

CHAPTER FIVE

SCRATCHBUILDING SHIP PARTS

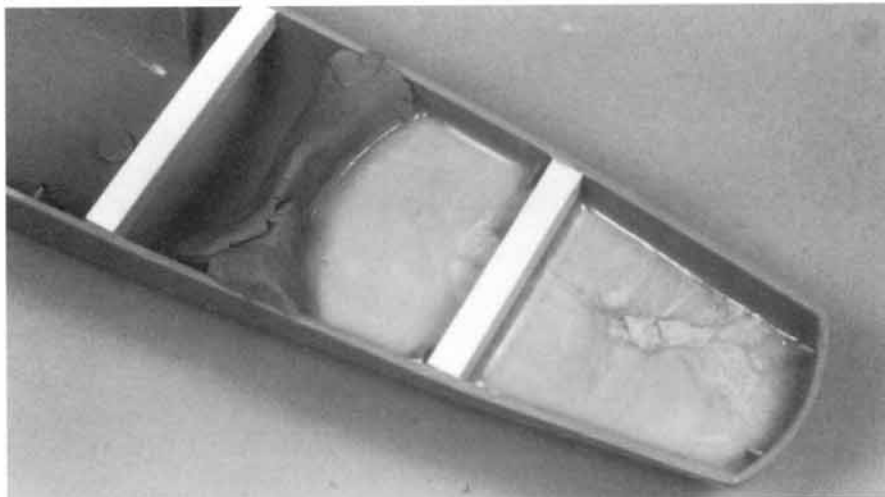
Scratchbuilding is easy if you know a few basic tricks. You need a good supply of Evergreen plastic strip, sheeting, and tubing, as well as brass tubing and rod. You can greatly enhance the appearance of your model by replacing decks, building new propeller shafts, replacing guns, or scratchbuilding railings.

REPLACING STEEL DECKS

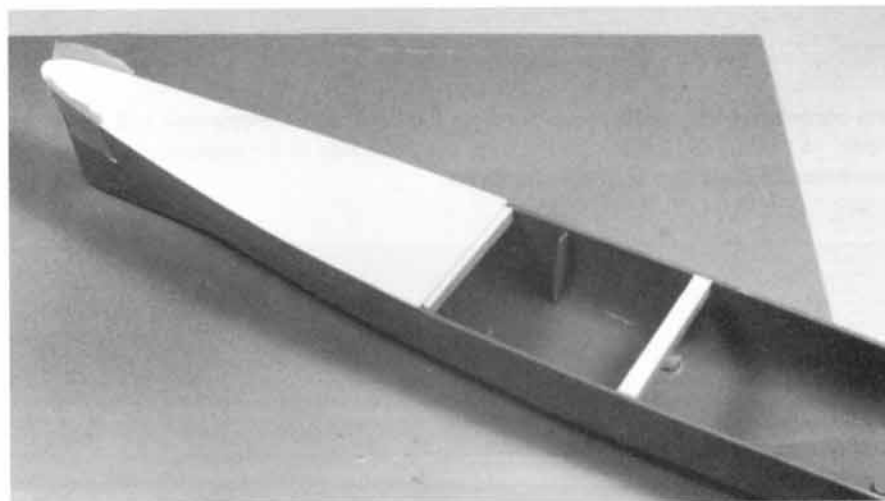
Some kits have decks that must be replaced for one reason or another. Good examples are Revell's 1/248 scale *Buckley* or 1/240 scale *Ward*. These large scale kits can be made into beautiful ship models with some alterations. The deck inserts for the railings on the *Buckley* leave seams that are impossible to remove without also removing the stanchions and all the surface detail at these locations. The *Ward* has a scribed wooden deck, yet the real ship had a steel deck.

Replacing a steel deck is easy with some sheet stock and several lengths of thick strip stock. The strip stock is placed along sections of the hull to help strengthen it so it won't flex after you install the deck. You must form-fit the lengths between the sides of the hull, taking care that the plastic strips don't change the shape of the hull or cause bulges along the sides. The best way to set the strips is to cut them so they lie inside the hull flush with the top. This requires careful form-fitting, so go slowly and check your work. To ensure that they are flush with the top of the hull, lay a small section of sheet stock over the strip.

Use white tube super glue to glue the strips in place. Be sure to apply the glue to the sides and the bottom of the strips where they meet the hull. Apply some accelerator to the glue and move on to the next hull section. On large scale ships, set a strip about every 2". If you are using two sections of sheet stock, be sure to place a strip at the joint so the seam will have support.



To strengthen the hull and to provide support for the new deck glue strips of plastic across the hull.

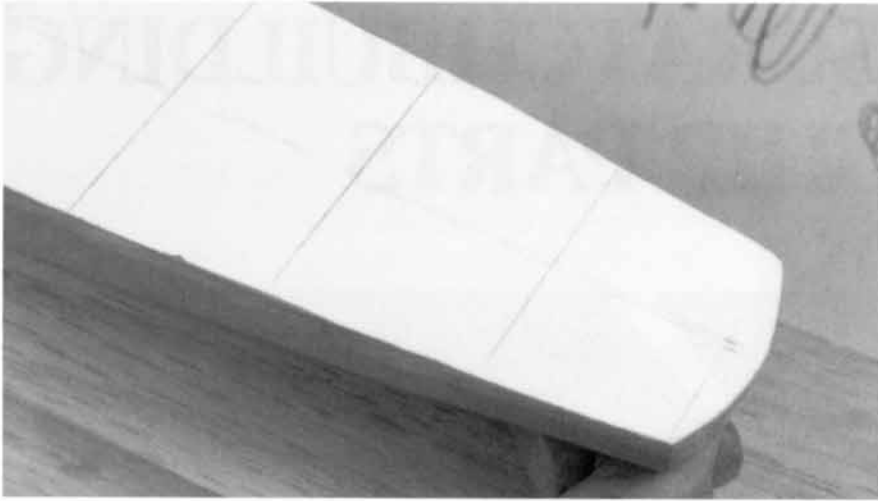


The forward section of the deck on this kit is complete. After adding the aft section, use super glue to fill the seam between the two deck sections.

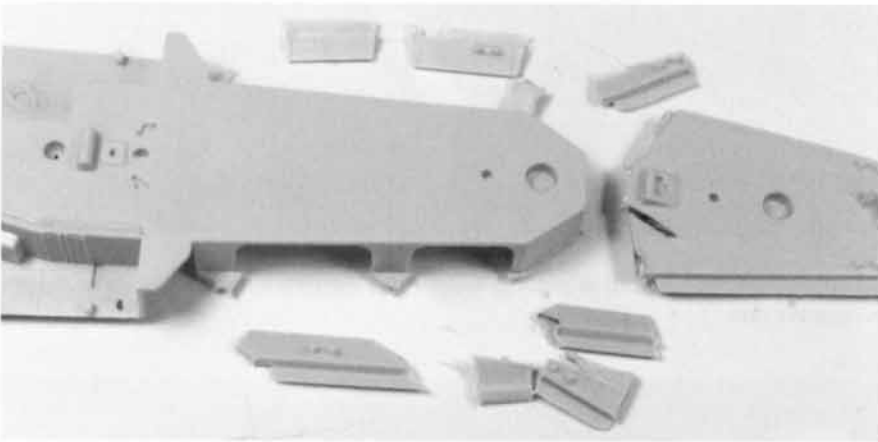
Next, clean the perimeter of the hull, making sure all flash and ejection marks are removed. Be sure not to change the shape of the lip of the hull when you do this. Next, lay the hull upside down onto the sheet stock and trace the outline. Cut out the shape,

but leave a strip of about 1/8" to 1/4" around the drawing so you have some room to play with.

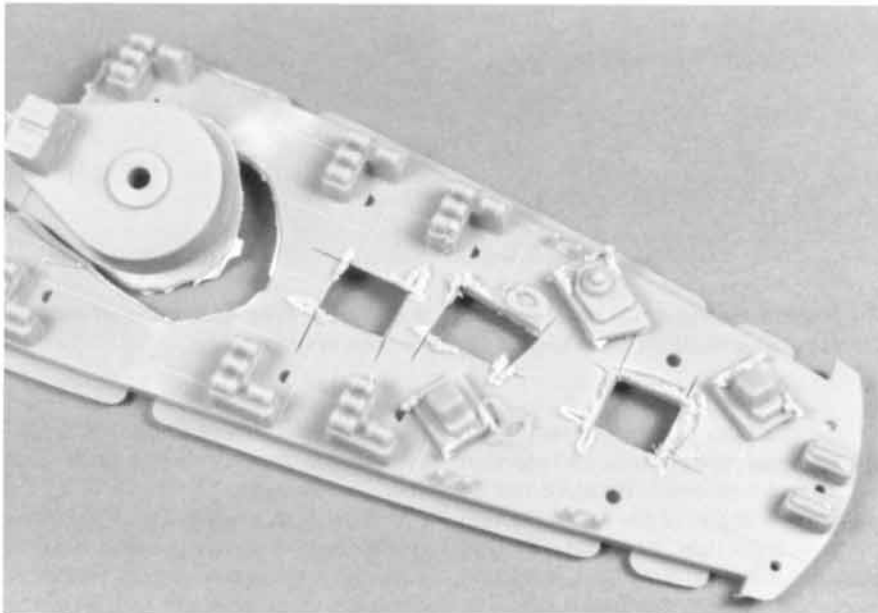
Now you are ready to glue the deck down. Squeeze a small bead of super glue along the contact surface of the strip stock sections and press the



To ensure that the superstructure and other main deck fittings will be positioned correctly, draw a grid system on the deck with a soft pencil.



The superstructure can be rough-cut from the deck with a motor tool and a circular blade. To remove the excess plastic from the underside of the superstructure run the part across a stationary piece of sandpaper.



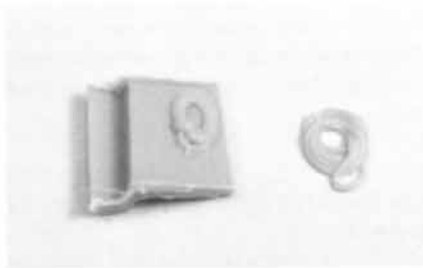
deck onto the top of the hull. Be sure the entire surface of the sheet stock lies flush against the strips and the side of the hull. If it is a small ship kit, this is pretty easy to do, but if it's a large model you may need some help. If you lay the sheet stock on a flexible piece of foam cushion and press the hull against it you will get a perfect fit. Just be sure the super glue doesn't bleed out from the sides of the hull and glue the foam to the plastic.

Once the glue is dry you are ready for the final gluing phase. Run a bead of super glue around the perimeter of the hull where it meets the sheet stock. When it is dry you are ready to cut and sand the excess. Use a number 11 X-Acto blade to trim as much as possible. Use the edge of the hull to guide the blade, but be careful not to gouge or cut too much plastic. I usually shave layers off at a time and sand the remaining plastic off using a combination of sheet sandpaper and Flex-I-File sanding sticks. The lip of the hull will provide an excellent guide for your sanding efforts and the deck will form the exact shape of the hull.

If you used two sections of plastic sheeting, use quick-gel super glue as a filler at the seam. Be sure the seam is positioned above a length of strip stock. When the glue is dry and you are ready to sand, be sure the sandpaper is flush with the deck. You want a smooth deck without any waves, so be careful how you sand. Sand the entire surface of the plastic to smooth it.

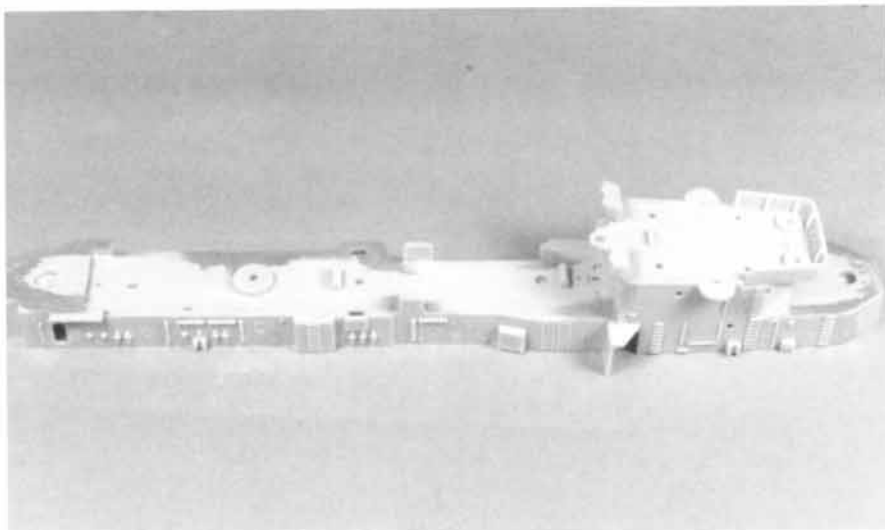
Once you are finished with the deck, draw a grid on it. This will help you position the superstructure and other deck fittings. Strike a center line from the bow to the stern and draw lines perpendicular to the center line. These will run from port to starboard. Lay the edge of a triangle along the center line and strike a line from the center to one side then extend it to the

Deck fittings and small superstructure sections can be cut out with the motor tool or scribed out using Bare Metal Foil's plastic scriber.



You can cut out even finely detailed deck ropes. Now it's easy to paint these beautiful details and attach them to the new deck with white glue.

The completed lower superstructure assembly is now ready to be glued to the deck.



other side. Once you have one line drawn you can use a ruler to draw more lines just by moving the ruler from one line to the next. Once the grid is set you are ready to begin cutting out parts from the kit's deck and building up the superstructure.

The fastest way to cut out parts from the kit-supplied deck is with a motor tool and circular cutter. If you don't have a motor tool, use a razor saw and a jeweler's saw. Be careful when cutting—especially with the motor tool—so you don't damage any parts. Rough-cut all the parts and trim them. Remove excess plastic from under the part by running it across stationary sandpaper.

For larger parts like superstructure sections, be careful not to sand into the part. Check your work as you progress and rotate it frequently. Excess plastic on smaller parts will get paper-thin and can be easily removed with an X-Acto knife. I have had great success removing the plastic from molded detail like coiled ropes. All these small parts can be glued to the deck with white glue after the deck and parts are painted.

BITTS

You can scratchbuild bitts in two ways. The first is to select a diameter of plastic rod that comes close to the scale appearance you want. Adjust your chopper to cut the rod to the correct height of the bitts and cut the number you need plus some spares. Now cut some strip stock to the size you need for the base of the bitts. For

1/450 scale ships and smaller use .005" sheet stock, and for larger scales use .010" sheet stock. The strips should be slightly wider than the diameter of the rod, and each length should be long enough for two pieces of rod plus some excess at both end points.

Once you have finished cutting the bases lay them on a length of masking tape to secure them and attach the rod lengths to the strips using white glue. You will have to work with each rod, centering it on the strip and making sure that it is straight. When the glue is dry place a small amount of super glue around the base of each length of rod to secure it. Once the glue is dry you can adjust the height of the rods and fix any angled cuts using a Flex-I-File sanding stick.

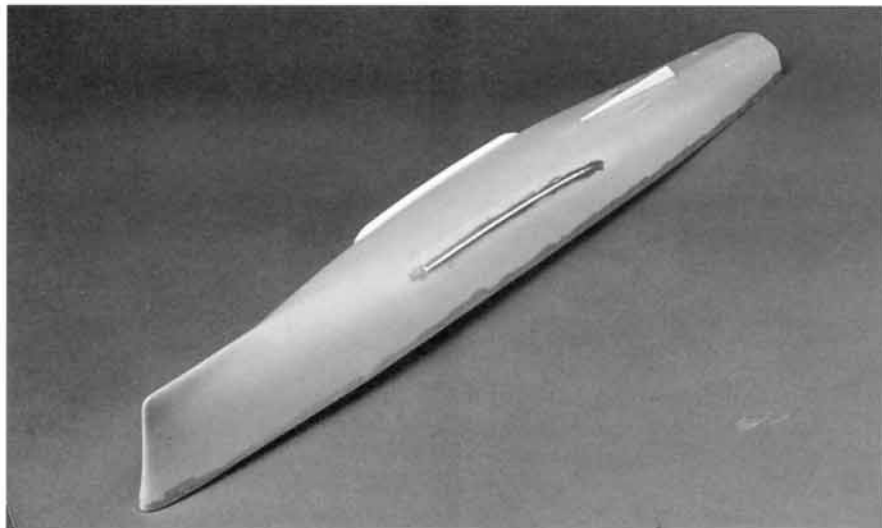
The second method is to select the rod size you want and cut the base strips. Since you will be drilling into the deck and inserting the rod into the hole, you can use either plastic or brass. Next, super glue the base strips to the deck, mark the locations on the strips where the bitts will go, and drill holes there. Use a slightly larger drill bit than the diameter of the rod so you can adjust the rod's position, and try to keep the bit as straight as possible. Next, cut slightly oversized lengths of rod with your chopper, position them, and apply a tiny amount of super glue to each rod. Sand each set of rods to the height you want and clean up the edges. This is the preferred method when you are replacing broken bitts on either injection-molded kits or resin kits.

SIDE KEELS

Some full-hull ship models do not have side keels or the keels are not very accurate. To add side keels, check your ship drawing to determine their location, length, and curve. Once you have determined the end points of the side keels, wrap lengths of masking tape around the hull at these locations. Be sure it is straight. Mark the end points on the tape on one side of the hull. Then lay a second length of tape over the first one and mark the edge of the hull as well as the end location of the side keel. To duplicate the exact location of the end point on the other side, simply lay the tape on the opposite side and mark the location. Large ship hulls may have more than one set of side keels, so be sure to mark them all.

When you have finished marking the end points, remove the tape and select a strip of Evergreen strip stock that closely approximates the thickness of the side keel. Cut a strip that is longer than you need and long enough so you can handle it with both hands. This will facilitate placement of the strip on the hull.

Start at one end and position the strip stock at the marked location. If the keel has a curve, and just about every one does, angle the strip stock slightly. Also be sure the strip stock is pointed down slightly. At this point run a small bead of super glue at the end point and let it set for a minute. Now that you have one side secure you can position the other end point and put as much of a curve into the



The complete side keels on Revell's *Buckley* will add to the overall appearance of the model. Photo by Glenn Johnson.

the Flex-I-File sanding stick will come in handy.

Once you are satisfied that the keels are shaped correctly and the seams are taken care of, paint the area with silver paint and check your work. If you find cracks add some super glue, remove the paint, and sand the area smooth. If you just have to do some additional sanding, remove the paint and sand the locations that need it.

KEEL EXTENSIONS

If your reference drawings show a keel protruding from the back half of the hull and the kit doesn't have one, you can add this detail. This usually occurs in kits that have hulls with pronounced upward curves on the rear bottom of the hull where the props, shafts, and rudder are located.

Mark the location on the hull where the keel will stop. Usually the length of exposed keel is not very long. Next, tape a long piece of thick strip stock along the bottom of the hull that is centered and extends past the end mark you made. This length of plastic will serve as an extension of the hull's bottom so you can measure the distance from where the keel starts to the mark. Transfer the mark for the keel end on the hull to the plastic strip (just eye it) and also mark the point on the strip where the keel will protrude from the hull. Now you have the length of the keel.

Next, measure the distance between the marked point on the hull and the marked point on the strip taped to the hull. This is the height of the keel at its end point. The easiest way to do this is to lay a strip of plastic at the marked point on the hull and at the mark on the strip and transfer the mark on the strip to the plastic.

Now draw two lines connecting at right angles onto the sheet stock you selected for the keel. Transfer the

The keel extension for Revell's 1/240 scale *Buckley* has been super glued into place and is awaiting a final check with the applications of some silver paint.

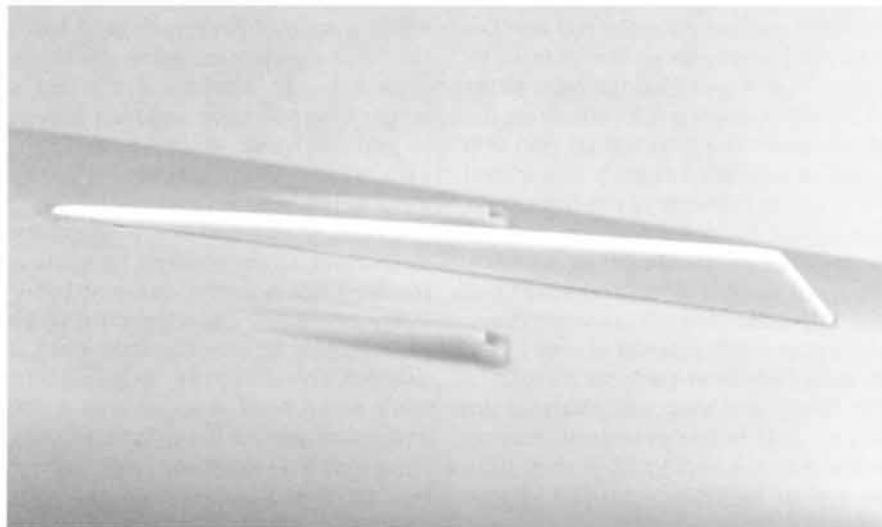
strip stock as you need simply by pushing or pulling it.

Once you are satisfied with the appearance of the strip, apply some super glue to the other end point. Be sure the length of the strip is lying against the side of the hull as you apply the glue. Once the glue has set at the end point, add small amounts of super glue to sections of the strip to secure it and then run a bead of glue along its entire length on both sides. Apply small amounts at a time and try to keep the glue along the seam so sanding will be minimal.

Once the glue has hardened cut the side keels at the end points. Be careful not to gouge the hull. If the strip stock is thick, use a razor saw to cut it down almost to where the plastic touches the hull and finish the job with an X-Acto blade. Once you have the correct lengths you are ready to shape

the ends. Use the tip of a Flex-File sanding stick to curve the ends so they appear to emerge from the side of the hull. Add a drop of super glue to each end point of the strip stock so you can feather the edge into the side of the hull. Wet-sand the line where the keel meets the hull by folding a piece of sandpaper in half and running the edge along the seam line. Balsa wood wrapped in sandpaper also works well for these locations.

Once you have removed any evidence of glue you are ready to thin the outer edge of the side keel until it has a somewhat blunt knife-edge. If you are working in scales of 1/450 and smaller you can most likely get away with not sanding the edge because the strip stock you use is going to be thin. In the larger scales the edge of the strip stock will appear flat if you don't do some contouring. Here once again



The new rudder on Revell's 1/240 scale *Buckley* looks great once it is painted. Do not forget to contour the edges of the rudder. Photo by Glenn Johnson.

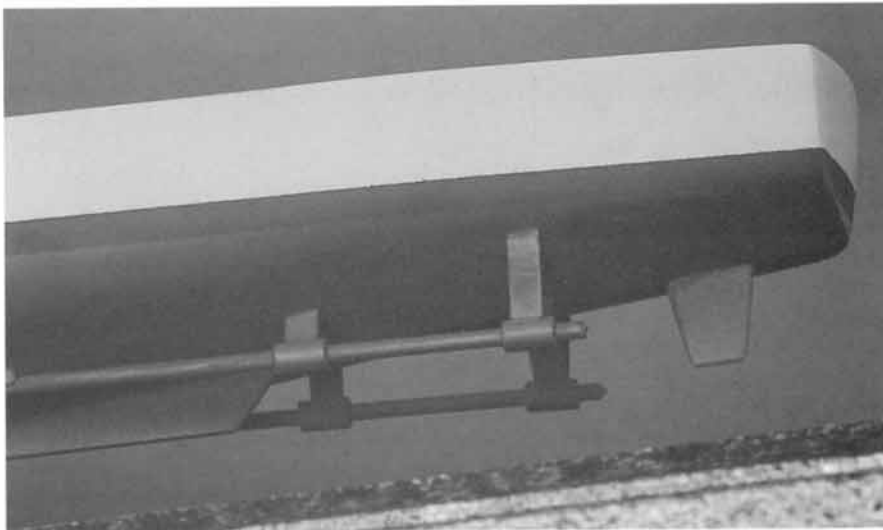
length and height measurements to these two lines and strike a third line from the end points so you have a triangle. Cut out the triangle and form-fit it into its location. In most cases the upward curve of the hull will be almost straight and the keel you cut should fit almost perfectly. You may have to form-fit it into place and cut several keel parts until you get the correct shape of the base.

When you are ready to attach the keel, position it and add a small amount of super glue. After the glue has dried run a bead around the base of the keel. Fill any small voids with quick-gel super glue. You can shape the glue with a flat-ended X-Acto blade, apply super glue accelerator, and sand and shape these areas when the glue has dried.

RUDDERS

The first step in scratchbuilding a rudder is to select a piece of sheet stock with the approximate thickness you need. There are two basic types of rudders—ones that connect to the hull by hinges and ones that connect to the hull at the base of the rudder. There are also combinations of these two basic configurations. For rudders that have hinges, draw the correct shape onto the sheet stock, cut it out, and smooth it with sandpaper. To give the rudder edges a contoured shape, run them across stationary sandpaper, rotating the edge as you move it. Next, tape the rudder to the hull and mark where the hinges are. Cut notches into the plastic using micro files and check your work as you progress. You want the notches to fit tightly, so remove small amounts of plastic at a time and form-fit the rudder into place.

If the base of the rudder connects to the hull you must first cut the correct angle at the base of the rudder so it will fit tightly. Once you have cut the correct angle, draw the sides and cut them. Tape the rudder to the hull so you can draw the correct angle for the top of the rudder. The free end should be parallel with the keel. The simplest way to get this angle is to tape the



rudder to the hull and then mark the line. Once you have drawn the line, cut the plastic, shape the edges, and contour the sides. Some rudders have odd angles to them and reproducing these is easy once you get the basic configuration cut.

SHAFTS AND V STRUTS

Some kits don't have accurate propeller shafts and V struts. Scratchbuilding new ones is easy, but requires some good eye measuring. When building new shafts, the most important pieces of material you need will be two sizes of tubing, one of which will slide tightly over the other. Evergreen Plastic Products and K&S engineering, which produces fine brass shapes, market tubing and rod sizes for these applications. The smaller tubing will be the shafts and larger tubing will form the bearing housings that connect to the shaft V struts.

Pick sizes of tubing that appear to be in scale with the model. I usually try to use brass tubing for shafts and plastic tubing for the bearing housings. Brass is good for shafts because of its strength, and plastic rod makes a good place to glue the struts, which are also plastic, to the bearing housings. Sometimes you cannot get a set of brass and plastic tubing to match for one reason or another, but you can usually get plastic tubing and rod sizes to match.

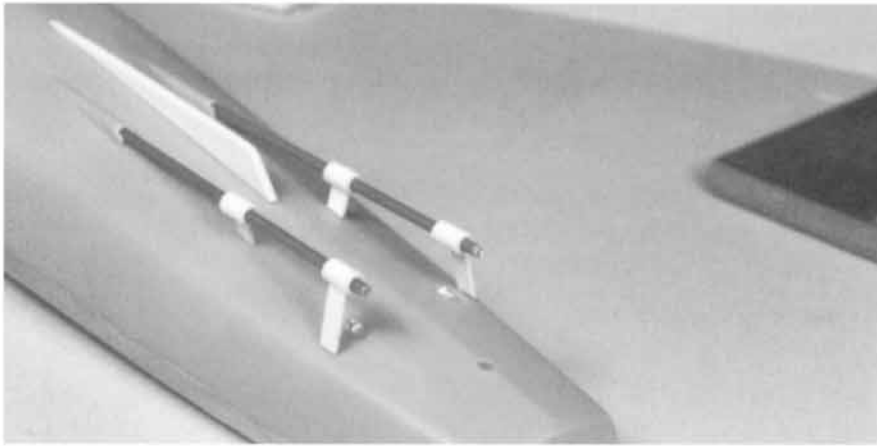
Next, drill holes into the hull protrusion housing where the shafts emerge so you can slide the tubing into the hull. When you do this, use a drill bit that is slightly larger than the

diameter of the shaft and always angle the hand drill as close to the hull as possible. Be sure to drill along the line the shaft forms as it protrudes from the hull. Once you have drilled the holes, insert the shafts and check their position.

At this point, mark the lengths of the shafts and cut them. Next, be sure the propellers fit over the shafts. Model kits usually have smaller shafts than are needed so you usually have to drill slightly larger holes into the propellers to accept the new shafts. Now you are ready to cut the bearing housing, but before you do, select the size of flat plastic stock you want to use for the V struts. Chances are you will need to cut the flat stock to the required V strut width, and the chopper is the perfect tool for this. The bearing housings are usually slightly longer than the width of the V struts and the struts are usually centered on the housings.

Cut the correct lengths of the bearing housings using the chopper so they are all the same length. I usually cut more than I need so I have spares. Next, slide the bearing housings over the shafts, position them in their correct locations along the shaft's length (consult your documentation and drawings), and apply a small amount of super glue to the end of each housing. Be sure the shafts are set correctly in the hull protrusion before you glue the bearing housings in place.

Once the glue is dry you are ready to set the distance of the shaft from the hull. Use a small piece of balsa wood to set the height of the shaft, then tape the shaft and balsa wood



In ensure that the V struts will look the same, work on one set at a time. Here the outer struts are installed and it's time to start measuring and cutting the inner ones.



Scratchbuilt shafts and V struts, a scratchbuilt rudder, and an accurate keel have greatly improved the appearance of Revell's 1/240 scale *Buckley*. Photo by Glenn Johnson.

securely in place above the hull. Now form-fit the V struts in place. Once you get a length set, cut another one the same length and with the same angles cut at the ends so you will have matching pairs, one for each shaft. Usually the inner and outer V struts of each shaft are of different lengths, but this depends on the shape of the hull. Once you get a set of struts cut, glue them in place and duplicate your work on each shaft location. In other words, if you cut the outer V strut lengths, first glue them in place and then measure, cut, and glue the inner lengths.

The tricky part is ensuring that the angle formed by the V struts that

connect to a bearing housing is the same on all shafts. Be sure that as you look down on the shafts the positioning of the outer and inner struts is the same. If you have secured the shaft with balsa wood and masking tape it should be secure enough so you can set a strut in place without gluing it. Once you are satisfied that a strut is positioned correctly, apply a small drop of super glue where it meets the bearing housing. Once you have them all glued you can remove the shaft and run a bead of super glue around the perimeter of the connection between the struts and bearing housing. This will provide an excellent contour

shape for the connection point. After the glue has dried, carefully sand the edges of the struts with a Flex-I-File sanding stick so they appear contoured. Don't glue the shaft assemblies to the hull until you are ready to paint the hull and mount it on its display stand. These parts are easily damaged, so plan your work carefully.

Finally, when you are ready, glue the struts to the hull with super glue. Then fill in the cracks and contour the connection point with Elmer's white glue. Don't use sandpaper here because the struts are very thin and can easily break.

SHIP RAILS

If your ship model is a large scale like Glencoe's *USS Oregon*, Revell's *USS Ward* or *Buckley*, or one of Nimicho's 1/200 scale ship series, adding individual stanchions and stretched sprue or thin wire for railings will greatly enhance it. Review your documentation to identify the locations of all railings. Determine also how many stanchions there are along a particular length and how many rows of horizontal lines there are to each railing.

All steel-hulled ships with wooden decks have a pronounced section of steel between the outer edge of the hull and where the wood starts. This is where stanchions are generally located. Set the spacing between the stanchions and ensure that each is centered along the steel section of the deck. If the ship has a steel deck you only have to make sure each stanchion is set back the same distance from the edge of the hull. This is also the case for railings on the decks of the superstructure.

Locating stanchions. Before we start on the specifics of installation let's talk about some approaches to locating the stanchions. This depends on where they are being installed. To set the distance from the edge of a deck, whether the stanchions are located on the main deck or the superstructure, cut long thin lengths of masking tape and lay them along the deck. The edge of the tape facing the deck will define the locations of the stanchions, so it should be set back some small distance from the edge of the deck. As you lay it you can eye the distance from the edge. It is important to set the beginning point of the tape at the correct

distance from the edge of the deck, since this will define the distance of the entire length of tape. Be consistent in your measurements with all railing lengths.

For curves, areas where there are only a few stanchions, or where taping is difficult, mark the location of each stanchion and eye the distance from the edge of the deck. Chances are you will get pretty close, and on these small lengths or on curves you won't detect any inconsistencies.

If you are working on a model with a wood deck with a pronounced section of plastic between the edge of the hull and the scribed wooden deck, you can measure the distance from the edge using a ruler with fine incremental measurements on it. This is faster than laying masking tape, although it generally only works on the main deck where you have room to maneuver the ruler. Mark the locations of each stanchion before you center them along this strip of plastic. On the upper superstructure decks you will still have to use masking tape or your eye to set the distance.

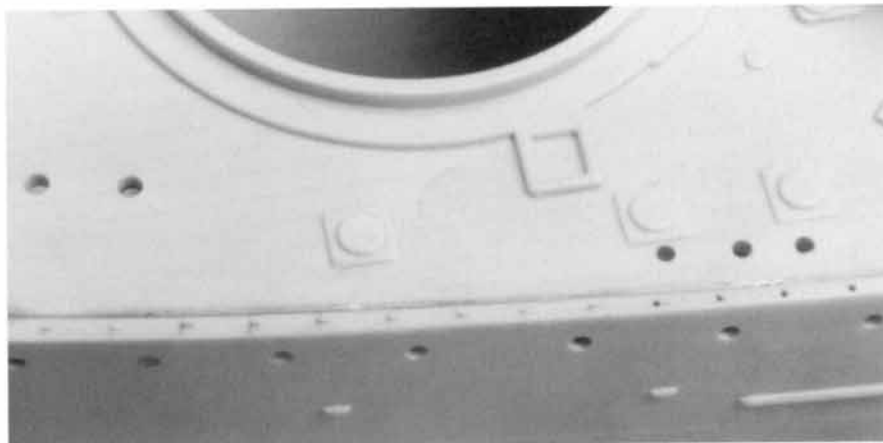
Whether or not you have documentation showing how many stanchions there are along a length of railing, the technique for marking them is the same. If you know how many there are, measure the length of railing and divide by the number of stanchions. The result is the distance between each stanchion.

Mark the beginning and end points of the length you measured so you have a starting point from which to measure increments between the stanchions, and account for any ladder locations. Take a set of dividers and set them to the incremental distance and then, starting at one end, walk the dividers along the railing length, marking the points as you go. You may want to do a practice run first. If you do not know how many stanchions there are, take a guess and divide this number by the length and mark them. Once you have the locations marked, indent each with a needle. This will serve as a pilot hole for the drill.

Making stanchions. Select the diameter of rod for stanchions that appears to be in scale with the model. Both plastic and brass rod work well, but I like to use brass because it is stronger. Once you have made your selection,



The scratchbuilt railings on Revell's *Buckley* are a marked improvement over the kit-supplied deck inserts. Photo by Glenn Johnson.



If you do not ensure that the railing stanchions are centered along the lip of the hull, the railing lengths will appear wavy once you have installed horizontal lines.

pick a drill bit slightly larger than the diameter of the rod. This is important because the holes you drill will not be set at a perfect 90-degree angle to the deck, and having a slightly larger hole will allow you to play with the position of each stanchion. Before you begin drilling on the model, test the bit and the rod to ensure that you have selected a bit large enough to allow you some play.

Since you are going to do a lot of drilling, use twist drill, which will allow you to complete the work in just a few minutes. If you are using a pin vise it's going to take a while. You don't need to drill more than $\frac{3}{16}$ " for each hole, and as you get some experi-

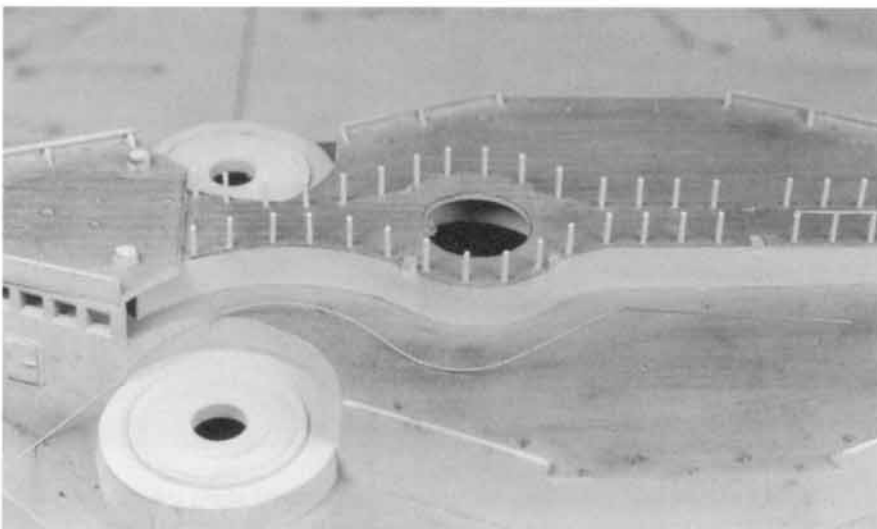
ence at it you will know how many turns on the drill you need for the proper depth.

Next, paint the rod the correct stanchion color—usually gray—and begin cutting the rod. Don't worry about cutting the lengths to any proper size. You want them to be oversized because the holes you drilled are not constant in depth and longer pieces of rod are easier to handle and adjust. I usually mark the size stanchion I need on a piece of masking tape that has been taped to my work bench. I then begin cutting lengths of rod until I have the correct number.

If I am using plastic rod I place a puddle of white glue onto a piece of



Set the stanchion anvil against the stanchion, lay a set of wire cutters flush against the top of the measurer, and snip off the excess length of stanchion.



Add curves and bends to the same length of wire and then glue it into place if you have room to work with it.

paper, pick up a stanchion with a set of tweezers, dip one end in the glue so a small amount is on the tip of the part, and place the stanchion into the hole. I position it straight from left to right and from front to back. You will need to get at eye level with the stanchion and look at it from the front, side, and top. Once you position the first one correctly, place the others using the first as a guide. If excess white glue puddles at the base of the stanchion, remove it with the tip of a toothpick. The glue will not set for a minute or two so you have time to position the

part and adjust if necessary. Start at a location where there is a superstructure section and line the stanchion up with it visually.

If you are using brass wire I recommend Duro's thick-gel super glue. Squeeze some onto the paper and dip the end of the stanchion into it. You only need a minute amount. Insert the wire and adjust as necessary. The glue will set in a few minutes so you have time to position the stanchion. Be sure to account for bow and stern areas that sweep upward as you install and position them.

Once all are in place check the entire row from the front, side, and top. If you find any incorrectly positioned simply pull them out and reset them. This is easy to do with stanchions set with white glue, but brass wire can be difficult to remove if set with super glue. Once the glue has set and you are satisfied with the position of each, you are ready to trim them. To get a consistent height for each, make a simple measuring device I call an anvil. Cut a length of square plastic stock to the height you want the stanchions to be and glue a long handle to it made from the same size stock. You now have an anvil you can position next to each stanchion. When you do this be sure it is resting flat on the deck. Take a pair of small electronics cutters, position them so the cutting edges are flush with the top of the anvil, and cut the stanchion.

Once you have cut all the stanchions, use a flat micro file to flatten the tops and remove burrs around the rim. To hold the stanchion steady while you file, secure it with tweezers with the ends wrapped in masking tape. The tape will help hold the stanchion and protect the painted surface. When you are done filing a length of railing, check to make sure all the heights match. Sometimes you will find one or two that are taller—simply cut or file them to size.

Horizontal bars. Once you have finished the stanchions you are ready to add the horizontal bars. You can use either stretched gray sprue or brass beading wire for this. I prefer brass beading wire because it will give you perfect bends and curves and is a constant diameter. If you use this, stretch it using two needle-nose pliers. As you pull the wire straight you will feel it stretch a bit and then become stiff. Carefully release it and cut the ends.

At this point the process of measuring and bending lengths of wire to fit lengths of railing is similar to shaping and cutting photoetched railings. You measure a length, apply any bends needed with a set of flat-nosed pliers, or make curves with a dowel slightly smaller than the diameter of the curve required. If you are applying the wire along a deck with a lot of room, you can measure long lengths and add curves and bends to the same continuous length. When you are

working in tight locations you may have to apply the wire in sections if you have bends and curves. In other words, you apply the curved area and then add the straight lengths. This calls for careful measuring, cutting, and gluing so the finished product looks like one continuous length.

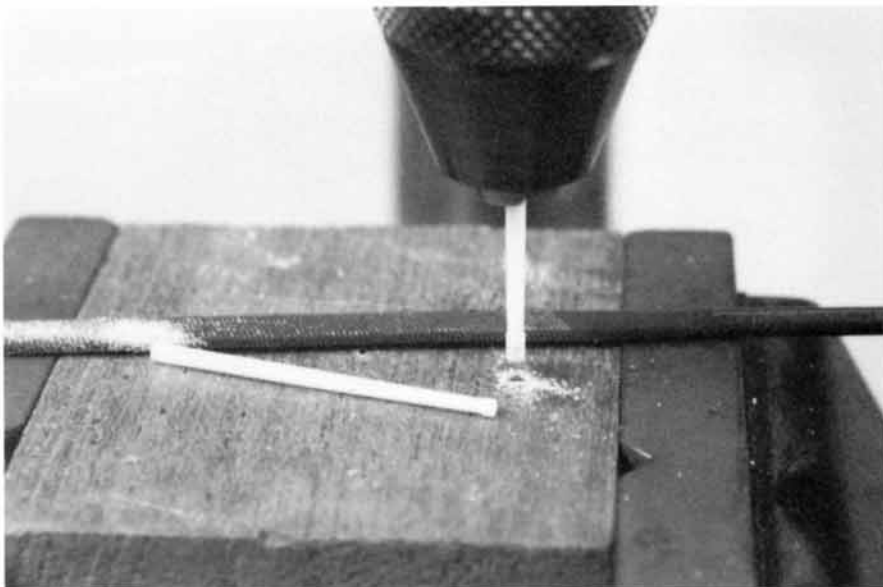
When you apply the wire, do the top length first and work down to the lower rows. The top rail will add strength to the stanchions and give you a guideline for the lower rows. I use white tube super glue. The wire will bond to the stanchion almost immediately, and once you get two or three stanchions set the rest go quickly. I find it easier to adjust the wire along a length of three or four stanchions, apply a drop of super glue at the end, and go to the next section. Once the wire is set I go back to finish gluing all the stanchions. After I finish a length I trim the ends and proceed to the next row.

If you have a ladder between two stanchions, glue the entire length and then go back and cut the wire from this location. Don't worry about cutting and measuring exact lengths of wire. It's only important to ensure that bends and curves are in their correct locations. Excess wire hanging from a stanchion can be trimmed with wire cutters.

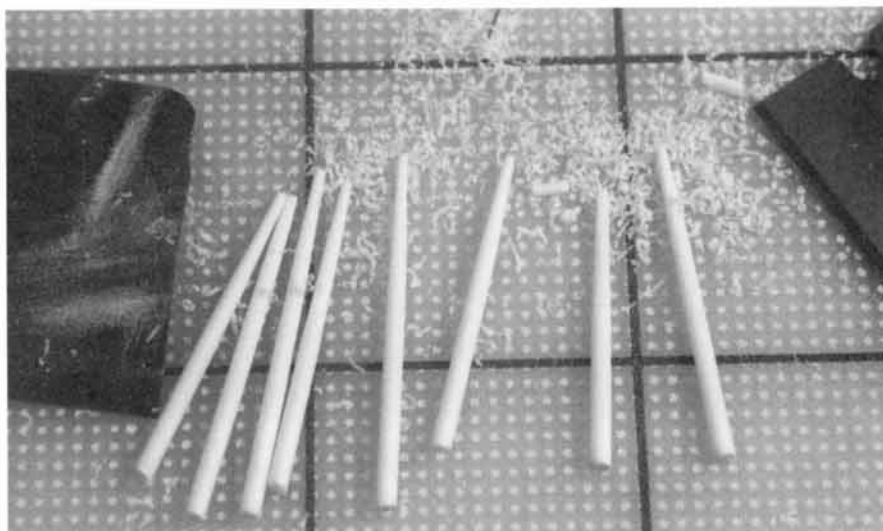
Once you have installed all the horizontal rows on a length of railing, paint the wire using a small flat brush. I like to use the same thinned paint that I airbrushed the stanchions with. It goes on smoothly and a little paint on the brush goes a long way. Be careful not to splash any onto the deck—this is easy to do when painting a small part with thinned paint.

GUNS

Sometimes ship kits have guns you just have to toss in your parts bin. In these instances, or when you want to configure a ship as she appeared at some point in her service life and you can't find guns in the scale you're working in, you have to scratchbuild them. Believe it or not, scratchbuilding guns is easy and it can even become addicting. Get some pictures and drawings of the guns you want to make. If you can't get drawings, at least get a few pictures so you can sketch it out. Single small-caliber guns



If you have a Dremel drill press you can make a simple lathe using a block of hardwood for the base. To taper the rod use a micro file to work the plastic down and then smooth it with a Flex-I-File sanding stick.



These plastic rod lengths were tapered by rolling them across the workbench while scraping them with a single-edged razor blade.

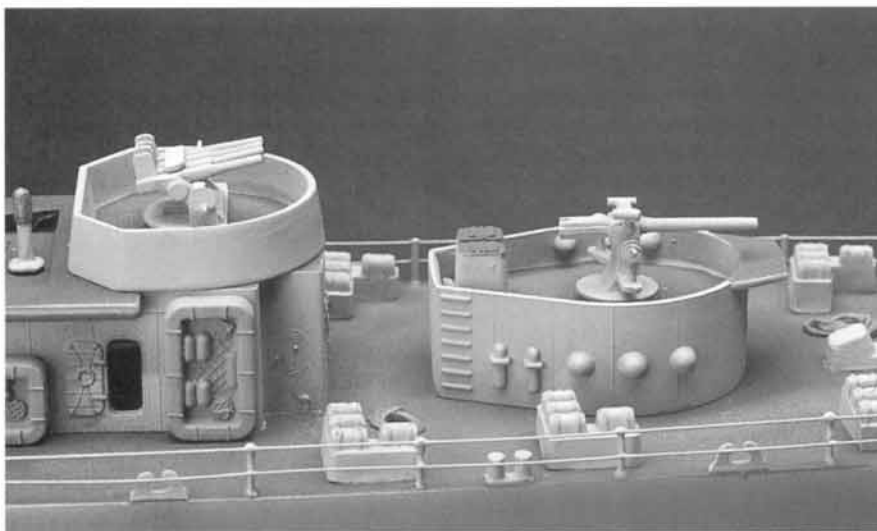
consist of a barrel, a breech assembly, a stand, and a base. With a little creativity and some Evergreen sheeting, rod, and strip stock you can make just about anything.

Determine what size rod will closely approximate the scale size of the gun barrel. Once you select a size you are ready to taper it down. There are two ways to make tapered gun barrels from plastic rod. The first is to roll the rod across your work bench and,

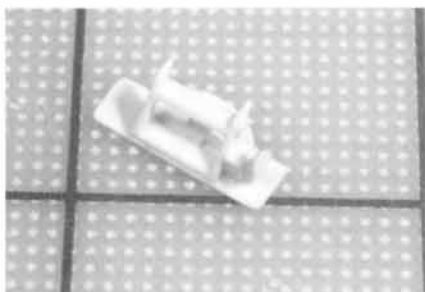
as you are rolling it, scrape layers of plastic off using a single-edged razor blade. This is the simple way and you can achieve good-looking barrels, but it takes some practice and you have to remember that not every one you make will be usable. The secret is to scrape and roll at the same time and add more pressure as the blade gets to the end of the rod length. When you have completed a barrel, smooth out the plastic by wrapping some 400-grit



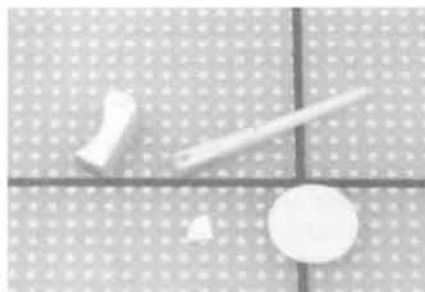
Simply cut the railing from the locations of your ladders. This is easier than trying to install minute lengths of railings cut to exact lengths.



Scratchbuilt guns are easy to make and add a major element of realism to a ship model. Photo by Glenn Johnson.



After assembling the 1.1-inch quadruple machine gun base, add small shapes of plastic to represent gear boxes and piping.



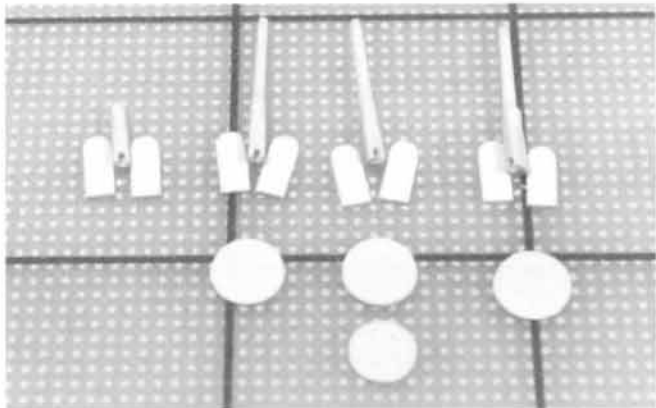
The basic parts of a 5-inch gun are base, gun barrel, and stand. Make the curve in the stand by running it across sandpaper wrapped around a small dowel.

sandpaper around the barrel and rotating the rod while pulling it out from the sandpaper at the same time. Work up to 600-grit sandpaper so the plastic is very smooth.

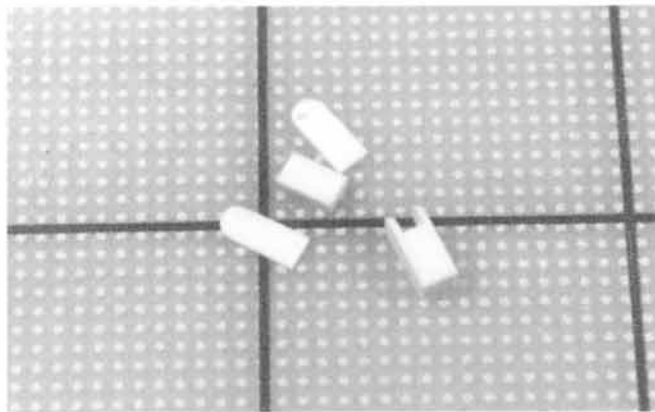
The second method, which is more precise, is to set up a simple lathe and use files to create the taper. To make the lathe, drill a hole with the same diameter as the rod into a small hardwood block and set the block into your Dremel drill press vise, making sure it sits flat. Insert the plastic rod into the chuck of the motor tool and clamp the motor tool into the drill press stand. Position the vise so the plastic rod is set into the hole you drilled into the hardwood. Be sure the rod is not skewed to one side. I also recommend you not have more than 1" to 1½" of plastic between the drill chuck and the hardwood base, as longer pieces tend to distort and break while the rod is rotating.

Set the motor tool to its lowest speed, and while you are holding the vise in place, with one hand run a micro file down the rod toward the vise, adding a little more pressure as you get closer to the vise. This filing will generate a lot of heat, so don't keep the file in contact with the plastic for more than a few seconds at a time. As you shave off layers you will notice that the tip of the plastic will become thinner than the hole in the hardwood base. Don't push too hard on the plastic with the file or you'll break the rod. To smooth the plastic, touch the rod with the pad of a Flex-I-File sanding stick as it is rotating.

When you have finished the barrels, cut them to length and make the breech assemblies. I use square stock slightly larger than the barrel to make them. I strike a line on all four sides of the stock and scrape forward of the line along the edges with a number 11 X-Acto blade so the strip changes from square stock to round stock in that area. I cut the stock to the length of the breech, glue the breech to the barrel with super glue, and gently sand the glue joint to remove the seam and contour the area. The trick here is to make sure the breech and barrel are straight. Use Testor's glue to position the two pieces, and once they are straight apply a small amount of super glue to the seam area. To cut the breech opening where the shell is



Make the breech for each one of these barrels from a square length of stock with rounded corners. Then glue the barrel and the breech and sand the seam line smooth with a Flex-I-File. Make the notches for the breech openings using a number 11 X-Acto blade.



Gun stands are nothing more than small lengths of plastic sheeting that were shaped and then sandwiched together.

inserted I notch the plastic with the tip of a number 11 X-Acto blade.

Next you need to make the gun's stand and its base. I use layers of sheeting sandwiched together. Cut out the general shape of the stand, but don't worry about any curves the stand may have. You'll need to cut out two large end pieces and several smaller sections to form the center that the breech will rest on. Glue the parts together with super glue and also run a bead along the seam lines of the layers to seal them. When the glue is dry run the part across stationary sandpaper to smooth the surfaces. If the stand has curves in it, and most stands do, you can duplicate this by wrapping sandpaper around a wood dowel with the diameter you want and then running the areas where the curves will be across the sandpaper. You can also wrap file handles with sandpaper for small diameters.

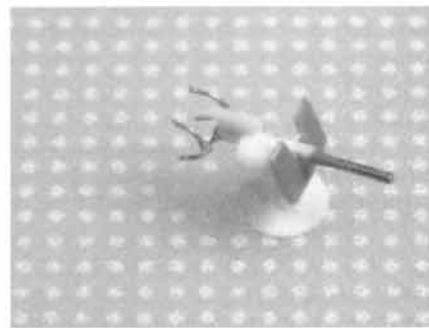
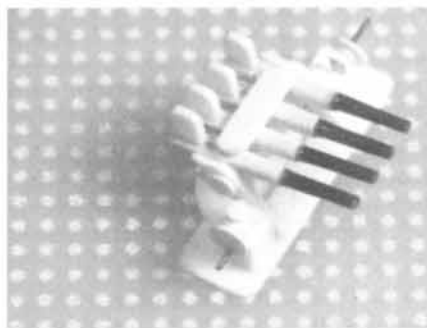
The next step is the base. For a round base use a Waldron punch tool for small disks and a circle template for larger disks. To use the template, draw a circle with the diameter you need onto sheet stock. Next, rough-cut the circle from the sheet stock. Now take a single-edged razor blade and make a series of straight cuts—called tangential cuts—along the edges of the circle. The more cuts you make the closer the shape will be to a circle.

When you have finished making the tangential cuts, sand the edge of the circle smooth using a Flex-I-Pad sanding stick, and rotating the disk as you sand. As you work your way around the circle with the pad the edges will become rounder. If the base has curved and straight sides, simply cut a small section of the circle and glue it to a square base. You can achieve any shape you want if you just draw the outline of the base and deter-

mine what shapes must be glued together to make the base. If you glue small sections together, run the completed base over sandpaper to smooth out seams.

Mount the stand onto the base and glue the gun barrel in place. Generally, the stand attaches to the gun barrel where the breech starts to change to a round shape. Be sure the notch you cut into the breech faces up.

Now you are ready to add small details like pedestals for the elevations and rotation disks and stands, recoil tubes, ammunition magazines or clips, and shell storage stands, all of which can be made from Evergreen's round and strip stock. Remember when making these parts that they only have to have the general shape of the part you are representing. You can make small disks with Waldron's punch tool, and small duplicate shapes with your chopper.



These scratchbuilt guns will be added to Revell's 1/240 scale *Buckley*. Once they are painted and weathered they add an unmatched level of realism to this large scale kit.