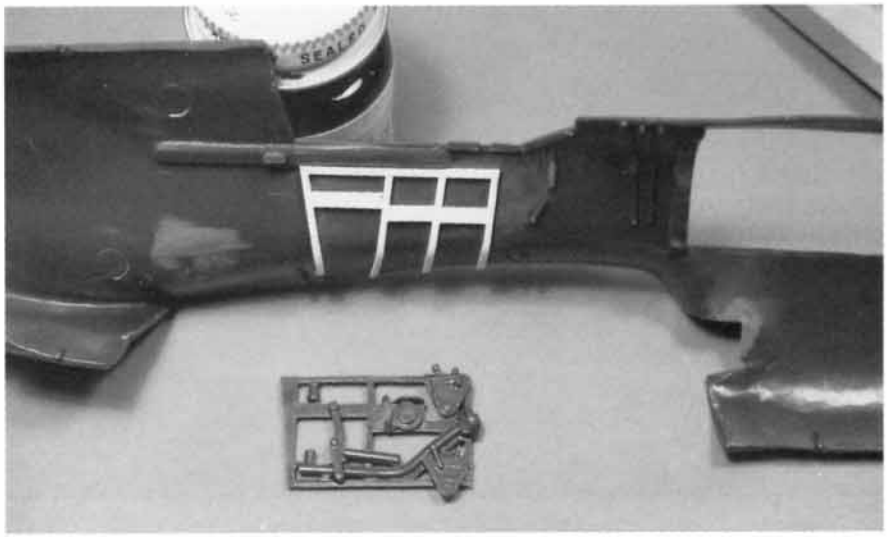


This 1/48 scale Hasegawa Zero needs a new paint job. The worn paint effect both in the cockpit and on the aircraft's skin was achieved with a mixture of silver and black paint applied with a soft brush and a toothpick. (Model by Major Bill Crisler, USAF.)

Although the cockpit of Testor's 1/22 scale Douglas EB-66E has a lot of small scratchbuilt parts, all the details stand out, thanks to the various shades and colors. (Model by Major Billy Crisler, USAF.)

If you are highlighting raised surface detail, a light touch of the brush along the raised surfaces will cause tiny paint particles to cling to them. If you are adding colors to flat surfaces, you will have to press a little harder for the paint particles to adhere. Drybrushing takes some practice. It is easy to overdo it with paints, so be careful. Upon completion, add a clear coat to protect the drybrushed paint.

To represent areas where paint has worn off, mix Testor's silver with some flat black until the color is not so shiny. Drybrush with a small brush along the edges of the seat sides and the edges of panels and boxes. Use a wide flat brush to drybrush onto larger areas like the sides of the cockpit and the seat bottom and back. To represent paint that has worn off wood, drybrush the areas with a lighter shade of the paint color and then rub with 600 grit sandpaper.



Interior framing should be as accurate as possible. Sometimes kit parts can be used as a guide.

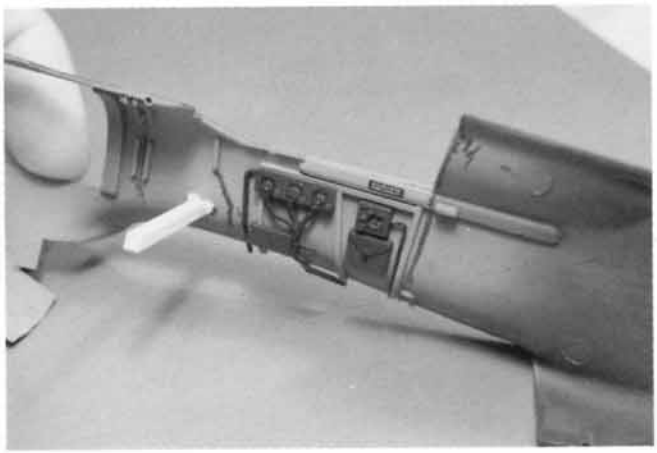
Dust, dirt, and fluid stains are also found inside a cockpit. Adding them must be done subtly. Polly-S markets an excellent set of weathering paints that includes dust, mud, dirt, and oily black. Dust usually accumulates in cracks, corners, and crevices. Dirt is usually tracked in by the pilot or blown in when the canopy is open and the aircraft is operating from a dirt field. Dirt can accumulate behind the pilot's seat, around the headrest, on the rudder pedals, and on the floor, particularly in corners.

In older aircraft, mud is found on the floor and around the rudder pedals. Fluid stains are found on the floor, particularly near the control stick, the flap actuator, and under the rudder pedals. These types of stains are best applied with a small brush. They should look like stains or wiped-up puddles. To simulate this, place a drop of paint in an area and wipe or dab with a Q-Tip.

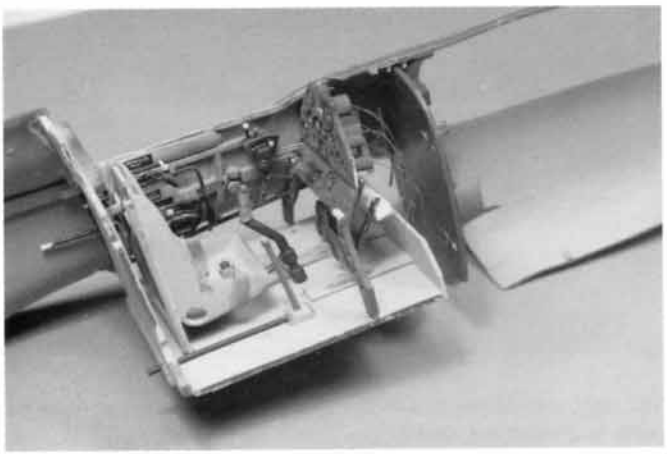
As you gain weathering experience, you will learn how to create a subtle effect. To avoid overdoing it, start by applying silver paint to the worn areas, then try some dust and dirt. Add fluid stains if it seems necessary. Propeller-driven aircraft, especially WWII planes, suffered a lot of wear and tear both inside and out. Jet aircraft operated from more suitable locations. Although their surfaces and exteriors can get faded and dirty, they don't suffer the same wear and tear as their piston-engine ancestors did.

MODIFYING KIT-SUPPLIED PARTS FOR INTERIOR DETAILING

Most large scale kits supply some level of interior detailing, including trim wheels, piping, throttle quadrants, and assorted electrical boxes. Sometimes these are molded into the interior siding of the model and you can enhance their appearance either by painting and drybrushing or by removing all molded interior detailing and building it from scratch. Working with the interior detailing supplied with the kit is the best starting point. While painting and drybrushing these details is adequate on 1/72 scale models, on 1/48 and 1/32 scale models the parts do not have enough depth to look realistic when



The right side of Revell's P-40 with modified electrical and radio boxes cut out from kit parts. The dial faces are Waldron instruments. The map box is scratchbuilt.



Although the sides of the cockpit look somewhat empty, once other parts such as seat, flooring, and console are added, the cockpit begins to take form.

painted. Often kit-supplied parts in 1/32 scale can be cut out, modified, or both for greater realism.

Most 1/32 scale kits, such as the Revell and Hasegawa WW II 1/32 scale fighter aircraft series, come with left and right interior sides, while the detail on most biplane models is molded into the fuselage sides. Jet fighter kits usually have a cockpit tub with the detailing added. When kits have separate interior sides, the parts they contain can be cut out, enhanced, and installed onto the inside of the fuselage. Sketch the sides of the fuselage and identify all the parts you will add. Next, temporarily install the cockpit backing, the flooring, and the console with masking tape and draw lines where these parts meet the fuselage sides. This will identify the boundaries of the cockpit sides and provide spatial orientation for the parts you plan to install. Next, draw in any interior framing your reference material identifies and install it.

Determine what is the best way to cut out the parts and assess what to do to them. Throttle quadrants can be enlarged by gluing some thin styrene stock to the back. If the control levers are not individually molded, they can be cut off and replaced with small plastic stock rod or wire. To provide a positive location for the levers, drill small holes into the quadrant, using a pin vise and a small drill bit. To reproduce the ball handles on control levers, apply a small drop of Kristal Kleer to the tip of the lever with a toothpick.

Enhance radio boxes and other electrical boxes by adding plastic stock to the back for greater depth. If dial faces are molded into the boxes, drill them out and add Waldron instrument dials. To drill out the molded dial, indent the center with a needle held in a pin vise, drill the dial out—using a bit the same size as the punch tool required to punch out the instrument—and drill deep enough to hold the instrument. Drill a small hole in the center to allow glue to seep out the back.

Once you have drilled all the holes and test-fitted the dials, cut off all the molded switches and drill small holes in their former locations. Stretch a piece of silver or gray sprue for the switches. Install dials and switches by the same methods you used in building consoles and using Waldron placards. (See pages 35–38).

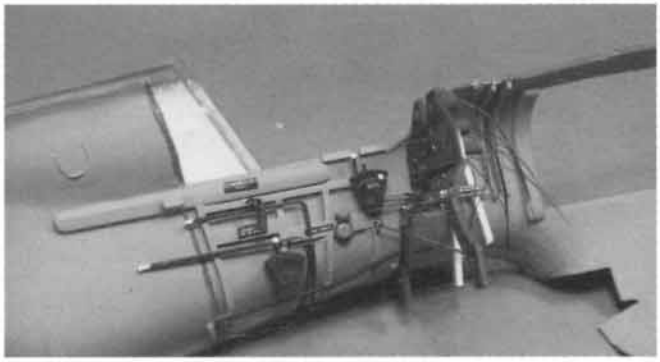
The control box for flap and trim adjustments is usually rectangular because it contains gears, pulleys, and cabling. The flap adjustment is usually a small, arm type device, while the trim adjustments are round disks. Make the flap adjustor from plastic rod or wire, and make trim wheels by punching out disks with your Waldron punch tool. On the actual aircraft, these trim wheels are usually located an inch or so above the box they are attached to. To represent this, simply punch a smaller disk size than the one that represents the trim wheel and attach it to the back of the trim wheel disk. Some trim wheels have small spindles around their rims, and you can represent this by notching the disk with a micro file. This is a tedious process, and proper spacing of the notches is important. The best way to secure the disk while you notch it is to hold it in a small clamp.

To enhance the appearance of electrical boxes, cut off existing switches and attach new ones using the techniques described above. For indicator lights, use a round toothpick to apply a small drop of Kristal Kleer for each. Paint the appropriate color.

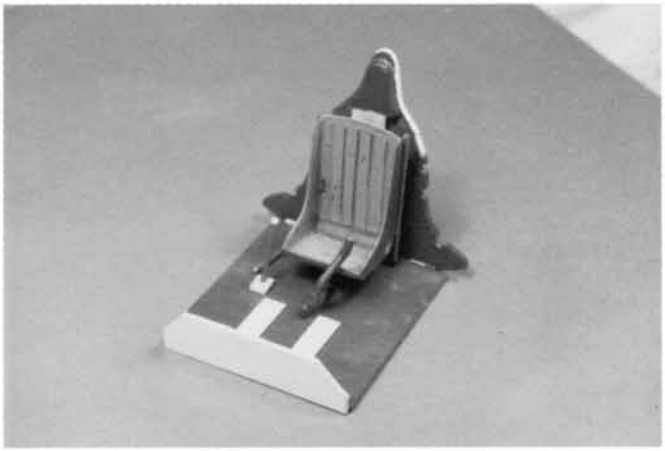
Almost all cockpits have piping and wiring running along the sides that either terminate at the bottom of an electrical box or run along the base of the cockpit and through the back wall into the rear of the fuselage. If you use round plastic stock for piping, place a drop of super glue at the bend locations, so that they will retain their shape. I usually cut a length of styrene rod, bend it, and form-fit it into its location.

For electrical cabling, strip the insulation off thin strand electronics wire, twist several strands together, place a drop of super glue on the twisted strand, bend into shape, and paint it. You can form-fit the wire in place once you add the parts to the cockpit sides.

When you test-fit the cockpit's backing, be sure it fits snugly between the fuselage sides. If it is too small,



The right side of Revell's P-40. The quadrants were cut from kit parts and modified, and piping and control cables were added. The wiring protruding from the back of the instruments on the console added an extra element of realism, because on the real aircraft you could see the wiring behind the console if you were looking down through the windshield.



Adding interior parts to the flooring gives an otherwise flat surface some depth. To further enhance their appearance, paint them different shades.

add thin plastic stock to fill the void. When you test-fit the interior parts, also test-fit the seat and tape it to the backing to make sure the parts don't interfere with the seat. Enhance the flooring by adding thin plastic stock to the area near the rudder pedals. This will give depth to an otherwise flat surface. You can also add piping to the floor next to the fuselage sides; run it from far under the console and through the rear cockpit wall. Once these parts are completed, paint them and glue into place.

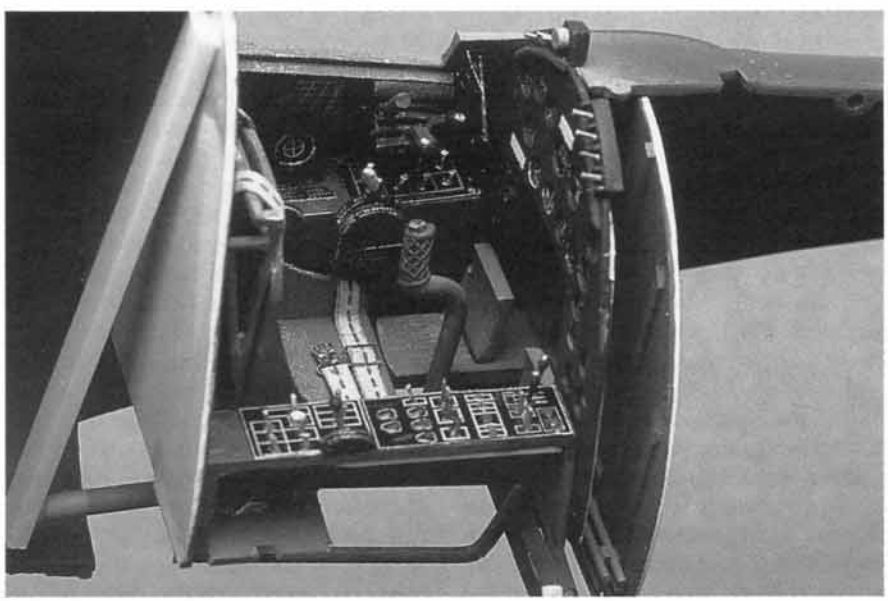
Seats can be separate or molded into the cockpit backing. If the seat is a separate part, chances are its back and sides are too thick. To improve its appearance, attach sandpaper to your workbench or to a piece of wood and sand the back and sides to thin them out.

Be sure the plastic is of uniform thickness, sanding a few times in one direction and then rotate it 180 degrees, or work in a figure eight. Sides and backing should not be paper-thin—they are supposed to be armor-plated—but they should not look out of scale. Some kits come with a seat frame. Thin this as well, and remove its mold lines.

When attaching a seat, don't glue it to the cockpit backing because most seats are positioned away from the rear cockpit wall. If the kit has seat framing, the seat will automatically have some spacing. If there is none, you can attach some stock plastic to the bottom of the seat to act as a set of legs and then attach the plastic to the floor. If the seat is molded into the cockpit's rear wall, you can cut it out and work with it as a separate part.

Before you cut out the seat, make a new wall by tracing it onto plastic stock and cutting it out. Test-fit the new wall in the cockpit and make necessary adjustments with sandpaper. When you are ready to cut the seat from the cockpit wall, if there is no raised outline to work with, first draw an outline of the seat's backing. Tape the part to your workbench and use triangles and dividers to draw and measure the lengths. Be sure the lines are straight and parallel. Rough-cut it with a razor saw and sand to the correct shape and thickness. Once it has been thinned and painted it is ready for the final touch—seat belts and shoulder harnesses.

Other details attached to the cockpit backing, such as the pilot's headrest, should also be cut out, modified, and reattached to the new cockpit wall. Removing these parts,



The scratchbuilt parts installed in the Corsair's cockpit. Also visible are Waldron placards, Waldron instruments, and a variety of other scratchbuilt levers, quadrants, and switches.

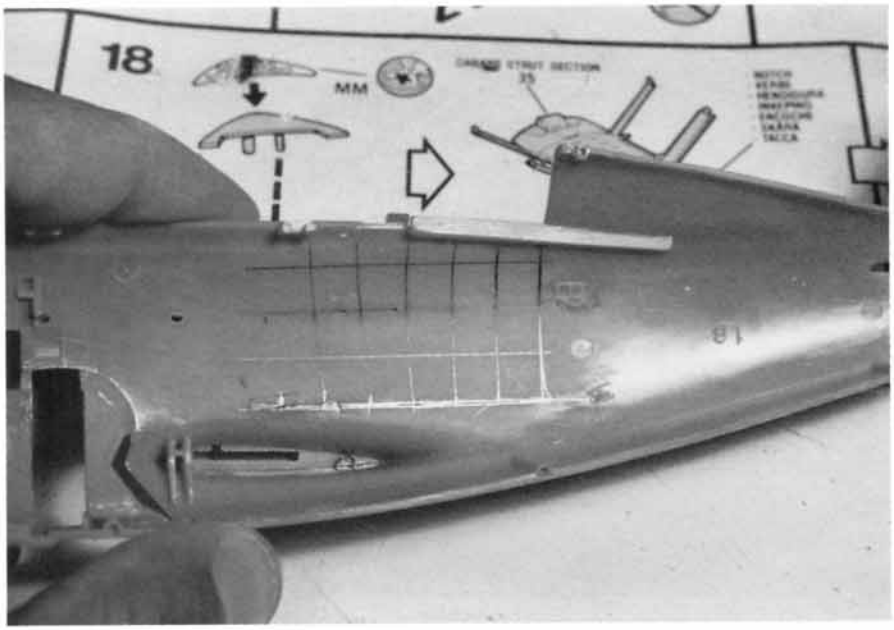
To be sure interior framing is spaced properly, draw the locations, using a small section of plastic strip and a set of dividers.

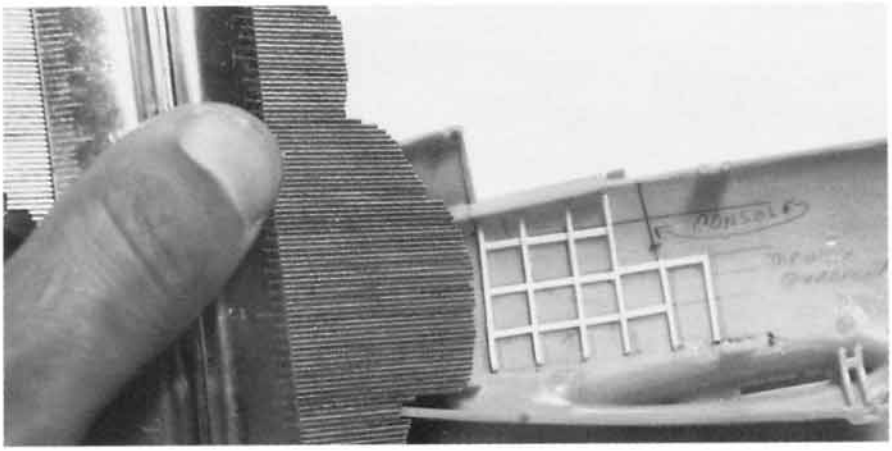
modifying, painting, and reattaching them will give the cockpit a greatly improved appearance.

SCRATCHBUILDING AN INTERIOR

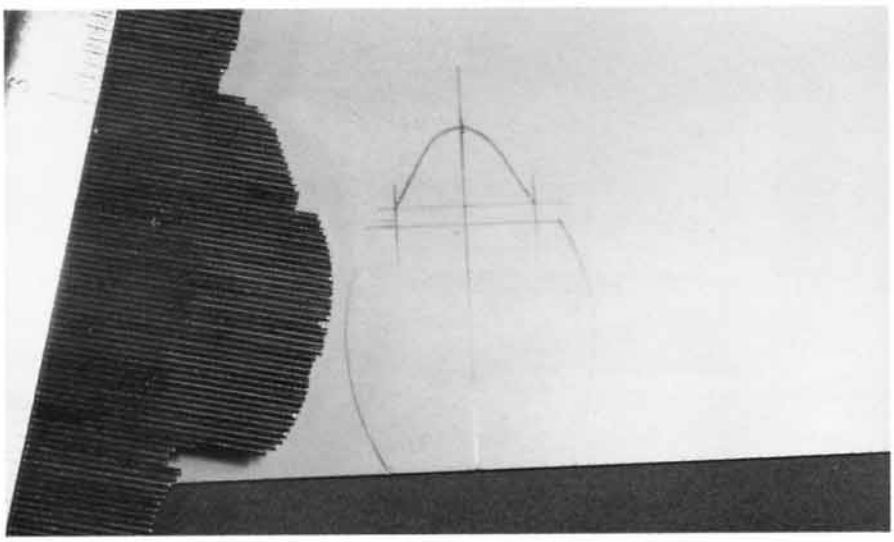
Most kits have interior parts you can modify to create a more accurate interior, but some have such poor detail there is nothing you can salvage. Reference material or cockpit pictures are a must for scratchbuilding, but if you don't have any, remember that most aircraft have the same controls at the same locations. The throttle quadrant and the propeller pitch control are usually on the pilot's left. Trim selectors for the control surfaces are also usually on the left, while the flap control can be on either side. Radio boxes, electrical boxes, and switch banks are usually located on the right side, but smaller electrical boxes can be on either side. Electrical wiring and piping are located on both sides, as are oxygen bottles. Rudder pedals are located under the console, and the control column is either a stick located between the pilot's legs or a control yoke protruding from the console.

First, mark the location of the flooring, console, and rear cockpit wall on both sides of the fuselage. Some kits have no rear wall but you can make one using a contour gauge and sheet stock. The best way to secure the contour gauge is to strike a line along the interior of the fuselage where the gauge will go, tape the fuselage half to the workbench, position the gauge over the line, and push the wires until they touch the line. I always push the wires at the beginning and end of the line first because this helps maintain the position of the gauge. After you have pushed all the wires, you are ready to transfer the shape to sheet stock. I usually use

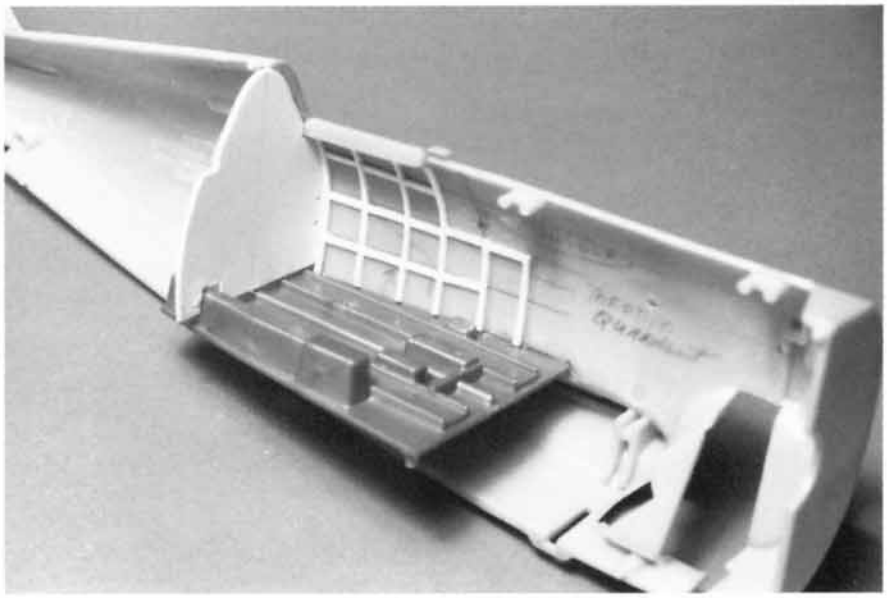




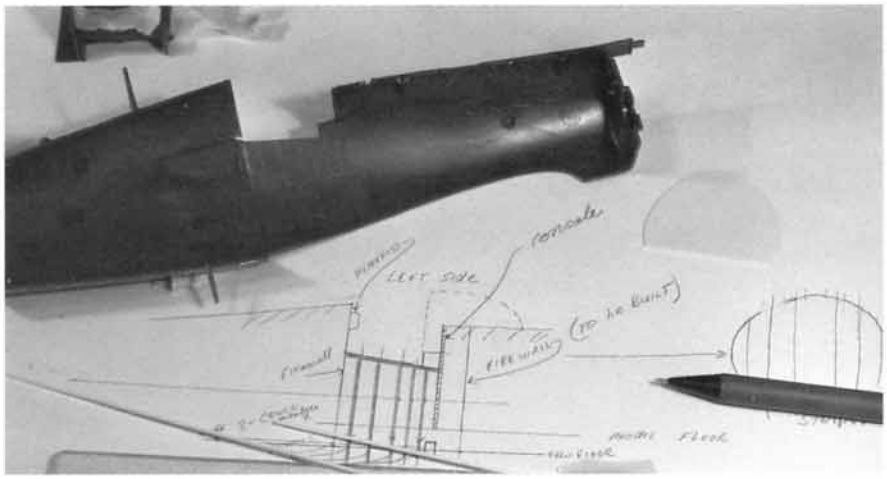
The easiest way to make interior bulkheads is to use a contour gauge. With a little practice, a gauge can save you a lot of time and frustration.



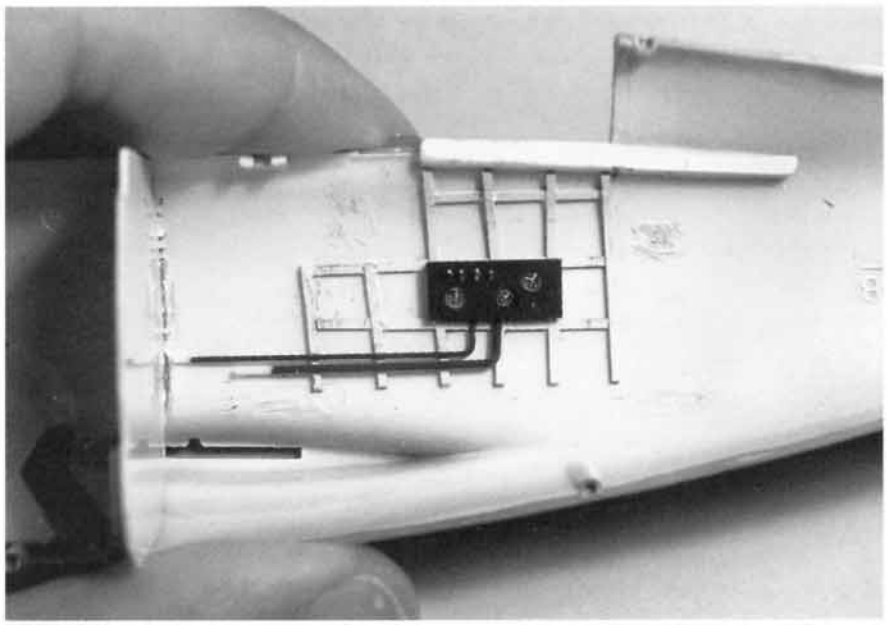
Once you are satisfied the contour gauge is set correctly, transfer the shape to sheet stock and flip it over to get the other half.



(Left) When the part you outlined with the contour gauge is cut out, you may have to do additional form-fitting to get it into place. Fill small spacing between the edges of the part and the interior wall of the fuselage with white glue.



(Center) If you are going to try a complicated project like scratchbuilding an interior, sketch where the interior parts will go and follow your plan.



An instrument box completed and installed, along with some electrical piping made from Evergreen plastic rod.

.025-inch (.6mm) stock because it can be cut with a pair of scissors, yet is stiff enough to work with.

You only have half the interior contour, so strike a perpendicular line on your sheet stock and carefully position the ends of the shape on the contour gauge along the line, draw the contour, flip the gauge over, position the ends, and draw the contour again. The shape will appear jagged, but you can smooth it out by sketching the shape freehand. Now you are ready to cut it out. If you were careful to get the exact shape with the contour gauge and to transfer it precisely to the plastic sheeting, the part should fit into the fuselage. To check the fit of the new piece, tape it to one side of the fuselage and tape the fuselage together.

Framing. If you decide to install framing, remember that vertical framing is larger than horizontal framing. Use a small strip of sheet stock or a piece of scrap brass from a photo-etched set to draw lines for framing on a curved surface. If you decide to install both types of framing, do all the vertical ones first and then form-fit the horizontal ones. Since the horizontal ones will be in sections and positioned between the vertical ones, make sure they are all installed along a straight line. Install all the strips along one line, adjust them until they appear straight, and place a drop of super glue with a .5mm lead pencil on the underside of each section. The capillary action will pull the glue under the plastic strip.

Avionics boxes. To build radio boxes and electrical boxes I start with

.06 x .25-inch (1.5 x 6.4mm) stock. If I need something thicker or wider, I simply glue more stock to the piece. Draw the shape you want on the sheet stock. Cut and shape with a razor saw and sandpaper. For instrument dials use spare instruments from Waldron's instrument sheet and add selector switches, toggle switches, piping, and electrical wiring.

Flight control trim wheels can be added using Waldron's punch set, but be sure to glue a smaller disk to the underside of the trim wheel to add depth to the part. If the trim wheel is an actual wheel instead of a selector-type dial, you have several options. For 1/48 scale kits, HO scale train brake wheels are about the right size. These parts can be found in well-stocked hobby stores. For 1/32 scale kits, buy Hasegawa's 1/32 scale Boeing F4B biplane. The kit has an excellent trim wheel which you can cast with RTV rubber. You can then make as many wheels as you need, using two-part resin.

Throttle and propeller pitch quadrants. There are two ways to make throttle and propeller pitch quadrants to give you a first-class part. The first is to take a solid piece of plastic stock, draw the quadrant's surface shape onto it, and cut and sand to the correct shape. Once the quadrant is the correct shape, place it in a vise between two pieces of balsa wood and strike lines across the top for the number of lever channels you need. Throttle quadrants usually have two or three channels, and propeller pitch quadrants usually have one or two channels. Draw the lines with a pencil, using a small, thin, flexible straightedge. Be sure they are evenly spaced. Scrap brass from a photoetched sheet works well for applications like this. Next, take a razor saw or a jeweler's saw and cut through the line into the quadrant. Be sure the cut goes a little down the side on both ends.

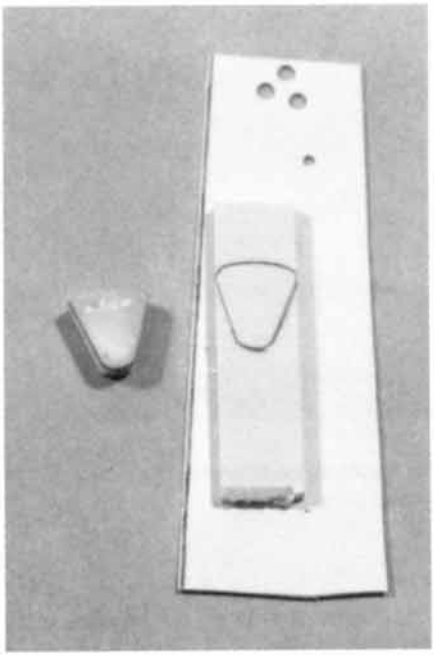
The second method uses a sandwich technique that requires you to draw the quadrant's outline several times. For accuracy, cut and shape one piece of stock to size to use as a master. If your quadrant has two channels you must make five drawings. I use stock of the same thickness for the front, middle, and back panels and slightly thinner gray stock for the two inner panels.

Rough-cut the parts, but cut the top curve where the levers will be located as accurately as possible. Next, secure the back part on a piece of masking tape and position the next panel—which should be gray—slightly lower than the first. Position the next layer at the same height as the back one, add the second gray part at the same location as the first gray part and then add the final layer at the same height as the back and middle layers.

When you remove the part from the masking tape the gray sheets will extend below the base of the part. Sand the part to its correct shape using the outline on the front as a guide. To get the correct curvature on the top and bottom of the quadrant, rotate the part as you move it across the sandpaper for a smooth, curved surface.

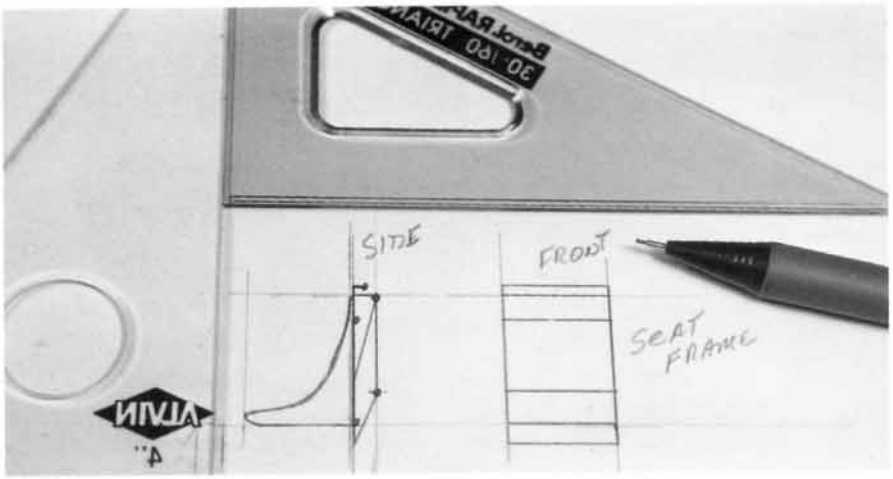
Paint the quadrants the correct color and add levers and handles made of round plastic stock or wire by inserting the levers into the channels. The throttle handle is usually much bigger than other lever handles and is usually in the shape of a hand grip. It can be represented by round stock that is thicker than the lever arm. Other handles are usually balls, which can be made by applying a drop of Krystal Kleer to the tip of the lever arm with a toothpick. Paint the throttle handle brown, the mixture ball red, and the others black.

Cables. Cables attached to the bases of the levers, which run from the side of the throttle quadrant to the engine, can be simulated with thin piano wire. Drill pilot holes into the forward side of the quadrant and run the wires through the side of the console. If you add this detail, be sure to drill the holes into the console before you glue the console into place.

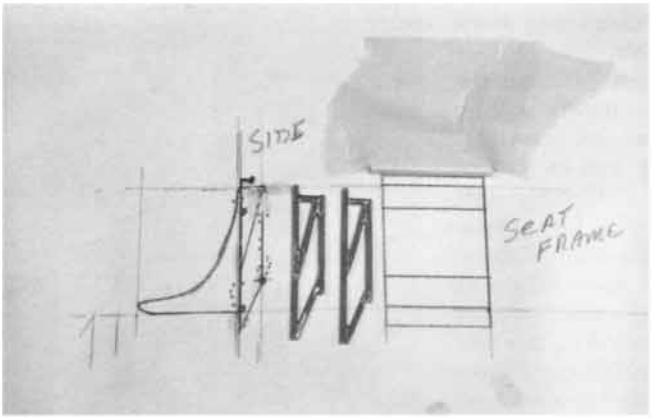


Throttle quadrants can be made from a solid piece of stock plastic that is cut and sanded to shape. Use a razor or jeweler's saw to cut the lever channels.

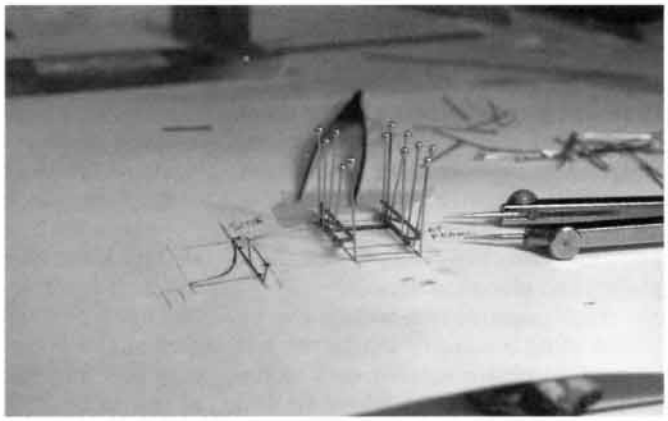
Seats. Scratchbuilding seats for propeller-driven aircraft can be tedious because the parts for the seat's frame are small and the plastic sheeting you use for the seat is thin.



The best way to build a seat frame is to draw side and front views of the framing.



Use pins to position and hold the pieces of the frame together when gluing.



Once the sides are complete, position them on the front view drawing with pins, cut the cross members, and glue them in place.

The first step in making a seat is to build the frame.

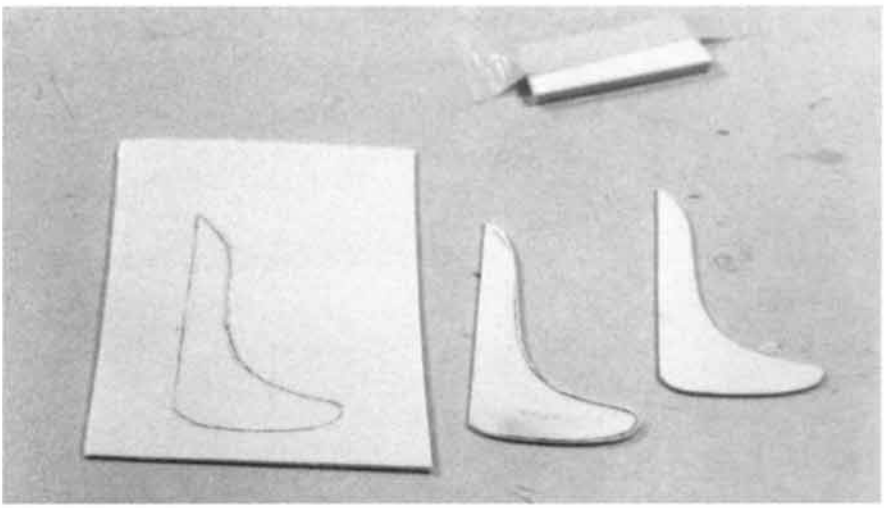
Draw a front and side view of the frame using reference material and pictures and taking measurements of the inside area of the cockpit with a pair of dividers. When you are satisfied with the drawing, tape it to your workbench, slip a piece of balsa wood sheeting under the drawing, and begin measuring and cutting parts for the frame from either round or square plastic stock.

Some seat frames are made of tubing, while some are rectangular lengths of metal and others are a combination. For 1/32 scale kits use stock that is approximately .0375 inches (1 mm), for 1/48 scale use .035-inch (.9mm) stock, and for 1/72 scale use .025-inch (.6mm) stock. I recommend building up the sides of the frame first, using the side drawing. Then connect the sides with cross members, using the front view drawing. As you position the parts, hold them in place with pins. Be sure to locate the pins where parts will not be attached to one another. The technique of using pins to hold parts in place is the same one used to build balsa wood models, only you can't stick the pins into the parts.

Once they are positioned correctly and secured with pins, apply a tiny amount of super glue to each connection point with a small piece of wire. You only need enough glue to join the parts at the upper surface. Avoid gluing the parts to the paper. After the glue has dried, remove the pins, lift the newly constructed part from the drawing, and apply glue to the circumference of each connection point. If the part is stuck to the drawing, carefully separate the plastic from the paper with a sharp #11 X-Acto blade.

The final step is to glue the cross members to the side framing. To ensure that the side frames are vertical, pin balsa wood strips at least ¼ inch (6.4mm) thick and ½ inch (12.7mm) wide along the outer lines of the front view drawing. This will give the side framing a positive seating and ensure that they will be at 90 degrees to the cross members. If the side framing is at some other angle, the balsa wood strips are still useful; they will provide a positive seating for the base of each side frame. Set the side frames into place and use pins to hold them. Form-fit the cross members one at a time and glue, using the same thin wire. Remove the completed frame from the drawing and finish gluing the pieces.

Now you are ready to work on the seat. Since seats can be sanded down to the correct thickness by running them across stationary sandpaper, you can construct them with thicker plastic stock. This makes it easier, especially when you are working in smaller scales. Use .025-inch (.6mm) stock for seat sides and .017-inch (.4mm) or .0109-inch (.3mm) stock for the seat backing and base.



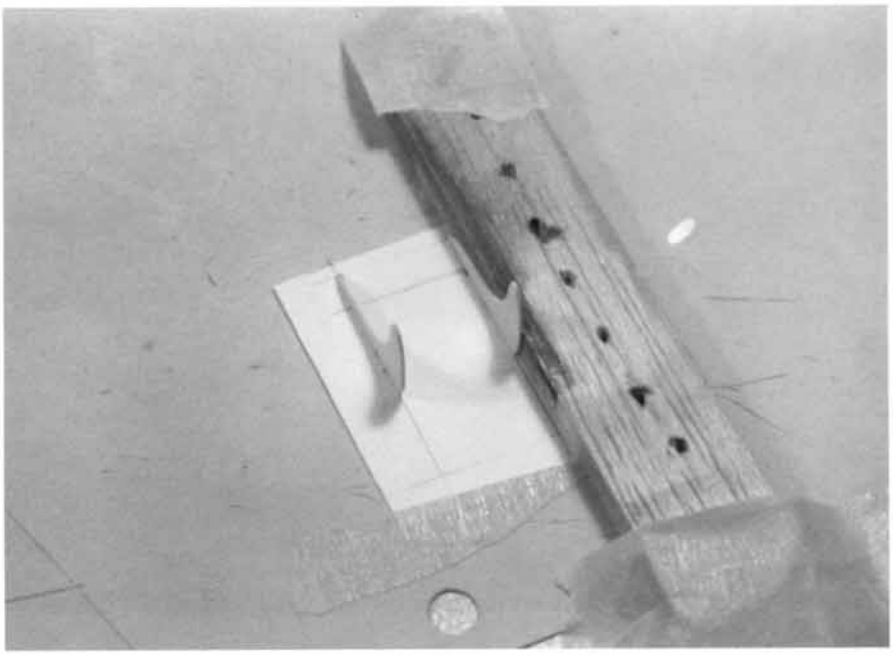
Rough-cut the seat sides, attach with white glue, and sand to the proper shape. The white glue comes off easily when you soak the part in water.

Draw the sides of the seats directly onto the .025-inch (.6mm) plastic, rough-cut the parts, and shape so they are perfectly matched. The easiest way is to glue them together with Elmer's glue and use micro files and sandpaper to give them their final shape. When you are finished, separate the parts with a #11 X-Acto blade and wash the excess white glue off with soap and water.

Now draw a front view of the seat onto the plastic stock you will use for the backing and base. The simplest seat is one that does not have a rounded bottom where the backing and base meet. For this type of seat, position the balsa strips to act as guides for the seat sides, position the sides on the drawing, and then glue them. Run a tiny bead of glue along the inner contact area between the side of the seat and the backing. When the glue is dry, remove the balsa blocks and glue a piece of sheet stock to the bottom of the sides. Cut and shape the excess plastic. I usually cut the excess with an X-Acto blade and sand the last 1/16 inch (1.6 mm) by running the seat across a stationary piece of sandpaper. This is also the best way to thin the sides if they are too thick.

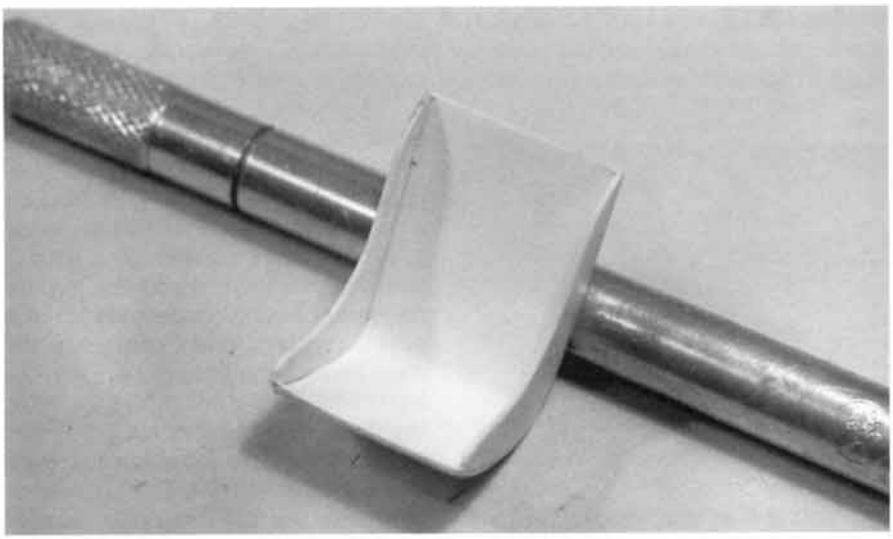
If the seat has a rounded base, draw a long rectangle onto the sheeting, correctly locate and glue the sides on the upper portion of the rectangle, and use the remaining area of the rectangle as the seat's bottom. After the glue has dried, trim excess plastic, leaving a lip of 1/8 inch (3.2 mm). Slowly rotate the plastic sheeting around the back and bottom of the seat, gluing the sheeting as you work toward the forward edge of the seat.

After you have glued the bottom half in place and the glue is dry, trim the excess and sand the seat to the correct shape and thickness. I sometimes add an extra layer of plastic to the back and base for strength and sand it down. Sometimes even 1/32 inch (.8 mm) of additional plastic can add considerable strength to a thin piece. Finally, check for cracks and excess glue with silver paint. Be sure to remove this paint before priming and give the surfaces of the seat a final sanding with 600 grit sandpaper to smooth out any scratches.

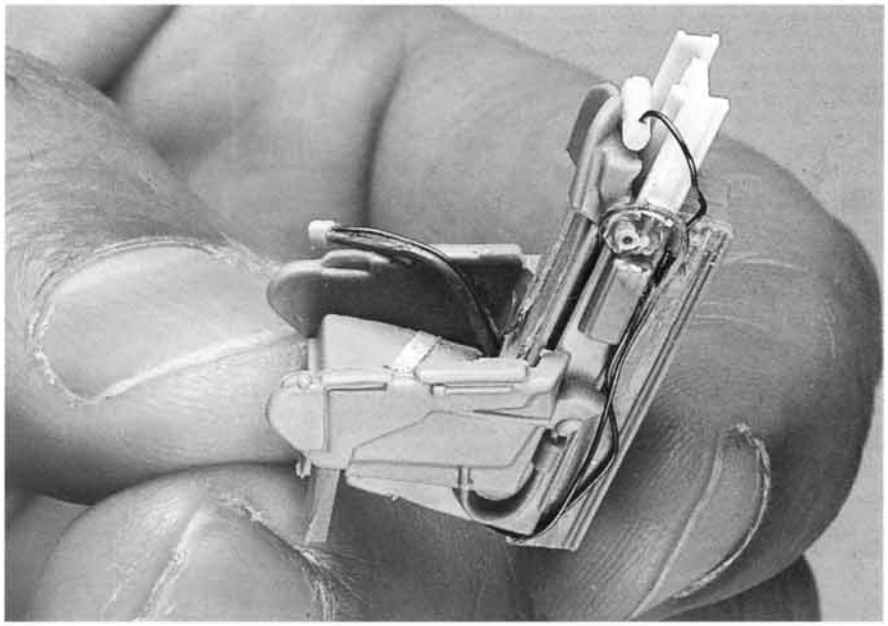


Glue the sides to the backing and run a bead of super glue along the inner joint to secure the parts. If the seat has a rounded base, simply roll the sheeting around the base of the sides and glue.

Jet aircraft ejection seats are complicated pieces of machinery. Most jet aircraft kits have good seats which can be improved by adding plastic stock such as tubing, small boxes, and strips of wire. Or you can purchase an aftermarket resin ejection seat with a lot of detail added. If the seat from your kit has molded seat belts, remove them with a small piece of sandpaper wrapped around the end of a piece of balsa wood. The balsa wood should be small enough that you can sand the belt off the side or from top to bottom. If you use a fine grit, you won't mar the seat's cushion detail. Extra detail and seat belts, along with proper painting and



The completed seat is ready for final shaping. The corners of the seat still have to be rounded. A thicker piece of sheet stock will be added to the bottom to reinforce the base.

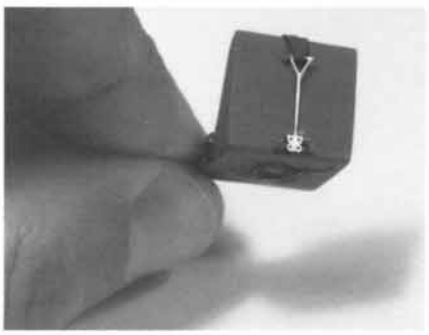


Ejection seats for jets are hard to scratchbuild, but one way to improve the appearance of kit seats is to add wiring, framing, and piping to them. This is a kit ejection seat from Monogram's 1/48 scale F-100.

drybrushing, can easily transform a kit ejection seat into a work of art.

MAKING SEAT BELTS & SHOULDER HARNESSES

Seat belt hardware adds a lot of realism to the cockpit. Model Technologies and other cottage industry manufacturers market high-quality photoetched hardware that is easy to use. Some modelers use paper to represent seat belts and shoulder harnesses, but I have found it difficult to work with. Instead, I use 3M masking tape, which does not rip easily, takes paint well, and looks realistic.



The back side of this P-51 Mustang seat has its shoulder hardware attached. The seat belt length has been folded over the seat. The last step will be to add the buckle and length-adjusting hardware.

For 1/48 and 1/32 scale kits use two layers of tape back to back. On 1/24 scale kits use three layers, and on 1/72 scale kits use a single strip. To work with masking tape, lay it down on your workbench, draw the correct seat belt or shoulder harness width, and cut it out with a #11 X-Acto blade. Cut individual lengths longer than you need at first. Make enough for both seat belts and shoulder harnesses. Seat belts are slightly wider than shoulder harnesses, so be sure to measure and cut different widths.

For good-looking leather belts, I paint the masking tape with a base color of Polly-S earth brown and highlight it by drybrushing with Testor's wood color. When you add the wood color, you get streaks of a lighter color, which helps represent the discoloration leather undergoes when it gets dirty, wet, and exposed to the sun. To represent canvas use either a lightened olive drab or a light gray. Highlight these colors with a lighter shade of the base color and drybrush some Polly-S dirt for weathering. Definitely use the dirt color on light gray canvas, because light colors always show even the slightest dirt.

Once the paint is dry you are ready to add the hardware. For the seat belts you should have two long lengths. The easiest way to attach the buckles correctly is to slide them onto the belt and fold a small portion of the belt under itself. Position the hardware in the crease of the fold, making sure the portion folded under is positioned exactly under the upper section, and place a tiny drop of super glue on the underside of the belt to secure the fold.

Shoulder harnesses can be two individual lengths with separate adjustments or one long length—the photoetched parts are set up for both designs. When building a seat with one continuous length, measure the approximate length you will need. Attach the necessary hardware to the back of the seat with super glue, fold the belt length in two, run it through the loop, lay it over the seat, and cut it to the appropriate length. The shoulder harnesses should be as long as the seat's back, and the tips of the harnesses should almost touch the seat bottom. Add extra length, so that it can be folded under itself. For both types of harnesses, add the mid-length strap length adjusters before adding the end buckles. Sliding these length adjusters takes a gentle touch; be careful not to bend them. Once you have them in place, add the end buckles the same way you did the seat belts.

For belt grommets, place four drops of silver paint in a box pattern on the top of each belt that needs hardware at its tip. Apply the paint with a sharp-tipped round toothpick. Don't put lot of paint on the toothpick; you are looking for a subtle effect, not four giant globs of paint.

To attach seat belts to the seat bottom, fold them over the edges of the seat and lay the remaining length across it. After you cut the belt to the correct length, place small drops of super glue on the bottom of the belt and press it onto the seat. The seat belts should be long enough to touch the opposite side of the seat. Since harnesses lie against the back of the seat, add a small drop of super glue toward the end of each harness and press it against the back of the seat.

GUNSIGHTS

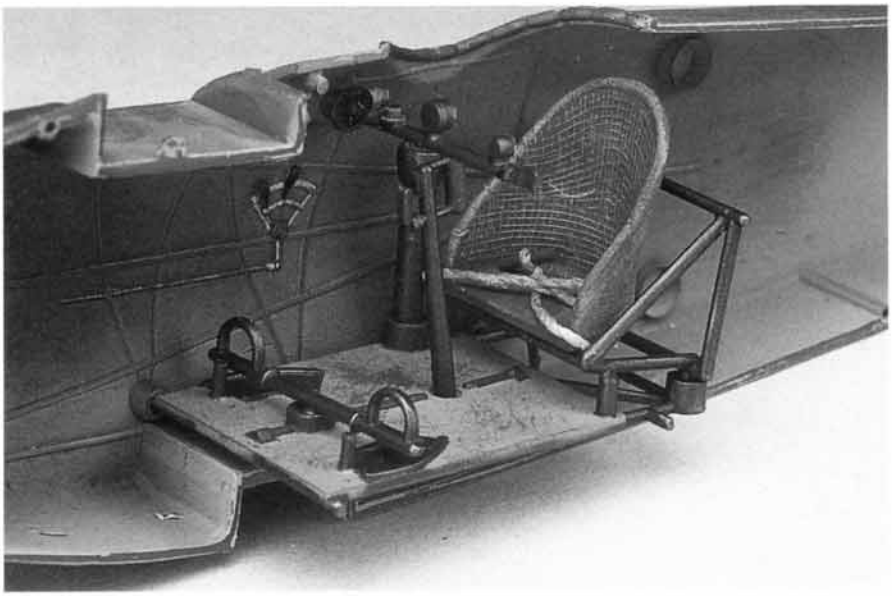
Many manufacturers supply some type of gunsight part that usu-

ally has the correct shape but lacks detail. Most WWII fighter aircraft were fitted with some type of reflective gunsight centered either at the top of the console or above, while modern jets have heads-up displays that combine computer-aided gun and missile aiming along with instrument readings. The reflective glass for the gunsight is positioned so the pilot can look through the reflective glass at the target.

Adding some detail and modifying kit-supplied gunsights adds a pinch of realism to the cockpit. First, define the shape of the gunsight using sandpaper and micro files. Define edges and corners and make sure round shapes are actually round. Be sure to remove any flash, mold seams, and dimples on the surface of the part. Flash and mold seams can be removed with a #11 X-Acto blade, but dimples must be filled.

Once you have better defined the gunsight's shape, identify the locations of any clear parts like prisms or reflective glass. If there is round clear glass located on the gunsight—such as on a P-51 Mustang—match the closest diameter from Waldron's punch set, identify the drill bit size, and drill out these locations. Go only deep enough to allow a piece of clear plastic to sit either on or just below the surface. The shape of the end of the drill bit will form a ledge on the inside wall of the hole, and the clear plastic disk will sit nicely against it. Be careful when drilling, because the plastic will be thin afterward. Punch out the appropriate size disk from clear plastic stock and glue it in the hole using white glue. The easiest way to pick up the clear disk is with the end of a round toothpick moistened with saliva.

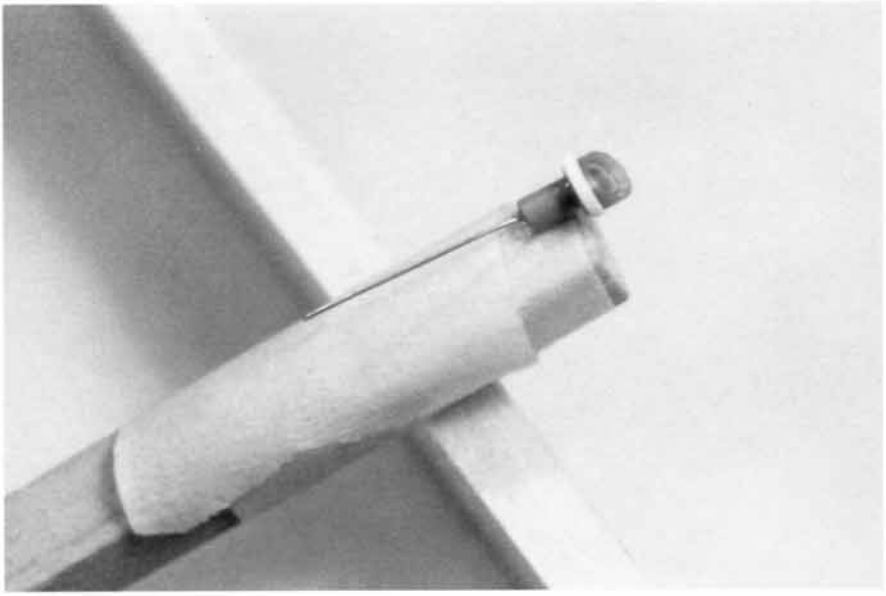
If the reflective glass is located on the gunsight, the manufacturer probably molded the correct shape and location, but molded it as part of the gunsight instead of supplying a separate piece of clear plastic. The trick is to modify the area so you can install a piece of clear plastic. Since reflective glass is located on the top of the gunsight and the sides that hold the glass in position are metal, all you have to do is cut out the center of the plastic, leaving thin walls on both sides. Use your micro files to slowly remove the plastic while shaping it. Dig into the plastic with the triangular file, using the flat surface files to define the bottom and sides. Be careful as you thin out the sides—replacing a side with plastic sheeting will be difficult due to its small size. When the area is shaped, use a pair of dividers to measure where clear plastic will sit. Transfer the measurements to clear stock, cut out the part, and glue with white glue.



Some World War I aircraft used rope for a seat belt. The small section of rope was taken from Revell's 1/96 scale sailing ship model USS Constitution.

You can dress up the sides of the gunsight with small plastic disks punched out with Waldron's punch tool. A switch or two of stretched sprue, or a small instruction decal or scrap plate from a placard set really adds realism. Most gunsights are a light shade of flat black. Mix a small amount of flat white with your flat black. Be sure the gunsight is not the same shade as the console. You want it to stand out, and if you paint it the

Revell's stock 1/32 scale P-40 gunsight, modified to sport reflective glass and adjusting dials. The disks were punched from sheet styrene with Waldron's punch tool.



Scratchbuilt gunsights are not hard to do. This one is made from two sizes of round stock, a small piece of flat stock, and a piece of wire.

same color as the console, the detail won't be visible. Disks and switches should also be a lighter shade or a different color than the gunsight. Don't add clear parts until you have finished painting.

Remember, no one will stand over your model with reference pictures checking to see that every detail is exact. You are trying for a balance between realism, perception of depth, and overall presentation by building an interior that speaks directly to the viewer's eyes.

ADVANCED TECHNIQUES WITH WALDRON PRODUCTS

I've put these techniques for adding cockpit realism at the end of this chapter because they require some more advanced skills. Although manufacturers now supply photoetched parts for consoles and cockpit placards for many aircraft, you may need or wish to build your own. With the help of some Waldron products and the following techniques, you can.

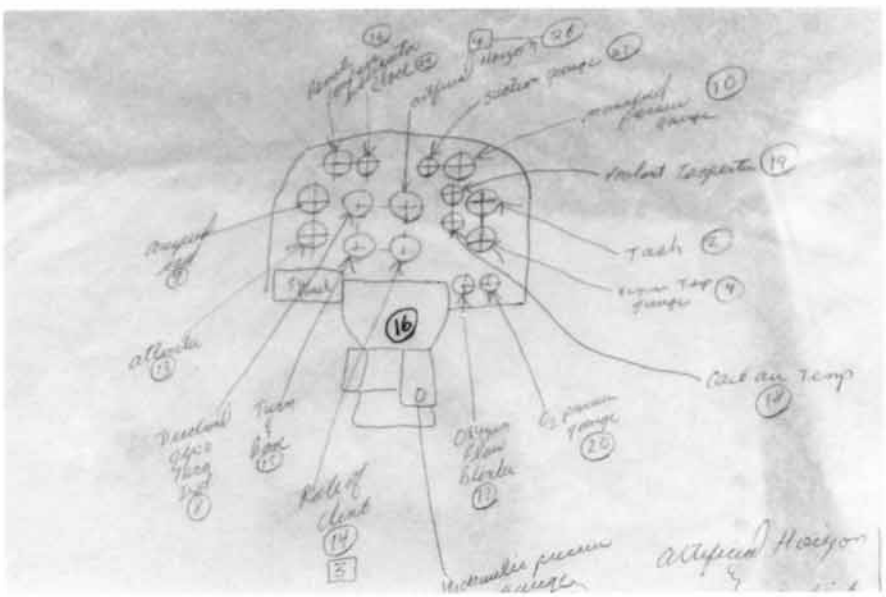
Build a console. Waldron markets flight instruments and instrument bezels that are easy to install and moderately priced. The first step in building a console with these products is to get some reference material on the aircraft, including cockpit pictures of the console. Without this material, you will have only the kit's console for a guide. Study the pictures and become familiar with the location of instruments and switches.

Next, make a sketch of the console, including the instruments, which need only be represented by circles. The exact location of each instrument on the sketch is not as important as including all of them and their approximate locations with respect to one another. Most aircraft consoles are structured so the most important instruments, such as the attitude indicator (more commonly known as the artificial horizon), the turn and bank indicator, the speed indicator, and the altitude indicator, are located toward the center.

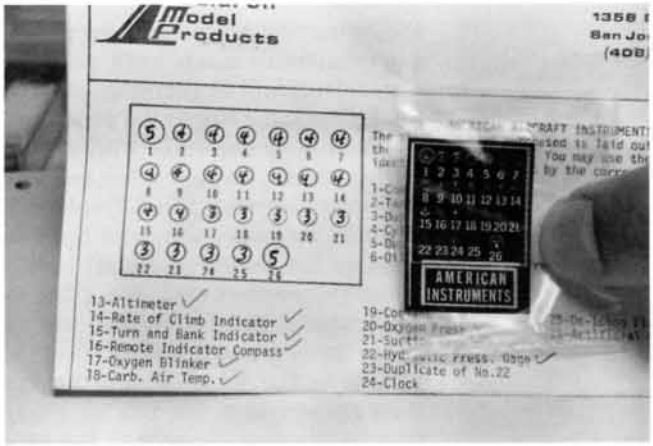
Strike a reference line down the approximate center of the sketch. Since most instruments follow a vertical or horizontal line, several should be along the same line.

Once you have completed the sketch, label each circle with the name of an instrument and match the instrument to its location on the Waldron instrument sheet. They are numbered; the instruction sheet also has a cross index that lists each number and the type of instrument, making them easy to find. Write the Waldron instrument number next to the instrument's name on the sketch, and write the punch size you will need. Determine what size punch you need for each instrument by matching the punch head with the instruction sheet diagram. To prevent any mixups between instrument number and punch size, draw boxes or circles around the instrument numbers.

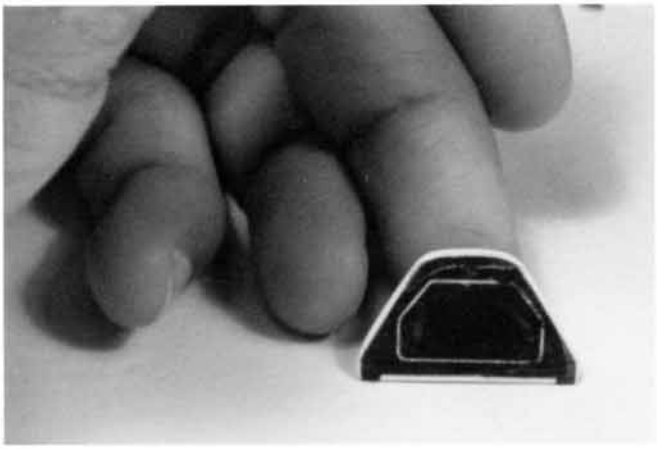
Once you have a complete drawing, decide how you want to make the console. Waldron recommends a slightly bigger console so all the



Sketching the console with all necessary information included on each instrument helps you coordinate the instruments and their locations.



Write the correct punch size for each instrument onto the diagram. This will give you a reference sheet to check before punching an instrument.



Adding extra strip stock to the kit's console helps increase the surface area so you can fit all the instruments.

instruments will fit. This means you will have to carefully remove some interior plastic and do a lot of trial-and-error fitting. I make all my consoles using a simple sandwich construction technique that incorporates the kit's console, and I have never had a problem making the instruments fit.

First, check the fit of the kit's console inside the cockpit. Tape the fuselage halves together and insert the console. In most cases it will not fit snugly, which means you must add thin plastic strips along the sides. Adding this plastic results in a more realistic finished console with little or no spacing between the edge of the console and the cockpit wall. It also gives you extra room to play with when locating instruments. Once you have glued the extra plastic strips and checked the fit, sand the surface of the kit's console flat. It will become the back half of the new console.

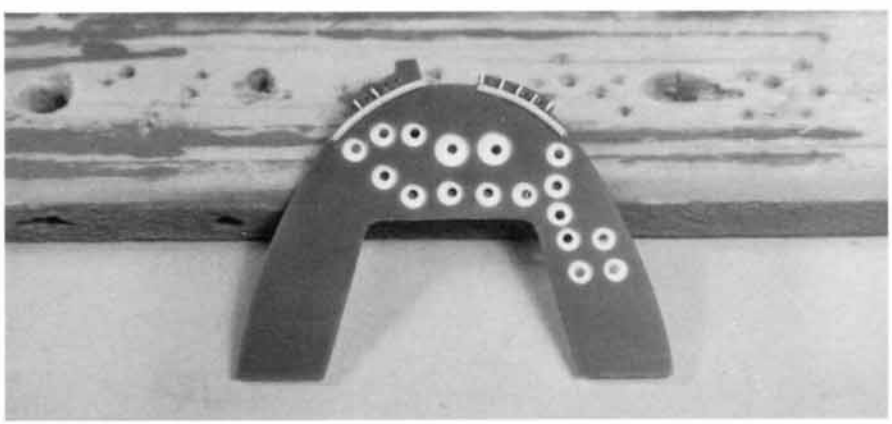
Next, trace the modified kit's console onto sheet plastic no more that .015 to .017 inches (.38 to .43 mm) thick. This is the best thickness for Waldron's instruments, which are approximately .0109 inches (.3 mm) thick. Strike a straight line onto the plastic sheeting; this will be your reference line and the base line for the new console face. Carefully locate the base of the kit's console directly on top of the line at least ½ inch (12.7 mm) away from the edge of the sheeting. Trace around the edge of the console with a .5mm lead pencil, then draw a box around your tracing about ½ inch (12.7 mm) away from the console's edge.

When you have finished drawing the box cut it out, tape it to your workbench, and tape the longest side of a triangle or other straightedge along the base of the console drawing. The straightedge must be directly on top of the bottom edge of the drawing, since the bottom edge serves as the base from which to draw vertical and horizontal lines for locating instruments. If you place the straightedge below the edge of the console drawing, be sure it is parallel with the bottom edge.

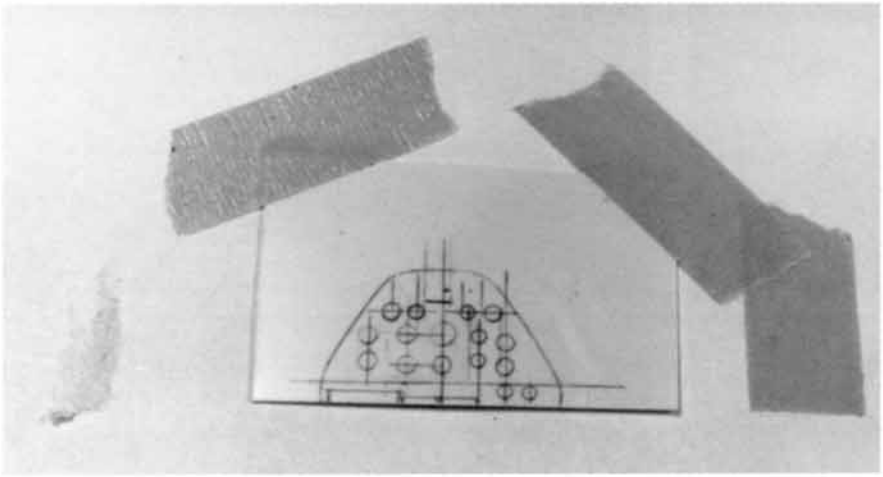
Locate the center of the drawing by measuring its base and dividing by two. Mark this location and strike a line from top to bottom by placing another triangle along the base of the triangle you taped to the desk. Now you have a reference point between the sketch and the console drawing.

Start drawing vertical and horizontal lines on the console to locate instruments. It will make the job a lot easier if you start with the largest instruments. Or start with the ones in the center of the console and work toward the outer edges. Either method will reduce the likelihood that you will have to erase lines and start over. It's a slow process that requires you to continually refer to the sketch and your documentation for the locations, alignments, and groupings of instruments.

Once you have drawn some center lines, start drawing circles onto the console using a circle template.



Another good example of how the kit's console can be used. Here Revell's 1/32 scale Corsair console was thinned out and then modified.



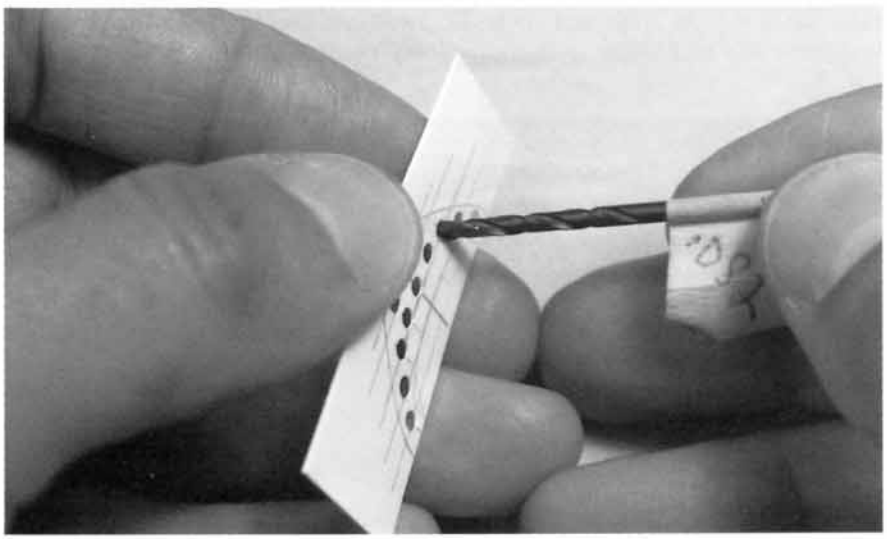
When all the instrument locations are drawn, the console face should look just like this.

Be sure the size of the circle you use corresponds to a correct punch size for an instrument. I have all my templates labeled for each punch size. I start with the largest instruments first and get their locations set; then I can use them as reference points as I add more. Getting the locations exactly correct is not as important as getting them evenly spaced and in line with one another.

If any switches are to be added, locate their positions on the console and use a small drill bit to drill pilot holes. For 1/32 scale consoles use a number 73 or 74 bit; for 1/48 scale kits use a number 78 bit; and for 1/72 scale use 78 to 82. If several switches are in line, be sure they are evenly spaced and straight. The best way to do this is to strike a line and use a pair of dividers to space them.

When you have drawn all the circles and located all the switches, remove the new console from your workbench, cut out the outline with a pair of scissors, and slide it into the punch guide. Carefully position each circle under the correct punch hole. Be sure to pinch the console between the upper and lower parts of the punch guide so it won't slip. Centering a circle under a punch hole takes some practice. I suggest some trial runs before you do the real thing.

After you have punched out all the instrument holes, clean the plastic burrs around each hole so your instruments will fit correctly. Take a dill bit the same size as the punch and run it through each hole with a twisting motion. To test whether any burrs remain, run a punch through. If it binds or feels tight, you need to open up the hole. If you don't have a bit of the correct size, use a #11 X-Acto blade, but be careful not to gouge the edges of the hole.



Clean the burrs from around the punched hole, so that the instrument will fit properly. If you don't have the same size drill bits, use a #11 X-Acto blade.

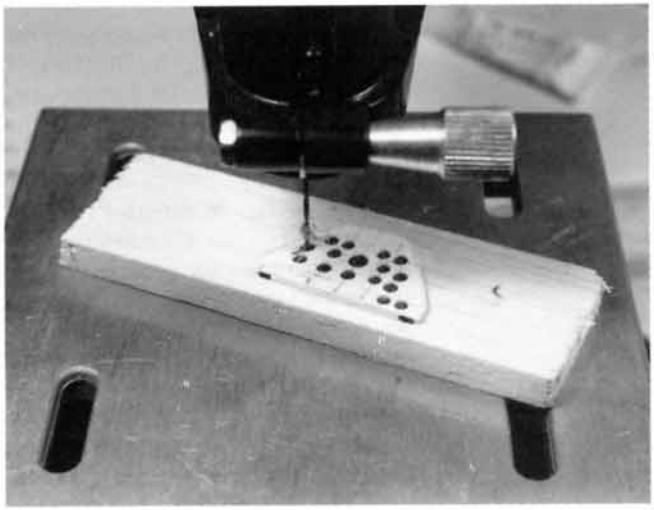
When the punches slide through their respective holes, you are ready to glue the new console to the kit's console. Position them so the edges don't overlap, and apply glue with the tip of a .5mm lead pencil on select locations around the perimeter. After it dries, run a bead around the perimeter. Don't let any glue get into the holes—it will prevent the instruments from seating correctly. I call this process the sandwich technique.

When the glue is dry, sand the edges smooth. Take a small drill bit, center it in each instrument hole, and drill through the backing. These holes will allow the white glue you will use to glue each instrument to seep out the back instead of overflowing onto the face of the instrument.

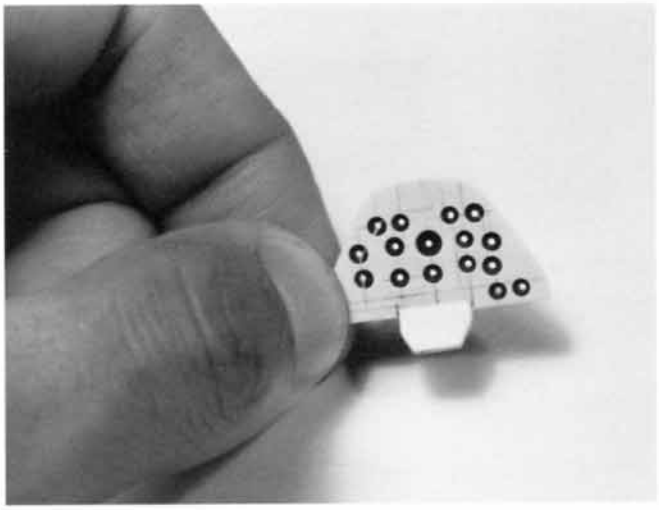
Now that the console is complete, you are ready to paint it and apply the instruments. Most consoles are flat black. Whatever color you choose, lighten it up with some white to create a perception of depth between the instruments and the face of the console.

When you are ready to apply the instruments, peel off the paper backing on the instrument sheet and paint the back of the instrument sheet flat enamel white or whatever color your reference material calls for. If you don't have any information, just use white. After the paint has dried, slip the instrument sheet into the punch guide and begin punching the instruments out. Punch one at a time and install it before doing the next one. This method is slow, but it will prevent you from losing any instruments. The sketch and reference information you added will allow you to punch an instrument, locate it on the drawing, and place it on the console.

To pick up instruments I cut the tip off a round toothpick, wet the blunted tip with my tongue, and pick



On small instrument consoles use Dremel's drill press to drill holes in the center of each instrument location. The holes allow glue to seep out the back.



The completed console is ready to be primed and painted. This console will be part of a Hasegawa P-51 Mustang.

up the instrument face first. Put a small drop of Elmer's white glue in the hole where the instrument will go and insert the instrument. Once it is in, it is hard to rotate, so get it right the first time. If you get it wrong, pop it out from the back and try again.

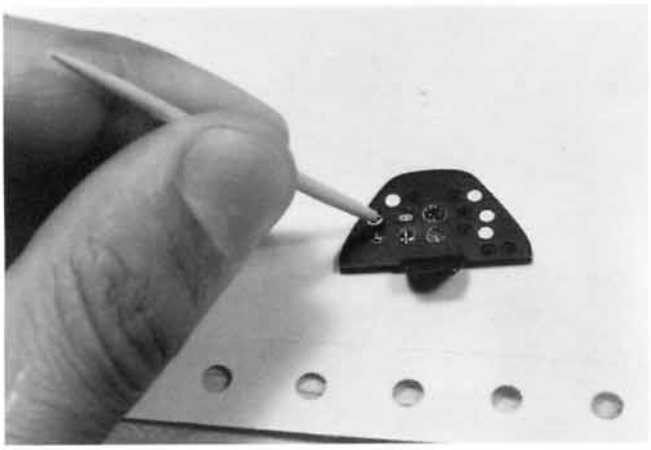
To make switches, stretch black or silver plastic sprue over a candle. Don't make it too thin. Since switches are too small to handle and hard to cut to a consistent length, take the length of stretched sprue and cut it into sections about ¼ to ½ inch (6.4 to 12.7 mm) in length. Glue them into the switch holes, using white glue. Be sure they are straight with respect to one another and the console.

After the glue has dried, lay the lengths of plastic against a sanding block and cut to length with a #11 X-Acto blade. If you lay the blade across the lengths of stretched plastic, you can cut them all at once.

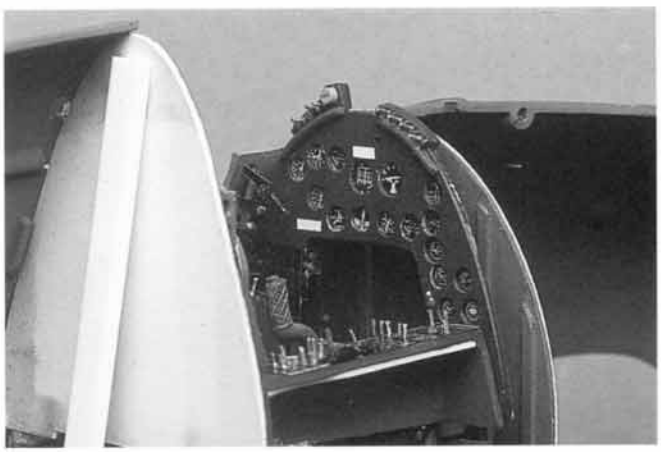
Cockpit consoles sometimes have instruction cards, which can be simulated with small decals. Monogram's 1/48 scale B-29 decal sheet contains dozens of small decals that can be used for this purpose on both 1/32 scale and 1/48 scale consoles. Another source is Waldron's Placards, which can be modified to look like instruction plates.

The last step is to install instrument bezels (the grooved rims around the instrument faces that protrude from the console). This is really an option—although bezels enhance the console, you can get by without them. If you decide to add them, cut them out one at a time on a glass surface with a sharp #11 X-Acto blade. Although bezels are small, they are stronger than they look and can be handled with a pair of tweezers. Secure the bezel with a toothpick as you cut the stubs that connect it to the tree. Sometimes bezels can get launched from their trees when you cut the second stub, so hold them down carefully.

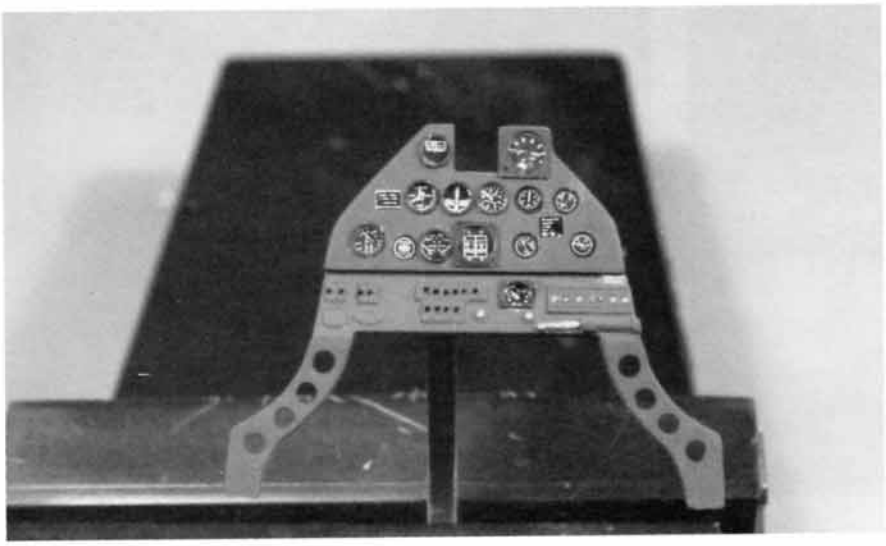
Before you attach the bezel to the console, paint the edges where you cut it from the tree. Chances are some shiny brass will be visible; this can be cured with some flat black.



Use a flat-ended, round toothpick with a moistened tip to pick and position the instruments.



The cockpit of a Corsair is filled with switch banks that can be easily reproduced with stretched sprue.



Revell's stock 1/32 scale P-40 instrument console with Waldron instruments and bezels and two additional instruction plates cut from decals. The only thing left to do is add the switches.

Don't attach bezels with anything but white glue or Kristal Kleer, which will dry clear and can be removed easily with a toothpick.

When you are ready to attach a bezel, apply white glue to the back side with a toothpick as you hold it with tweezers. Carefully lay the bezel over the instrument. Avoid getting glue on the instrument face. Position the bezel, press it down, and use a sharp toothpick to adjust it and remove excess glue.

As an alternative to using Waldron instruments, console decals can be used to produce a fairly good console. Some manufacturers supply them with some of their kits, and aftermarket suppliers such as Super Scale International include instrument decals with some of their decal sheets. On 1/72 scale kits console decals look okay, but on 1/48 scale and 1/32 scale kits the flat appearance of decals can be readily seen and detracts from the effect. To create a realistic console using these decals, use the sandwich method to make a new console. Punch out the instruments from the decal sheet and install them just like Waldron instruments.

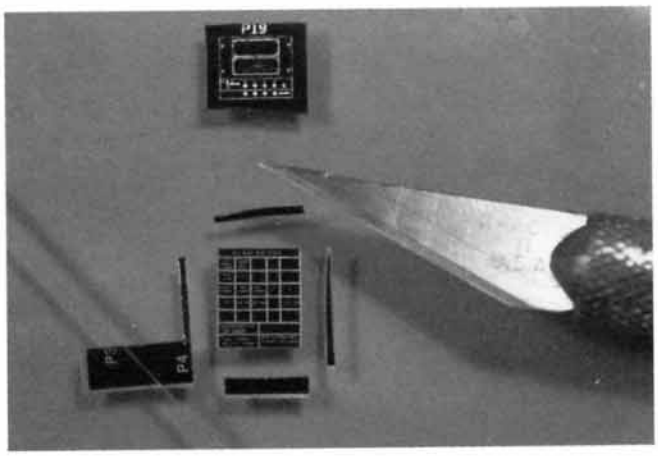
On many modern jets individual instruments have given way to CRT displays. To make them, use photographic negative slide material as the CRT display. Form-fit it into the CRT box and glue with Elmer's white glue. To distinguish the console from the CRT boxes, paint them different shades or colors.

Placards. Waldron Products also markets thin aluminum sheet cockpit placards for engine throttle quadrants, radio boxes, electrical and switch panels, gun controls, and trim and flap controls. Waldron Products also includes plastic disks and boxes for their placards. I use them in combination with both scratchbuilt and modified kit parts.

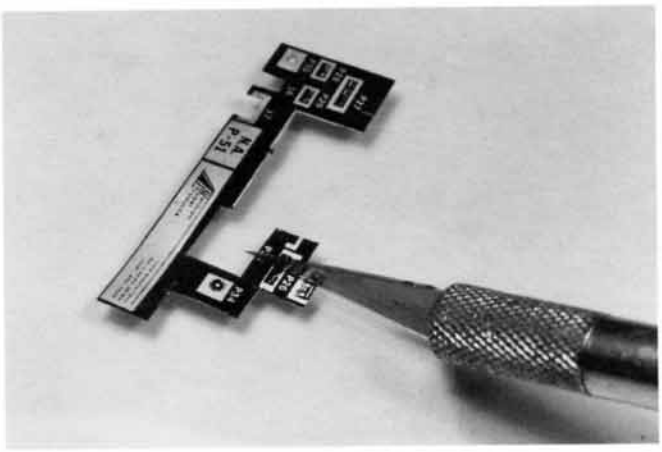
Even though Waldron includes pictures of finished kits in the assembly instructions, having pictures of the actual cockpit will help you immensely during assembly. It also helps to sketch the sides of the cockpit and draw in all the shapes to be added. This gives you spatial orientation inside the cockpit. It is important because all the parts you add must fit, and when you close the fuselage, the parts cannot interfere with other interior parts such as the seat.

Next, decide how you want to build up the cockpit. I always to use what the kit manufacturer supplies, if possible, because it saves time—so don't be afraid to modify kit parts to make them fit the Waldron placards.

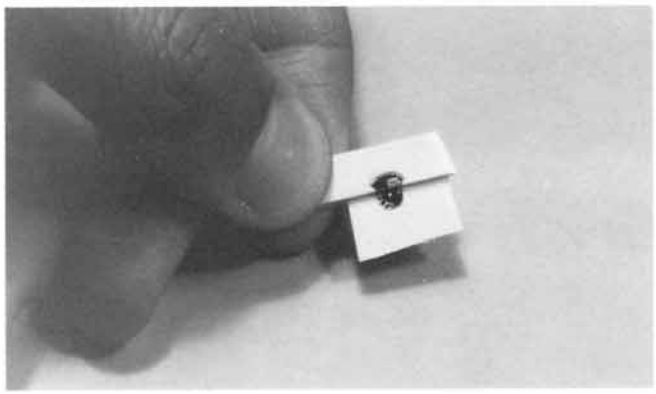
Once you have become familiar with the real cockpit and identified the kit parts you want to use and those you need to make, you are ready to start cutting out placards. The secret to working with Waldron



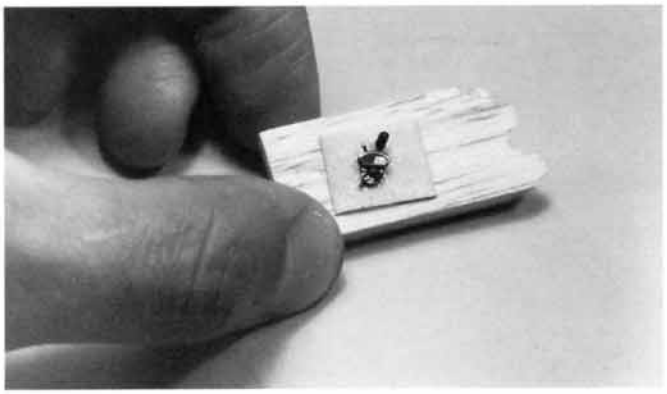
Rough-cut large placards and trim to size on a glass plate, using a straightedge.



Cut small placards by positioning the blade over the cut line and pressing down.



Using oversized stock makes mounting placards easy and ensures they will be centered on the plastic stock.



The same P-51 throttle quadrant after the plastic was trimmed and sanded. With the levers added, the part is ready to be installed.

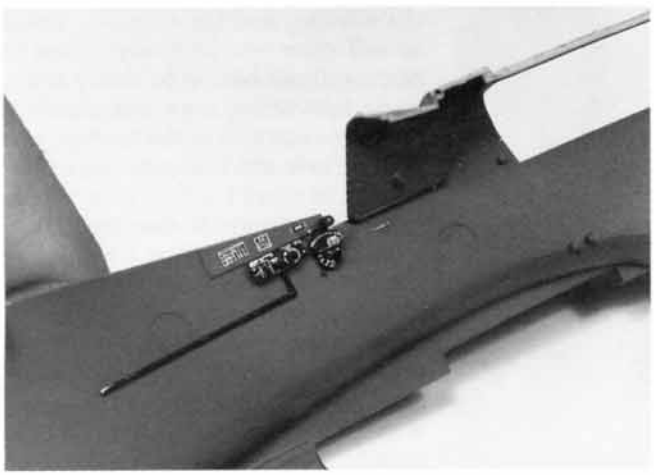
placards (or any type of placard made from metal or plastic) is to use only a sharp #11 X-Acto blade. If you cut with scissors you will bend the edges of the placard, and flattening them out may scratch the surface detail.

Rough-cut a placard on a glass plate, leaving some sheeting around the outline. There are two ways to trim the excess. The first is to place a small straightedge along the cutting line and run the X-Acto blade along it. You may need to run the blade over the cut more than once, so don't move the straightedge until you are done. This works well for large box-type placards. For small ones, secure the placard with a Q-Tip so you don't lose it as you cut. Position a #11 X-Acto blade over the edge to be cut and press down hard. This works well for placards with cutting edges smaller than the length of the blade.

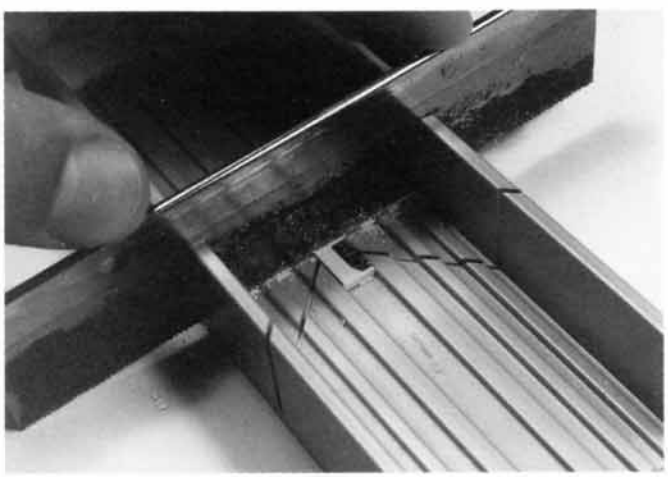
If the placards have curved cutting lines you will need to cut around the curves by using a series of tangent cuts. Once the part is glued to its backing, you can round it off with sandpaper. If the placards are round, punch them out with Waldron's punch set, but if the size does not match a punch diameter, rough-cut the part and make tangent cuts along the edges of the circle. Here again you can round off the part after it is glued to its backing. To make sure you don't lose any parts, work with one placard at a time.

Next, bend the placard into its proper shape. Waldron's instructions explain how to bend placards and at what angles they need to be bent. If there are multiple bends in a piece, they provide side-view drawings of the finished part for reference. Placards for square and rectangular shapes usually have only two sides, the top and the front, and these are the easiest to bend. I use combinations of plastic strip, my X-Acto blades, and edges of sanding blocks to help bend them into shape. If you make a mistake you can flatten the placard and try again, but this will usually only work once.

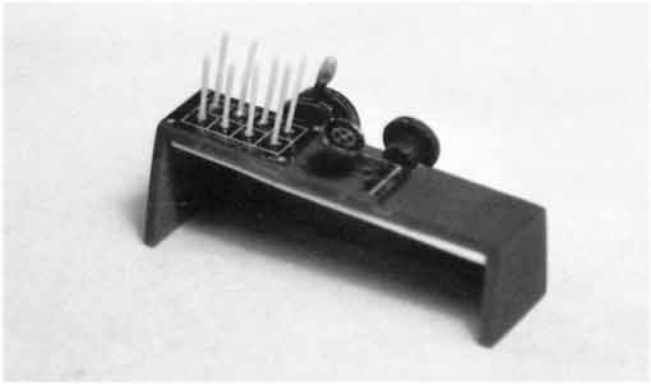
After you have finished bending, you are ready to attach the placard to its plastic backing. Although Waldron supplies plastic shapes for some of the smaller placards, you will have to use plastic stock for the larger ones. I use stock that is thicker and longer than necessary; then I don't have to



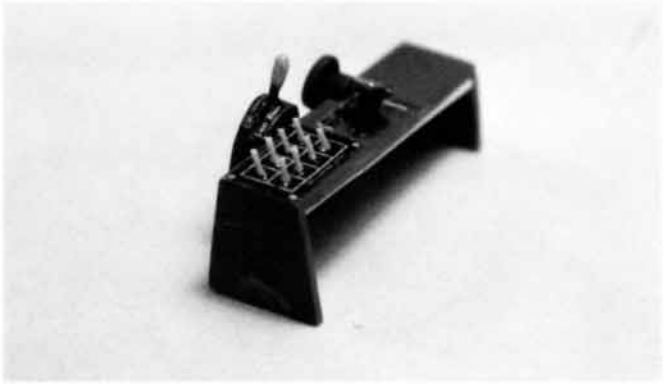
The left side of Hasegawa's 1/32 scale P-51 Mustang with instruction plates and some of the Waldron placards installed. The piping was made from Evergreen rod bent into shape.



To cut down the sides of box-type placards, use a razor saw and a miter box.



It's easier to install oversized stretched sprue and cut it to size than to cut exact lengths from the start.



The switches on the Corsair cockpit panel were cut to their correct length with small wire cutters and painted silver.

worry about getting it positioned correctly. This is because the super glue will secure the placard the instant it touches the plastic. After the glue is dry, cut the stock down to within 1/10 to 1/32 inch (2.5 to .8 mm) of the placard. Sand the remainder off by running the plastic across stationary sandpaper.

After you have shaped the stock, paint it to match the black color of the placard. Protect the placard's face from paint with masking tape.

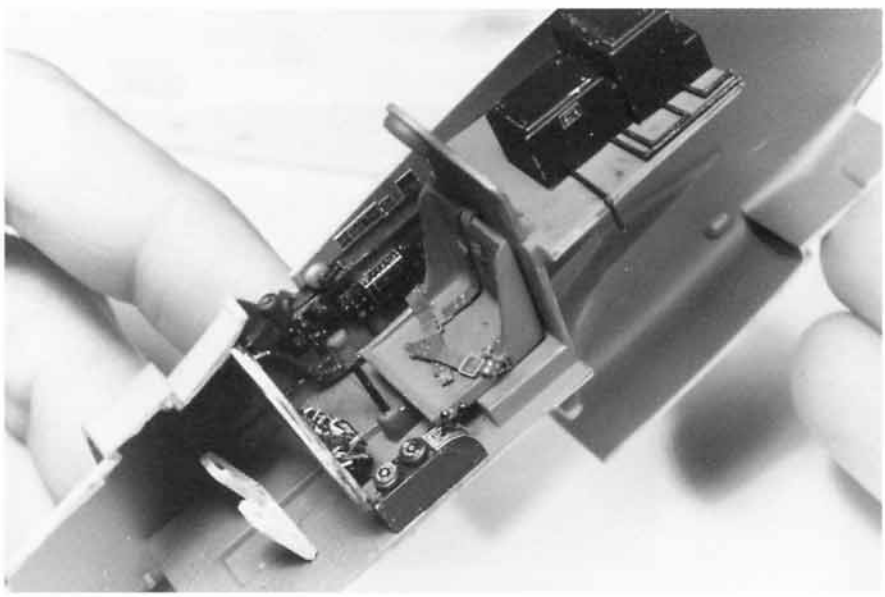
The last step before installation is to add selector and toggle switches. For selector switches choose the Waldron punch size that matches the dial location on the placard, punch out a small disk, secure it on a strip of masking tape, and glue a small piece of strip stock across the center of the disk. When the glue dries cut the strip stock so its edges are even with the disk's edge. Paint the disk a slightly lighter color than the placard. When the paint is dry glue the selector switch in place. Be sure to position it correctly—the plastic strip you glued to the disk should be pointing toward an inscription on the placard.

Toggle switches can be added the same way as described in the section on consoles, but I recommend painting them a different shade of black so they stand out—or use silver or gray sprue. Drill holes through the placard to place the switches, indenting the drill locations with a pin first so the bit will be properly positioned. The switches should be evenly spaced and in a straight line. They don't have to be all pointed in one direction (some will be off and others will be on).

If the placards have indicator lights, they can be simulated by adding a drop of Elmer's white glue or Krystal Kleer to each location using a round toothpick as an applicator. These glues have a high surface tension and will form a perfect hemispherical shape. After the glue has dried, paint it the appropriate color. If you have no information on indicator light colors, use red and green.

When you are ready to start adding the placards to the cockpit walls and flooring, first attach parts such as the cockpit rear wall, the seat, the flooring, and the console. Doing so will allow you to fit everything in place without having to worry about parts interfering with one another. Complete one side of the fuselage at a time. Close the fuselage halves frequently to check the fit of each part.

If you decide to use decal placards instead of Waldron's aluminum placards, the same construction techniques apply, but be sure the decal is properly applied and has a good protective coating. To ensure good adhesion, apply it to a gloss surface and give it several overcoats of a clear flat finish. This will allow you to drill holes in the decal for switches without ripping it, and to glue plastic stock to it. For all gluing use either Krystal Kleer or Elmer's white glue.



Form-fit each placard into place as you construct the interior. The right side of Hasegawa's P-51 is complete and ready to be mated with the other side of the fuselage.