

The forward section of this 1/48 scale Monogram Me 262 engine was detailed so that the open access panels would display a realistic-looking jet engine. (Model by Scott Weller.)

Detailing engines for propeller-driven aircraft includes adding wiring, piping, and cabling, as well as proper painting to highlight detail. You may also have to replace parts such as the valve push rods on radial engines because the kit-supplied parts don't match up with their locations on the cylinders; or you may have to add them if they weren't provided.

The amount of engine detailing you do depends on how you plan to build the model and display the engine, and whether it's a piston or jet engine. Jet engines don't offer as much detail opportunity, and most kit manufacturers don't include engines,

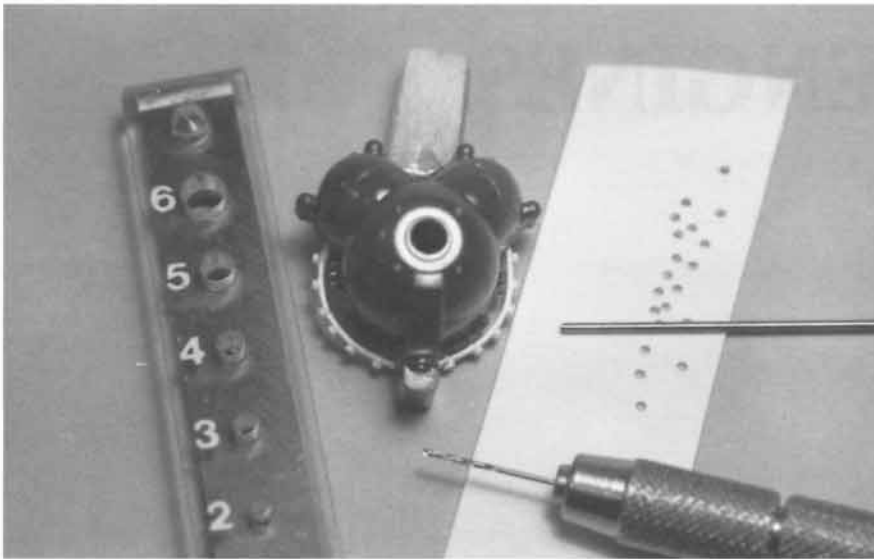
so all you are left with to work on are air intake and exhaust cone details. Unfortunately, these are sometimes lacking in the kit, but with the addition of small lengths of strip stock they can be greatly improved.

DETAILING ENGINES

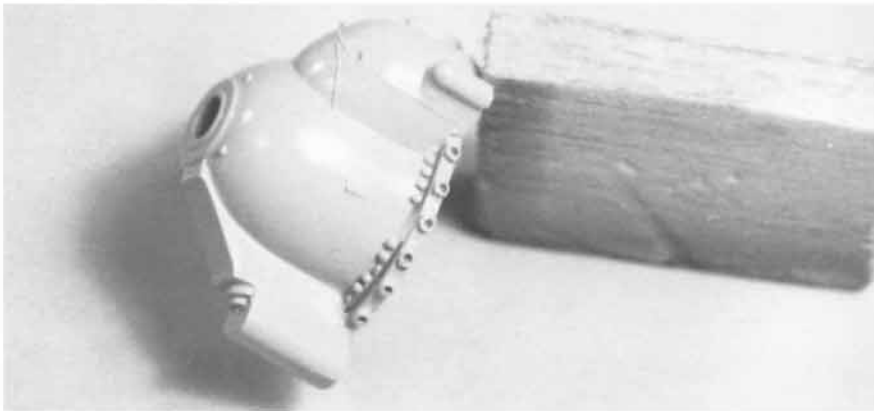
Almost all radial engines have a ring-shaped wiring harness at the base of the crankcase. Spark plug wires emerge from this ring. Both ring and wires are protected by metal jackets. Most engines from the early '30s and later had two spark plug wires for each cylinder. They are located next to one another on the

ring with a wider space between sets of wires. One spark plug location was always centered on the front of the cylinder and the other either on the top or the back.

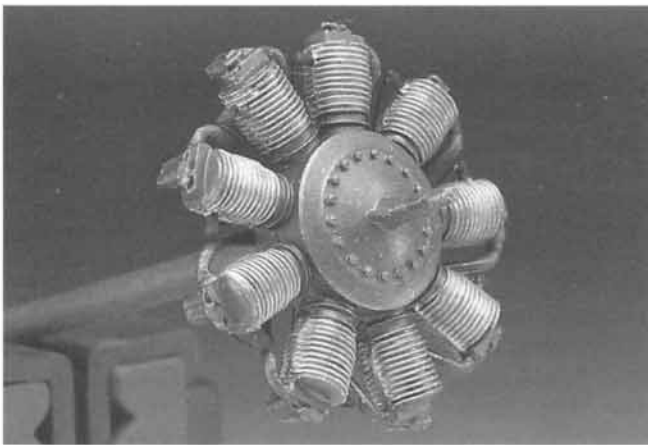
To add wiring you will need to mark the wiring harness ring for the correct number of cylinder sets and drill small holes in the ring with a pin vise and small drill bit for a positive seating. Use the circular template to match the ring to a circle size, draw it on paper, and mark the correct number of cylinders on the circle. This allows you to play with locations until you get them spaced evenly. Once you are satisfied with the spacing,



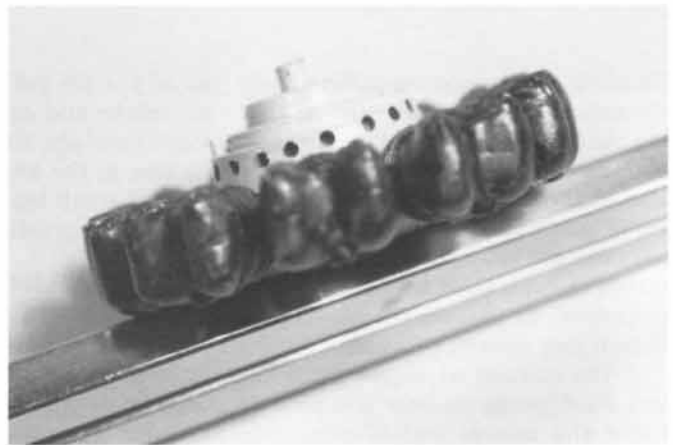
The wiring harness on Revell's 1/32 scale R-2800 engine was replaced and individual locations for the wiring were added using Waldron's punch tool.



Drill out wiring locations so the strands of stretched plastic seat properly.



Testor's Metalizer colors highlight the details of this engine. The base color was airbrushed and cylinder colors were applied with a brush.



No push rods are supplied on Revell's 1/32 scale R-2800, but you can add them without much trouble. Drill the locations for the individual push rods using the cylinder locations as a guide.

transfer the locations to the part using a small marker.

Now drill holes in the cylinders at the correct spark plug locations. Be sure the drill bit size matches the size of the wiring. Use strands of electronic wire for 1/48 and 1/72 scale engines, and stretched sprue for 1/32 and 1/24 scale kits. If you use electronic wire, strip the plastic covering off, separate the strands, and stretch them carefully to straighten them out.

After drilling the holes for the spark plug wires, prime the subassemblies and give them a coat of Testor's gloss gull gray. To accent cylinders and highlight cooling vanes, hand paint them with Testor's non-buffing gunmetal Metalizer. Testor's Metalizer paints are thinned for airbrushing, but the non-buffing types can be brushed onto small areas. Due to the thinned consistency of the paint and the fact that it doesn't adhere well to gloss enamels, the paint will flow into the areas between the cylinder's cooling vanes while only slightly staining the tops of the vanes. This gives a two-color appearance to the cylinders and highlights detail.

Be extra careful applying the Metalizer in the area where the cylinder meets the crankcase because thinned paint can easily flow onto the face of the crankcase. The tops of the cylinders are usually a darker color than the body, so paint them with Testor's non-buffing exhaust color Metalizer. To accent crankcase bolts use Testor's silver applied with a

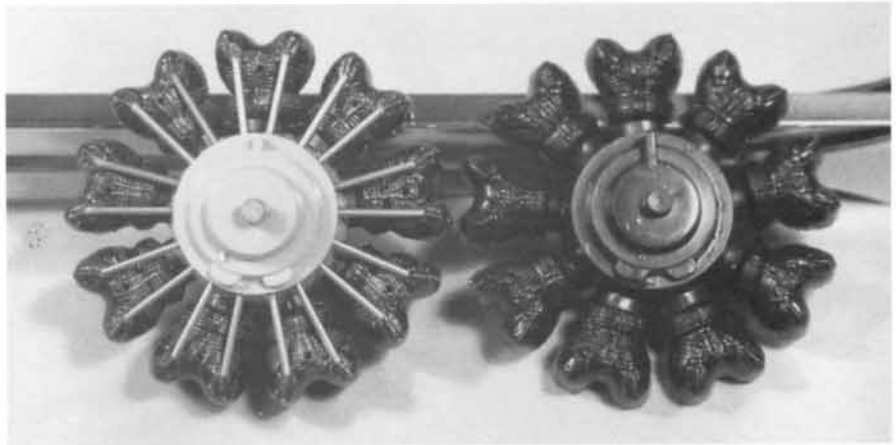
sharpened round toothpick. As a final touch add a small square or rectangular black decal to the crankcase to represent the manufacturer's plate.

Push rods that are separate parts seldom match their locations on the cylinder heads. I recommend cutting them at their base and replacing them with Evergreen round plastic stock. Paint a length of round stock the correct color (black or natural metal), then cut approximate lengths for the number of push rods you need. Form-fit each push rod into place and attach with Elmer's white glue. Where the push rod meets the cylinder head the glue also acts as a filler that can be touched up with paint.

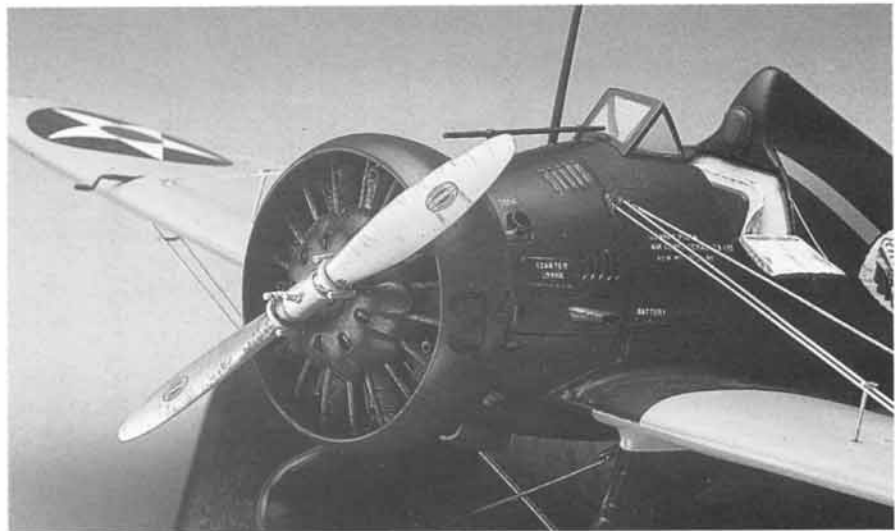
To weather the engine, dust it with a mixture of brown and black pastel applied with a soft brush and airbrush a coat of clear flat to seal. Drybrush some Polly-S "oil" color onto the engine cylinders and the area where the cylinders meet the crankcase. Apply a touch of Polly-S oil color to the crankcase sump, which is the long rectangular part protruding from the crankcase and pointing down. These oil stains must be subtle, so don't overdo it.

The last step is to add the wiring. Determine the color of the metal covering protecting the actual engine wiring: usually this was copper, black, or a bright metallic color. After you paint the wire strands or sprue, install them around the harness at the base of the crankcase using white glue. Form-fit them one cylinder location at a time. I usually do the front wires first, then locate the wires for the backs of the cylinders. If there is a second row of cylinders I work on the front row first.

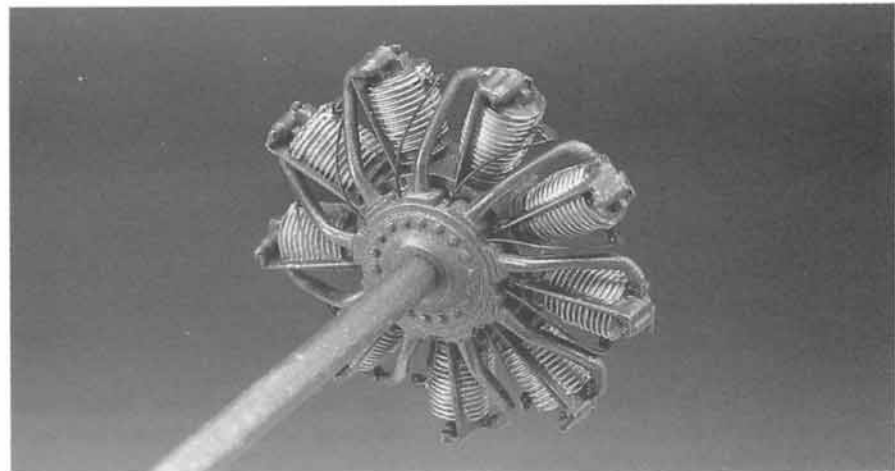
In-line engines are set up much like straight block automobile engines—spark plug wires on both sides of the engine block in straight rows. Remove the molded wiring detail with a #11 X-Acto blade and sandpaper. Then mark the locations of the spark plug wires and drill holes. The spark plug wires are usually wrapped together and distributed along the block. Glue them one at a time and bundle them together as you



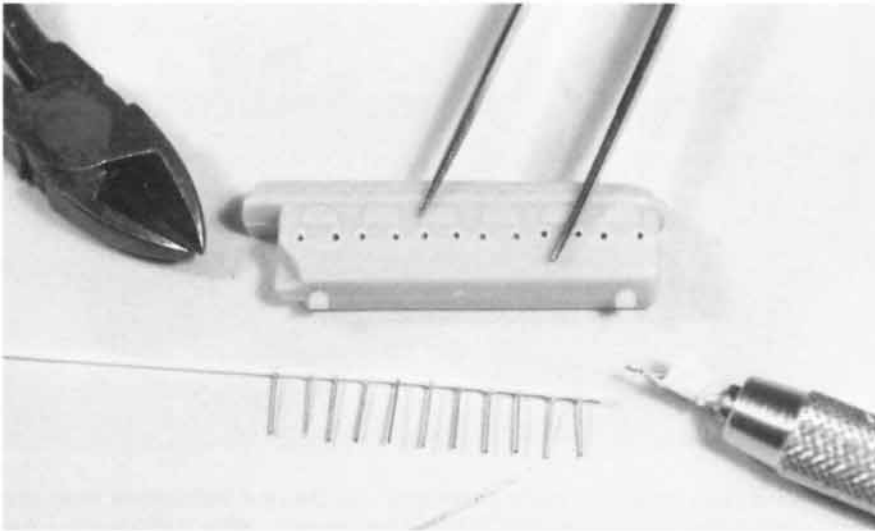
Airbrush the push rods with Testor's Metalizer and then cut and form-fit them into place. The engine part on the right is the stock kit part. What a difference a few lengths of plastic rod can make on an engine that lacks detail!



Hasegawa's 1/32 scale engine for its Peashooter kit is great, but the push rods don't line up with the cylinder heads. To correct these types of problems, simply remove the kit's rods and replace them with individual lengths.

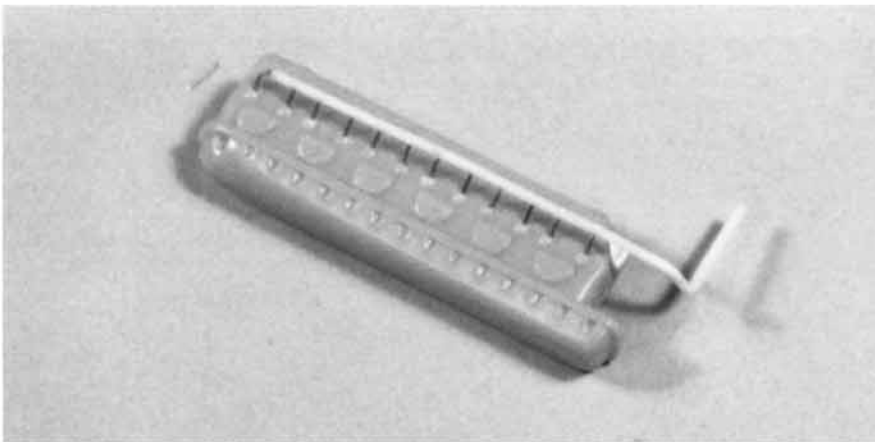


The wiring on this engine ended on the back side, where it would not be seen.



(Left) Bundled stretched sprue or a combination of plastic rod and thin wire can represent wiring harnesses on in-line engines.

(Center) The wiring harness has been installed and will be painted after assembly of the rest of the engine. These details add a three dimensional effect to in-line engines.



move toward the rear of the engine. White glue works best because it dries clear.

Mixture, throttle, and sensor cables, as well as other types of wiring you may want to add to an engine, can be made by stretching various diameters and colors of sprue. Always start with a long length of sprue, glue one end in place, form-fit it into place, and then glue the other end.

To give the engine weight and to anchor the spark plug wires more securely, you may want to fill the block with resin. Be sure all seams are sealed, or the resin will seep out.

You can also highlight detail on these engines by painting them various shades and colors. The block is usually a different color than the top of the engine and rear components. Engine mounts are usually framing, which can be painted various shades of the same color.

The overall effect of adding wires, painting the engine and mounts different colors, and weathering is to turn even an average in-line engine into a masterpiece.

Jet engines are the most difficult to detail, and few models have them. The original piping and wiring are difficult to remove without marring the engine, so I recommend adding additional piping and wiring to provide a perception of depth. Evergreen rod is the best plastic for this because it is soft and flexible. Use various size rods, especially if you are running several lengths together, and always use Elmer's white glue to attach them to the engine. Thin electronics solder also works well because it conforms easily to the shape of the engine. Add junction boxes and other appendages using various sizes and shapes of small square stock. If you are going to connect piping and wiring to these



Even if the engine is molded into the fuselage, you can still add detail. To enhance the appearance of Monogram's 1/48 scale P-51 Mustang, wiring and drain tubes were added. (Model by Richard Boutin, Sr.)

junction boxes, drill small holes so the rods will fit into them.

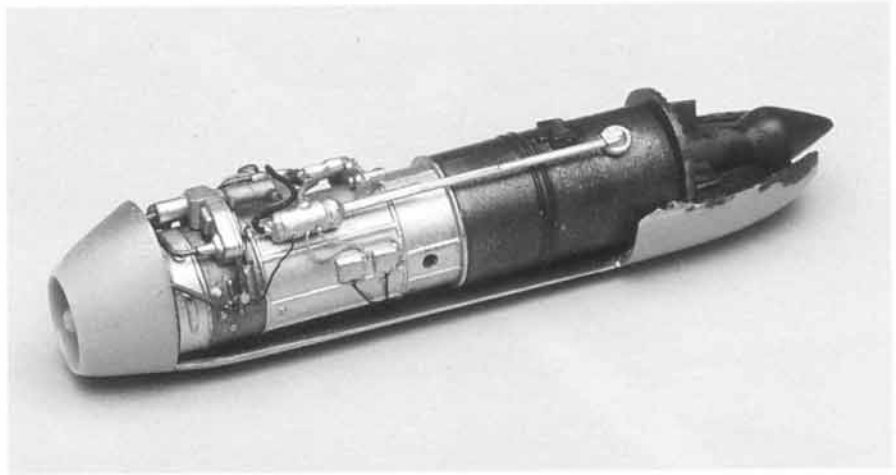
Most engines, like the ones supplied with Hasegawa's 1/32 scale F-104 or Revell's 1/32 scale Me 262, have lots of molded-on detail which can be greatly enhanced by drybrushing. The molded boxes on these engines also make excellent connection points for additional piping and wiring.

You might also try sanding the backing of the intake part until only the vanes are left. Trace the part on sheet stock, cut it out, paint both parts, and position the circular disk about $\frac{1}{16}$ inch (1.6 mm) behind the intake. This increase the perception of depth and makes the individual turbine blades stand out.

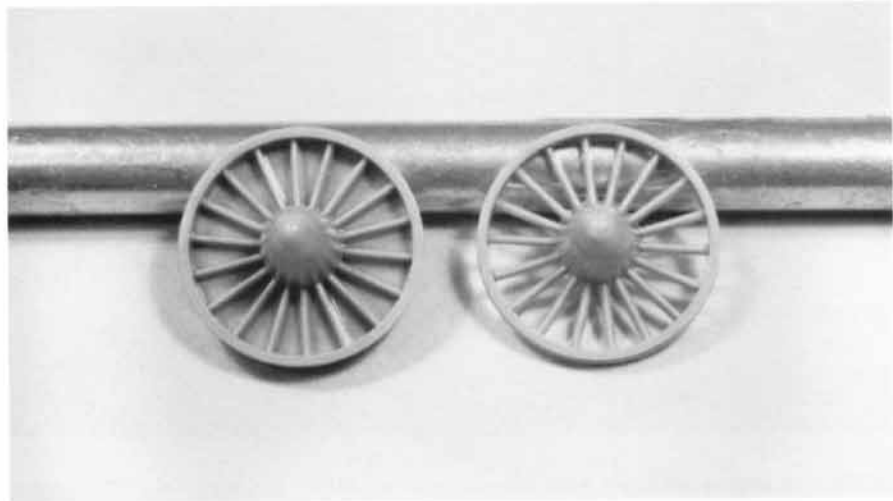
PROPELLERS, ENGINE INTAKES & EXHAUSTS

Proper painting of propellers should not be overlooked. After you remove the mold lines, give the propeller a coat of primer and mask the blades. Airbrush the tips gloss yellow with a few drops of gloss white added to make the color look faded. After it has dried (two to three days), mask these areas and paint the blades gloss black with a little gloss white added to make a slightly lighter shade. (If the hub area is a different color than the blades, mask it too.) Use gloss black because flat black does not accept a clear finish well. It will also ensure that small decals on the propeller blades will not silver.

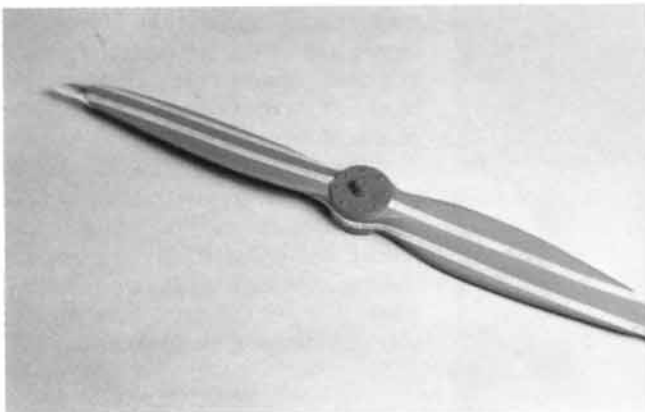
Finally, mask the entire length of the blades before you spray the hubs. After you have finished painting,



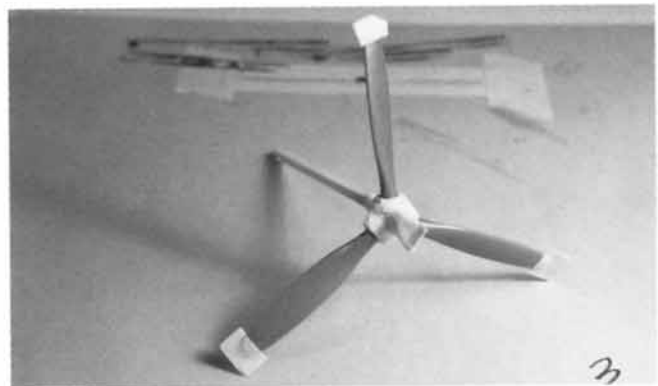
Adding tubing and wiring detail to jet engines takes time because you must conform the tubing to the shape of the engine. This 1/48 scale Me 262 engine by Monogram is a combination of kit parts, metal, and plastic tubing. (Model by Scott Weller.)



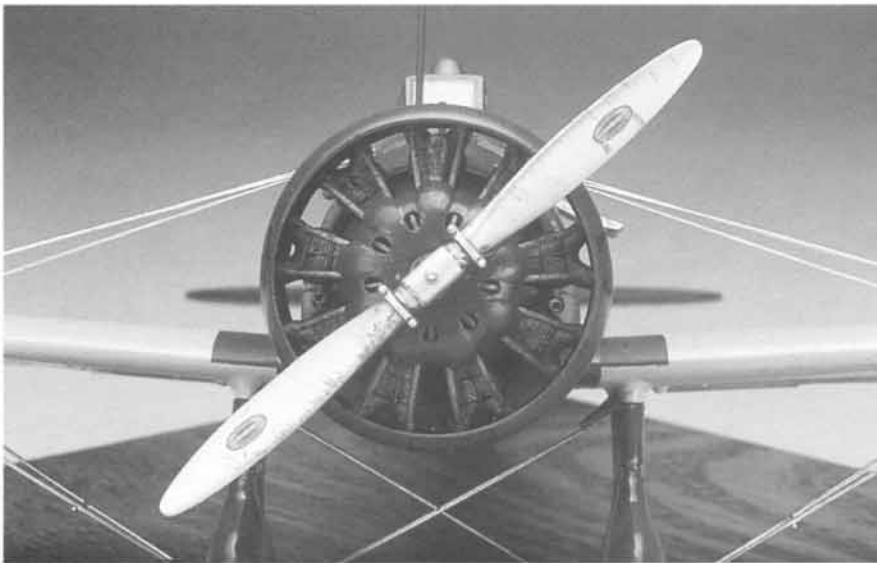
Improve the appearance of jet engine intakes by removing the plastic from around the turbine blades. This is done easily by running the part across a piece of sandpaper.



Masking propeller blades to represent laminated wood is easy with thin strips of masking tape.



Most metal propellers can be masked and painted quickly, but if you are using gloss paints, be sure they are dry before you mask them.



Oil and lubrication leaks on variable pitch propellers are common, so don't forget them.

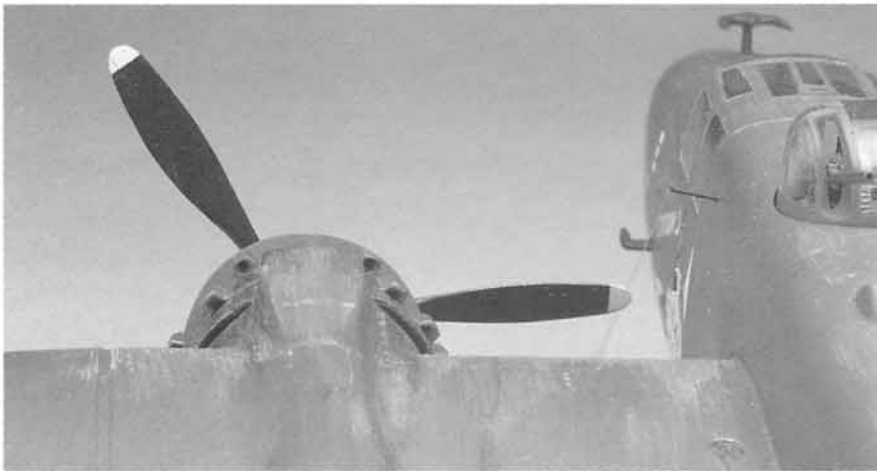
apply decals to the blades. When they have dried, run a soft lead pencil across the leading edges; then run your finger across the lead residue to work it into the paint and flatten it out. This will give the blades a subtly worn effect. Seal the residue by air-brushing the entire propeller with a clear flat finish.

Oil and grease leak out of the propeller hub where the pitch gears are located and smear onto the hub and down the blades. Although the oil is blown off during flight and splattered onto the engine and cowling, as the engine comes to a stop after landing the oil seeps onto the blades. It streaks across the front of the blades, but not all the way out to the tips. Generally the first quarter length has this residual oil, so use your Polly-S oil color sparingly in this area.

Frequently overlooked by modelers are engine exhaust ports, air intakes, cowling flaps, and other exterior engine vents. They are normally molded as solid pieces or have solid screen grating molded on. For a touch of realism, hollow them out.

Exhaust ports can be hollowed out in several ways, depending on the type of model and the locations of the ports. On a fighter plane they can be hollowed out with a Dremel drill press stand and a motor tool. Match the bit to the port diameters and drill out the plastic by pressing the part to the bit. The trick is to hold the part with both hands. Don't let the bit contact it for long or you may melt the plastic. Go slowly and drill small layers of plastic at a time. Remove the part frequently to check progress and blow away the plastic shavings.

For exhausts like those on bombers use combinations of drill bits and micro files to cut into the plastic and shape it. If the ports are oblong, use motor tool side cutters; when you get the pilot hole drilled, you can shape it easily with the side



Drilling out engine exhausts adds another level of realism to your model. The engine exhausts on Monogram's beautiful 1/48 scale B-25J were hollowed out using drill bits and micro files.



Open angled exhaust ports by holding them with both hands and carefully drilling out the individual ports.

(Right) Hollowing exhaust ports on kit-supplied parts makes a big improvement.

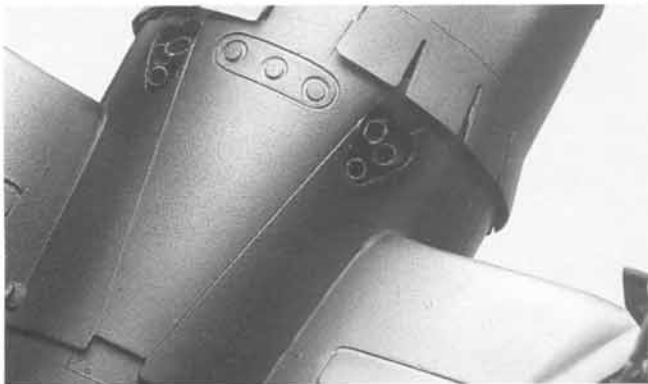
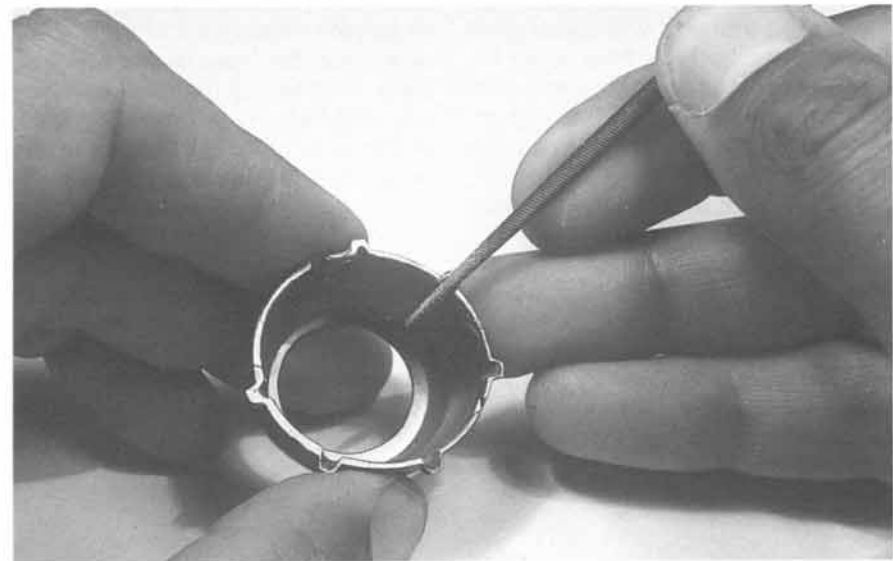
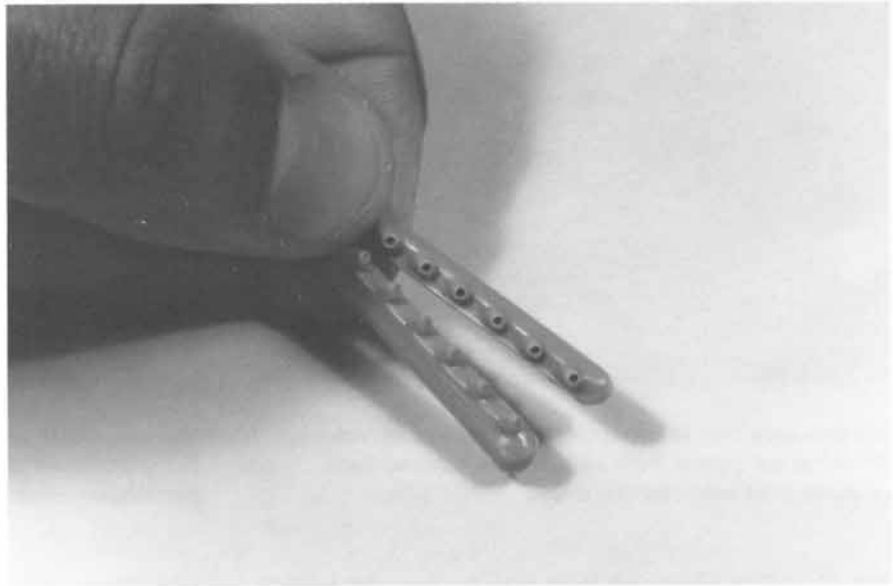
(Center) Sometimes cutters and drill bits are not enough to hollow out a part. In these stubborn cases use micro files to cut and shape.

cutter. When hollowing out exhausts, go only deep enough so the port appears to be hollow—between $\frac{1}{16}$ and $\frac{1}{8}$ inch (1.6 mm and 3.2 mm).

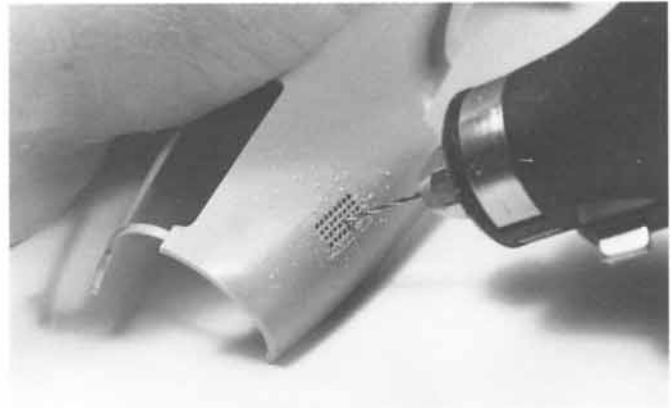
Engine breather holes and intakes can be tricky, especially with multiple holes next to one another like those on a P-51 Mustang. For small holes use a pin vise with a drill bit to get the hole started to a good depth. Then if you decide to speed up the process with a motor tool the bit will have a good starter hole. Small bits tend to skip if the pilot hole is not deep enough. For square air intakes use micro files or a combination of files and bits to remove the plastic, shape the hole, and thin out the sides. Since you are working with thin plastic, be gentle and go slowly.

Cowling flaps, especially on a bomber, look more realistic if the plastic between them is removed. This can be done with a razor saw or a jeweler's saw, depending on the scale of the model. Generally, the smaller scales require a jeweler's saw.

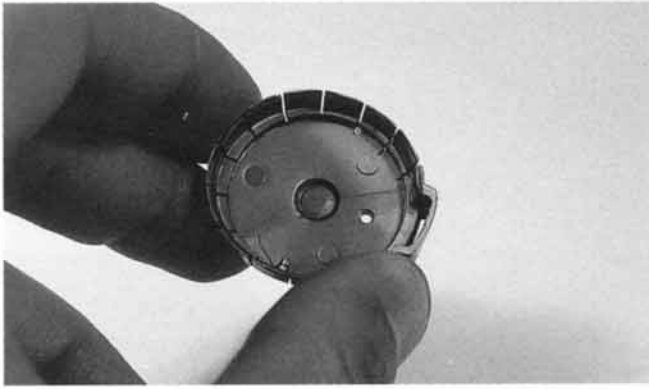
Engine vents can also be drilled out several ways, depending on the situation. The most difficult are the small vents, especially on the upper wing surfaces of bombers. The best



Sometimes you have to replace the exhausts with tubing. The molded in exhaust ports on Revell's 1/32 scale Corsair were cut out and replaced with plastic tubing. The edges were thinned with a #11 X-Acto blade.



Although photoetched parts are available for the breather holes on P-51 Mustangs, it's easier and cheaper to simply drill out the holes.



Another area that is sometimes overlooked by modelers is removing the plastic from between the cowling flaps. It can easily be done with a jeweler's saw.



The wing vents on Monogram's 1/48 scale B-25J were drilled out and cleaned and shaped with a #11 X-Acto blade. Protect surrounding plastic with masking tape first.

way to hollow them out is to drill a series of small holes, use a #11 X-Acto blade to remove the plastic between them, and smooth the sides with micro files. There is little room for error, and repairing gouges can be difficult in some locations. Mask the surrounding plastic so it will not be damaged if you slip.

To remove large amounts of plastic, start small and progressively enlarge the diameter and depth of the hole. This is slow going, but you can achieve thin plastic walls without melting them if you work up to the size you want. To secure a part in a vise, sandwich it between two pieces of balsa wood for protection. The balsa will also help hold it in place.

Air intakes can be open or have screening covers, so check your documentation. Fighters usually have big air intakes on the front of the cowling or around the front of the fuselage, while two- and four-engine bombers can have intakes on the leading edges of the wings as well. If the area is covered with screening, cut out the molded screening and add photoetched screening. Not all air intakes on an aircraft have screen covers; a good example is the B-17. The intakes between the engines have screening, while those between the fuselage and inboard engines don't.

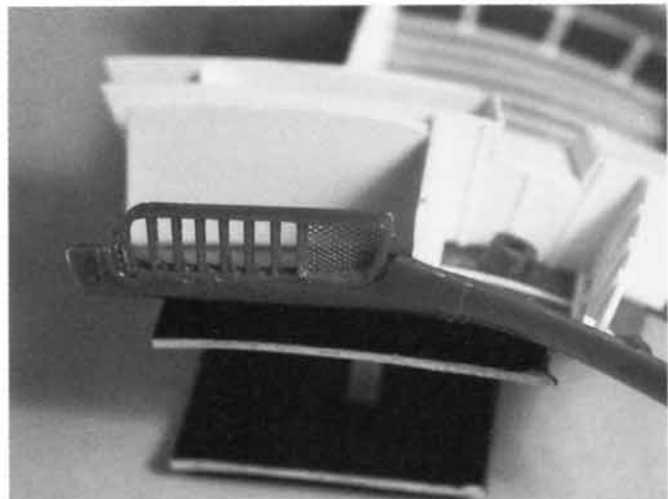
Model Technologies and other photoetching companies market excellent grades of wire mesh screen-

ing. It can be hard to cut to an exact shape, so plan placement carefully and use an oversized section. Cut it to the approximate shape and install it on the inside of either the fuselage or the wing. This requires some patience because you need to form-fit by trial and error, but it sure beats trying to cut it to the exact size and installing it from the outside.

Exhaust ports generally take on a rust or mud color due to temperature and exposure to the elements. Paint exhausts with Testor's burnt metal buffing Metalizer, polish with a Q-Tip, and seal with Testor's Metalizer sealer so the color is dulled. I have seen real B-17s with exhausts that appear to be almost a mud color.



One of the toughest engine intake parts to scratchbuild is a Corsair intake, but there is an easier way. Run the part across a dowel wrapped with sandpaper until the backing is very thin, and remove the remaining plastic with a knife.



Once the part is cleaned up add photoetched screening and glue it in place. Super glue works best as a filler, especially to shape parts around small areas.

(Right) There is no substitute for the air intakes on this Corsair. All it took to achieve this level of realism is a little elbow grease and about ten cents worth of photoetched screening.

(Center) The exhaust stains stand out against the faded appearance of the olive drab paint. Note the subtle exhaust stains on the upper surfaces of the elevators, caused by the two inboard engines. (Model by Richard Boutin, Sr.)

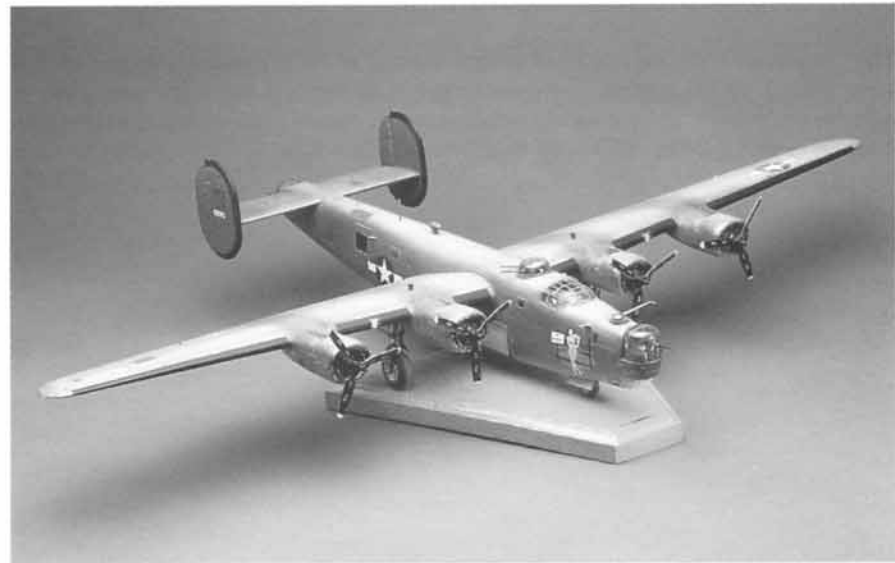
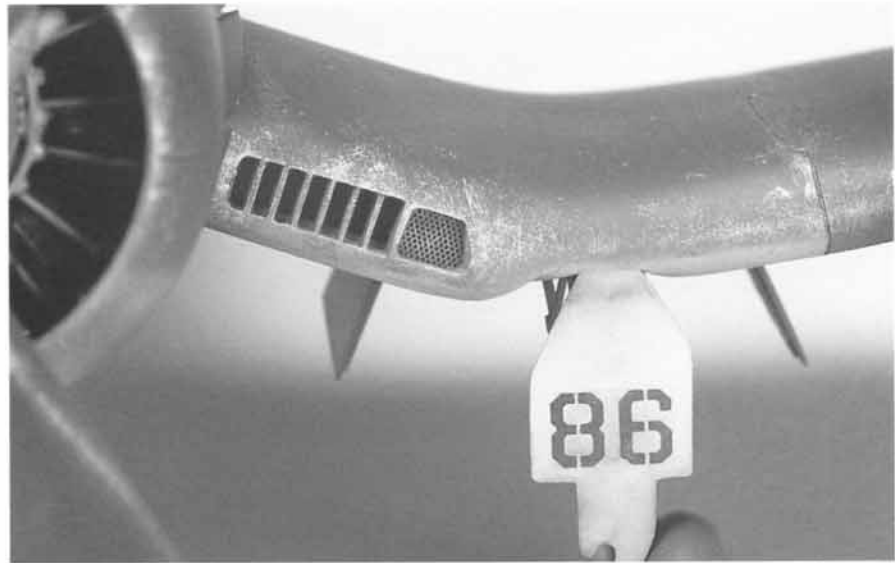
Although this might be the actual color, on small scale models it just doesn't look right.

Jet exhaust nozzles are complex pieces of equipment that can expand and contract depending on speed and acceleration. The nozzles are designed along the same principles as a camera's diaphragm. The diaphragm is a series of metal plates that slide past one another to form an opening of a specific size. On jet nozzles this can be represented by gluing small strips of plastic stock along the nozzle's interior and exterior. When adding stock, do a test run and glue the strips with small amounts of Elmer's white glue. The trial run will tell you a lot about the spacing you need between strips. Once you get the spacing set, you can make a spacer out of a piece of strip or sheet stock. It will ensure evenly spaced strips around the nozzle. If you have an odd spacing, position that area toward the bottom. To remove strips, soak the part in water.

You can also add the actuator rods that move the plates, but I recommend this only on 1/32 scale aircraft. On 1/48 and 1/72 scale kits just adding the strips to both sides of the nozzle will give the parts the appearance of depth. Paint the nozzle with Testor's buffing Metalizer and use a Q-Tip to polish it. The Q-Tip will only touch the top areas of the strip, resulting in a two-tone effect.

Don't forget to paint the insides of the cowling, the engine compartment, and any air intakes and

Adding small plastic strips on both the outside and inside of a jet exhaust can greatly improve its appearance. (Model by Major Billy Crisler, USAF.)





The tail areas of jets usually have several shades of burnt metal due to the intense heat created by the engine. Different mixtures of Testor's Metalizer were used to achieve the various shades on the tail area of this model. The various shades were blended in with a Q-Tip. (Model by Scott Weller.)

exhausts the correct colors. Engine compartments are usually covered in exhaust stains, grease, and oil stains, and the engine mounting framing is usually discolored by heat, so be sure to paint these details. The outer areas of engine brackets usually acquire a slightly burnt metal appearance, so add some Testor's burnt metal Metalizer to these areas. Dust the engine compartment with a dark pastel and seal it with Polly-S clear flat before you add any oil or grease stains. Wash the interior corners and folds with Polly-S oil color and dry-brush the interior surface with a combination of Polly-S oil and flat black. Jet exhausts are usually a mixture of burnt metal shades, which can be achieved using Testor's buffing and non-buffing Metalizers.